Section: Paediatrics

Original Research Article

EVALUATING DELAYED PATIENT DISCHARGES IN THE PEDIATRIC INTENSIVE CARE UNIT: A RETROSPECTIVE OBSERVATIONAL STUDY

Ramaning Loni[1], Mohamed Abduljalil Alawadhi[1], Abdulaziz B Aldoseri[1], Arundhati P Varma[2], Gabriel Fox[1], Ittrat Abbas[1], Fatima Alqanea[1], Sandhya J Kadam[3]

[1]King Hamad University Hospital, Bahrain
[2]Medical Student, Royal College of Surgeons in Ireland, RCSI, Bahrain
[3]Department of Pediatrics, Family HealthCare Network, Visalia, California, USA

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Corresponding Author:
Dr. Ramaning Loni,
Email: raj2031979@gmail.com

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ABSTRACT

Background: The delayed patient discharge from the hospital, particularly from the Pediatric Intensive Care Unit (PICU), can create considerable challenges for patient management, affecting healthcare delivery and family well-being. This study focused on understanding the incidence of delayed discharges, analysing contributing factors, and evaluating disposition outcomes related to delayed patient discharges within our department. **Materials and Methods:** This retrospective cohort study reviewed the data of patients discharged from our PICU Unit between January 2022 and October 2024. Key variables included age, sex, diagnosis, admission time, discharge planning details, length of stay in the unit, and reasons for delayed discharge. **Result:** Of the 550 children analyzed, 79 (14.4%) experienced delays exceeding 180 minutes. The median age of the children was 23.5 months; 54% were female and 46% were male. The median length of the stay was 3 days, and the median delay was 296 minutes. The primary reasons for delays included bed crisis (48%), nursing handover/changeover with bed preparation (40%), and waiting for caregivers (9%). Delayed cases primarily involved pediatric patients (78%). **Conclusion:** Though the discharge delays experienced by children with critical illness in the PICU were low, they can have significant healthcare consequences in terms of operational efficiency and treatment outcomes. In ascending order of contribution to the delays in the PICU were bed shortages, nurse shift changes, waiting for parents or caregivers, re-assessment, and waiting for PCR results. The findings support a need for quality improvement efforts to reduce discharge delays and enhance patient safety and healthcare quality.

INTRODUCTION

Discharge planning is a comprehensive approach that commences at the time of admission for patients receiving unplanned treatment or even before those scheduled for elective procedures. It encompasses an integrated method that ensures safe and prompt patient discharge for patients transitioning from one care setting to another, enabling a seamless shift adhering to the continuity of care plan, failure of which often triggers poor handover and delayed patient discharges.[1] Typically, a delayed patient discharge is defined as when a patient is prepared for discharge or transferred to another service but stays in the hospital bed. Delayed discharges directly imply operational efficiency and treatment outcomes in patient care. A clinical or multidisciplinary decision confirming preparedness and safety for discharge or transfer classifies a patient as having delayed patient discharge or transfer. Patients may need to wait due to a range of factors, such as for an assessment by a member of a multidisciplinary team, the commencement of a community care package, funding for placement in residential or nursing care, or a vacancy (bed availability) in residential/nursing care.[2] The National Accreditation Board has set a standard of 180 minutes to complete the discharge process for Hospitals and Health Care Organizations (NABH). These metrics aid hospitals in monitoring and enhancing their discharge procedures, ensuring prompt patient care and efficient resource use.[3]

Waring et al,[4] highlighted that hospital discharge works as a complex network, characterized by interdependent interactions among diverse health and social care entities that can be improvised through several proposed modifications such as appointing discharge coordinators as knowledge

