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Readmission to paediatric intensive care unit: frequency, causes and outcome

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Readmission to Paediatric Intensive Care Unit: Frequency, Causes and Outcome

Muhammad Rehan Khan1, Prem Kumar Maheshwari3, Sumaira Iram2 and Anwarul Haque1

ABSTRACT

Readmission to intensive care units is considered to be an important quality indicator in ICU settings. This study was carried out at the paediatric intensive unit (PICU) and step down units of paediatric ward at the Aga Khan University Hospital, Karachi, Pakistan, to assess the frequency, common causes and outcome of patients readmitted in PICU within 48 hours after discharge from unit. During the study period, 1022 patients were admitted in PICU, out of which 24 (2.34%) patients required readmission. Male to female ratio was 1.2:1. The mean length of stay on paediatric floor before readmission was 24 hours. Fifteen (62%) patients were readmitted due to worsening of primary condition while 9 (38%) developed new problems. Respiratory problems accounted for 15 (62.5%) of readmissions, followed by cardiovascular 4 (16.5%) and sepsis related causes 3 (12.5%). The mortality rate of readmitted patients was 21% (5/24) in this study as compared to overall PICU mortality of 122 (11.93%).

Key Words: Readmission. PICU. Children. Mortality.

Advances in critical care medicine have resulted in a significant improvement in the survival of critically ill patients worldwide. However, the intensive care facilities are limited and expensive, especially in developing countries. This limitation of resources and cost constraints lead to early discharge of patients from intensive care units. Unexpected readmission of these patients in ICU during the same hospitalization is considered to be an important quality indicator.1 Several reports have been published worldwide, showing the increasing frequency and mortality of patients readmitted in ICUs.2 There is need to analyze the causes of readmission so that effective strategies can be devised to address this important risk factor of mortality in ICU settings. There is lack of data regarding re-admission in intensive care units in resource limited countries like Pakistan. So this retrospective study was carried out to analyze the frequency, common causes and outcome of children who were re-admitted within 48 hours after discharge from paediatric intensive care unit (PICU) during the same hospitalization.

The study was carried out at paediatric intensive care unit and step-down units at the Aga Khan University Hospital, Karachi, Pakistan. The medical records of all patients under the age of 15 years, admitted in the PICU from January 2010 to December 2011, were reviewed. All patients who were re-admitted within 48 hours after transfer from PICU during the same hospitalization were included in the analysis. Basic demographic details, admitting diagnosis, length of stay in PICU and time interval between discharge from PICU and readmission were collected through a structured proforma. The University’s ethical review committee waived the need for ethical approval for the study. Statistical Package for Social Sciences (SPSS) version 18 was used for the data analysis. Percentage and frequency were calculated for categorical or quantitative variables. Mean and standard derivation were calculated for continuous or quantitative variables.

During the study period, a total of 1022 patients were admitted in PICU and 900 were transferred to step down units. Of the transferred patients, 24 (2.6%) patients were readmitted within 48 hours after discharge from PICU. Fifteen (62%) patients were readmitted due to worsening of primary condition while 9 (38%) developed new problems. Respiratory problems accounted for 15 (62.5%) of readmissions, followed by cardiovascular 4 (16.5%) and sepsis related causes 3 (12.5%). The mortality rate of readmitted patients was 21% (5/24) in this study as compared to overall PICU mortality of 122 (11.93%).

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seen in around 3 (12.5%) of patients while neurological causes were observed in 2 (8.3%) of children. Causes of readmission during study period are summarized in Table I. Before readmission to PICU, 5 (20%) of patients needed endotracheal intubation, 5 (20%) needed inotropic support while 4 (16%) needed both in step-down units on the pediatric floor. The overall mortality rate of patients admitted in PICU was 11.93% (122/1022). On the other hand, the mortality rate in readmitted patients was 21% (5/24).

In modern era, paediatric intensive care units are considered to be the cornerstone of healthcare system in critically ill children. Although early discharges from ICUs can be cost-effective and also increases the availability of beds for other sick patients requiring intensive care, it exposes the patients to lower level of care at ward floors which may not only result in deterioration of clinical condition but may also lead to increased mortality.\(^3\) To the best of our knowledge, this is first study from Pakistan describing the characteristics, frequency, causes and outcome of patients readmitted in PICU within 48 hours from paediatric floor.

In this study, the frequency of readmission was found to be 2.34% (n=24). There is no data available regarding the frequency of readmission in paediatric intensive care units in developing countries.

However, various recent reports from developed countries have described a broad range of re-admission rates from 0.9 to 19% in ICUs. In a recent study from Canada, the readmission rate was found to be 2.4% (112/4625). Thus, the reported frequency of readmission in this study is comparable to international data.\(^2\)

Respiratory issues were the most common cause of readmission in this study, followed by cardiovascular causes. Similar trends have been reported previously as well, where respiratory problems are found to be highly associated with the readmission of patients to ICU.\(^2,4\) The reported mortality rate of readmitted patients is variable in international data, ranging from 8 - 20.7%. In this study, the mortality rate in readmitted patients was 5 (21%) which is comparable to literature. Interestingly, the overall PICU mortality rate in this study (11.93%, 122/1022) was higher as compared to reported 2 - 5% mortality rate in literature. This observed difference can be due to limited resources and lack of certain state-of-the-art facilities like ECMO in our setup.\(^3,5\)

The main limitations of this study were its retrospective nature and small sample size. Furthermore, certain scoring systems (like PRISM score or