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mediators, promoting the physical proximity of stakeholders like ward coordinators to foster better collaboration, cultivating a local culture that values teamwork and ensuring that organizational resources align with these goals. Delays in patient discharge can lead to a cascading effect, such as an increased risk of hospital-acquired infections and loss of mobility and cognitive function.[5] Factors contributing to this phenomenon in the PICU include medical instability, logistic challenges, social issues, and administrative barriers. Establishing a standardized patient discharge-planning process, enhancing senior oversight, and fostering both interdepartmental and intra-departmental communication could contribute to better patient flow.[6] Kirk et al,[7] highlighted several risk factors associated with high mortality rates in pediatric patients who had critical illness. The greater severity of illness at the time of admission, oncologic or pre-existing comorbidity, requirement for organ support therapies, incidence of nosocomial infections, and bloodstream infections were all predictors of mortality among the long-term patients in the PICU. Preventing modifiable risk factors like nosocomial infections may reduce mortality rates in this high-risk population of patients with critical illness. Logistical issues are the principal factors that cause delayed patient discharges. The availability of beds in general pediatric wards plays a crucial role in expeditious PICU discharge. Similarly, delays increase hospital costs owing to extended resource usage during the PICU stay. Studies indicate that the fixed care costs in the PICU are 3.8 times higher than variable costs. Critical illness, prolonged ICU stay, and mechanical ventilation are associated with increased expenditure.[8] Additionally, a prolonged PICU stay can lead to increased stress in families, affecting their satisfaction with the care provided. High-stress levels can impede decision-making about post-discharge care plans.[9]

This study explores the multifaceted issue of delayed patient discharge from the PICU and its broader implications for healthcare delivery. This study aims to provide a comprehensive exploration of delayed patient discharge in the PICU and develop evidence-based strategies to improve efficiency, treatment outcomes, and overall hospital performance by addressing these areas. Since most of the earlier studies have been focused on adult medical and surgical wards, and there is a dearth of earlier research on delayed discharges from pediatric ICUs in Bahrain, the study aims to enhance the quality of healthcare delivery in the PICUs in Bahrain.

MATERIALS AND METHODS

This retrospective cohort study was conducted in the PICU of King Hamad University Hospital, Bahrain. We reviewed patient records from January 1, 2022, to October 31, 2024, for all delayed patient discharges to understand the occurrence of delayed discharges, reasons, and disposition outcomes. The ethical committee approval number is RMS-KHUH/IRB/2024-875. A delayed patient discharge is defined as a situation where a patient, although medically cleared for discharge or transfer to another service, remains in a hospital bed for more than 180 minutes beyond the standard discharge time, as outlined by the National Accreditation Board.

The Bahraini healthcare system consists of both public and private providers. Public hospitals may experience more delayed discharge due to increased patient loads and limited resources than private facilities. Therefore, the occurrence of delayed discharge during a specified duration was analyzed by investigating the medical, administrative, social, and logistical elements that contributed to it.

Inclusion and exclusion criteria

The study cohort included all children aged one week to 14 years admitted to the PICU and later discharged or transferred from the unit. However, 49 children with chronic health conditions requiring long-term or recurrent admissions and 51 children, of whom 75% of the essential data, such as demographic details and clinical history, were missing, were excluded from the analysis. There were 12 children who died in the standard discharge group.

Data collection was facilitated through an extensive review of electronic medical records (EMR) retrieved from the study setting (KHUH)Healthcare Information System, ensuring a robust database for evaluation. Trained personnel used standardized forms for correct data abstraction and flagged discrepancies for further investigation.

Key variables collected included: age, sex, and ethnicity as demographic information; length of stay and final diagnosis as clinical data; planned versus actual discharge dates/times as discharge details; availability of community resources, bed availability in the ward, and nursing changeover time as influencing factors. Sample size determination relied on preliminary departmental data about delayed patient discharges, including estimated proportions, as a baseline for expected incidence variability within the study population. The sample size was calculated based on the total number of discharges that met the predetermined inclusion and exclusion criteria. Targeting a statistical power of 80% ($\beta = 0.2$) at a confidence level of 95% ($\alpha = 0.05$) ensured the reliable identification and control of Type I (false positive) and Type II (false negative) errors concerning primary outcomes related to delayed patient discharge incidence. 650 admissions and discharges were made during this period, including mortality.

Statistical Analysis:

The data was statistically analysed by using the SPSS version 27.0 software. Descriptive statistics were as follows: categorical variables were

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presented using frequencies/percentages, while continuous variables were reported utilizing medians/interquartile ranges. Primary reasons for delayed patient discharges were found without performing inferential statistical tests, as formal hypothesis testing was not conducted for continuous variables.

RESULTS

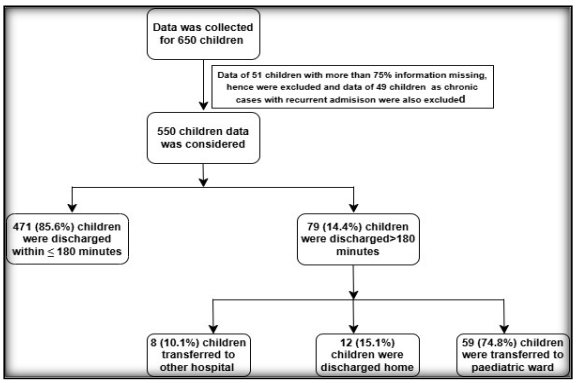

Figure 1: Flowchart showing discharge process.

Data was collected for 650 children, of which 100 were excluded under the exclusion criteria. Our study results are as follows: Of the 550 discharged children, only 471 were discharged within< 180 minutes [Figure 1].

Therefore, 79 (14.4%) were considered for analysis because their discharge time exceeded 180 minutes after the issuance of the discharge plan. Out of 471 children (85.6%) who were discharged within the stipulated period, 12 children died. The median age of this sample was 23.5 (IQR 6-78.75) months, with approximately 54.4% being female and 45.6% being male. The median length of hospital stay was 3 days (IQR 1-6). The median time to delayed discharge was 296 (IQR 223-415) minutes.

Table 1: Descriptives of children with delayed discharges (n=79)

Demographics	**Median/ n (%)**
Median Age (months)	23.5 (IQR 6-78.75)
Sex	
Male	36 (45.6 %)
Female	43 (54.4 %)
System	
ENT	4 (4.1%)
General pediatrics	62 (78.5%)
General Surgery	3 (3.8%)
Neurosurgery	3 (3.8%)
Pediatric hematology	1 (1.3%)
Pediatric neurology	1 (1.3%)
Pediatric surgery	5 (6.3%)
Median length of hospital stays (days)	3 (IQR 1–6)
Median delayed discharge in minutes	296 (IQR 223-–415)
Reason for delay	
Bed crisis	38 (48%)
COVID PCR result	1 (1.3%)
Reassessment and physician handover	1 (1.3%)
Waiting for parent/caregiver	7 (8.9%)
Nursing handover/changeover with bed preparation	32 (40.5%)

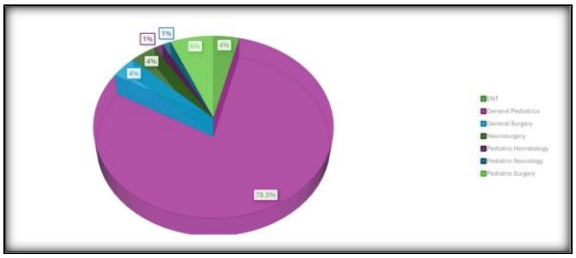

Figure 2: System distribution of delayed discharge cases

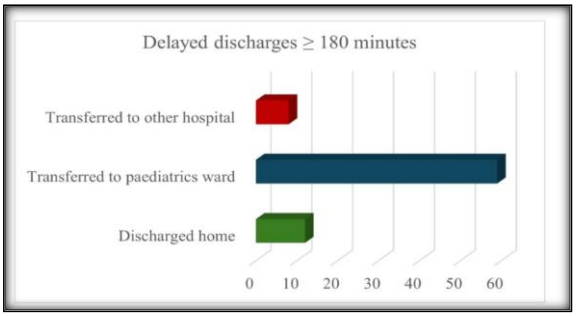

Figure 3: Outcome of patients discharged >180 minutes.

Most of the delayed discharge cases were general pediatric cases (78%), followed by pediatric surgery (6%) and ENT cases (4%) [Figure 2].

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Of the delayed discharge cases, the hospital transferred eight (10.1%) children to another hospital, discharged 12 (15.1%) directly to home care, and transferred 59 (74.8%) to the pediatric ward [Figure 3].

Among the delayed discharge cases, most of children, 59 (74.8%) to the pediatric ward, (12 (15.1%) in home discharges, and eight (10.1%) of the delayed discharge cases resulted in transfers to other hospitals.

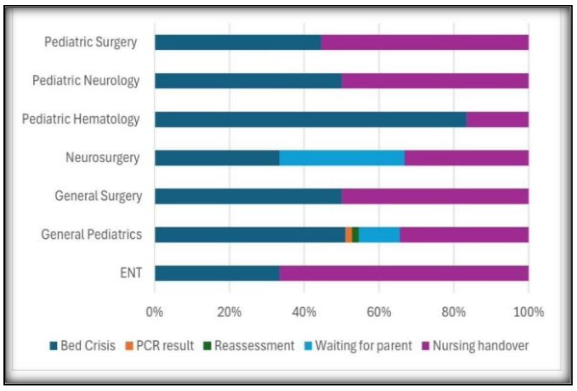

Figure 4: Reason for delayed discharge across various systems.

About half of the delays in discharge (48 %) were due to bed crisis, followed by nursing handovers/changeovers with bed preparation (40.5 %), and waiting for parents/caregivers (8.9%). The number of delays due to delay in physician handover or transfer, or discharge summary preparation with reassessment, and waiting for the COVID PCR test were 1.3% each [Table 1 and Figure 4].

DISCUSSION

The research highlights that patient discharge delays experienced by children with critical illness in the PICU were low. This observation raises notable concerns for healthcare providers striving to enhance operational efficiency in pediatric care environments. The incidence of bed blockage at 14.4% [Figure 1 and Table 1] in our study is higher than that reported in a Canadian study,[10] which found rates between 8% and 10%. However, it is lower than the 18%–28% rate of delayed discharges noted in an Australian study.[11] The age of children experiencing delayed discharges (IQR 6-78.75) [Table 1] suggested that younger patients are particularly susceptible to extended wait times before leaving the hospital. This finding confirms earlier studies showing that age-related factors, such as lower vaccination rates and increased distance from healthcare facilities, may contribute to higher hospitalization rates.[12]

Our analysis shows a discharge delay (IQR: 223-415) [Table 1], which is comparable to other studies.[13] From an Indian perspective, Mundodan et al,[14] in Kerala reported an average discharge duration of 5 hours and 41 minutes (341 minutes), with durations ranging from 181 to 392 minutes. Factors such as staff shortages, high patient volumes, inadequate bed availability, and lack of telemedicine integration worsen this issue, resulting in compromised care quality and negative patient treatment outcomes, primarily because of administrative inefficiencies or systemic problems such as bed shortages and overcrowding.[15]

In addition, the findings revealed that general pediatric cases were a substantial proportion (78%) of delayed patient discharges [Table 1 and Figure 2]. This aligns with the existing literature, suggesting that inpatient general wards often meet logistical difficulties that lead to longer lengths of stay. Delays in transferring patients to the PICU can be mitigated by early evaluation, prompt communication among team members, and adequate preparation. All personnel involved early in the process should minimize unnecessary bed blocking by giving proper attention to each step from clinical decision-making to the actual transfer. Standardizing transfer protocols can reduce the length of PICU stay, which is a desirable outcome.[16] This suggests underlying systemic challenges within pediatric healthcare settings that call for further investigation, particularly because general pediatrics often manage a wider range of conditions and complexities than specialized surgical or ENT cases. About the data presented, nearly half of all delay cases [Table 1and Figure 4] were primarily linked to "bed crisis," a common issue in many hospitals grappling with capacity management during peak admission times. The availability of beds in general pediatric wards plays a crucial role in expeditious PICU patient discharge. One approach to address the issue of limited bed availability is to minimize unnecessary delays in the discharge process. This can help decrease the number of patients occupying beds without legitimate clinical justification. Delays may occur with high occupancy rates or inadequate ward staffing.[17] The number of delays due to delayed physician handover, transfer, or patient discharge summary preparation and reassessment was 1.3% [Table 1 and Figure 4]. In contrast to our study, Sharma et al.[18] observed the delay in making discharge summaries as a main bottleneck in the process, followed by the clearances from various departments. To add on, Mustafa et al,[19] found late orders from physicians to be the primary cause of delayed discharge, followed by nursing handover issues, with bed readiness cited at 40.5%, thus highlighting the need for effective workforce management during busy periods. The main reason for this was a strict system of discharge summary making by the duty doctor on call. Therefore, effective strategies may include enhancing bed management systems or perfecting staff allocation during peak handovers. Notably, only a small percentage of patients were discharged home directly or transferred elsewhere, suggesting that potential barriers to post-discharge planning or

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family readiness should be addressed through improved communication between families and healthcare providers before patient discharge. Initiatives aimed at reducing delayed discharge can be categorized into five areas: information sharing, tools and guidelines, changes in practice, infrastructure and finance, and added categories. The decision-making process for transferring patients from the ICU is complex and stressful. The various influencing factors, including team involvement, clinical judgment skills, legal considerations, and multiple challenges, play a role.[20] Developing relevant skills and knowledge to enhance this decision-making process is crucial. Additionally, designing appropriate interventions can help ensure that decisions are principled and accurate. In contrast to delayed patient discharge, the transfers from the ICU that occur after duty hours are associated with significantly higher rates of hospital mortality. However, the length of hospital stays, and readmission rates do not show significant differences between daytime and after-hours transfers.[21]

Most initiatives focus on changes in practice and often integrate multiple categories. Generally, these efforts are executed within a single sector, rather than across different sectors. Several hospital strategies, such as communication hurdles, nurse-led discharges, home-first programs, and the development of added infrastructure, have shown positive short-term effects.[22]

Social factors, such as family dynamics or inadequate access to post-discharge resources, can also contribute significantly to delayed patient discharge. Identifying patients at high risk for extended stays is crucial to implement targeted management strategies to facilitate more efficient care and optimize resource utilization.[23] The strategy to mitigate delayed discharges from the PICU includes enhanced discharge planning; stakeholders must collaborate and engage in shared decision-making to ease a safe transition from the PICU to the ward. Consequently, future training initiatives should emphasize intergroup communication and effectively enhance shared decision-making practices to improve discharge planning.[24] The management interventions can improve the quality of care and help reduce hospital utilization by enhancing the effectiveness of community-based health services. Better access to community resources and streamlining care processes minimize unnecessary hospital admissions and promote a more efficient healthcare delivery system.[25] Patient and family-centered care is adopted and supported by numerous professional healthcare organizations globally which will be conscientious and sensitive to individual patient beliefs and practices. As a result, the outcomes of critically ill patients have improved.[26]

The study's limitations include its retrospective design and missing data, which may limit applicability without further validation in different locations and healthcare environments. Confounding variables such as hospital policy variations, staff training, and cultural factors were not explored. The focus on pediatric patients excludes other age groups or populations. Lack of longitudinal follow-up restricts the evaluation of long-term outcomes and the impact of delayed patient discharge on recovery, readmission, and healthcare use. Despite these constraints, the study highlights factors influencing delayed PICU patient discharge and the need for improved practices. Future research should address these limitations by using prospective data, longitudinal follow-up, and examining diverse settings.

CONCLUSION

The research highlights that patient discharge delays experienced by critically ill children in the PICU were low. Most affected children were around two years old and pertained to general pediatric cases. The main reasons for the delayed discharges were bed shortages, nurse shift changes, waiting for parents or caregivers, re-assessment by the physicians, discharge summary preparation, and waiting for COVID PCR results. Most disposition discharges were done to the general pediatric ward, and noticeably few patients from PICU were discharged directly to home after proper physician assessments. This study underscores the importance of managing delayed discharges from the Pediatric Intensive Care Unit (PICU). It offers insights into the incidence of delayed discharges, primary causes, and operational implications. Understanding these factors is vital for better resource allocation, smoother care transitions, and improved outcomes. The findings support quality improvement efforts to reduce patient discharge delays and enhance patient safety and healthcare quality.

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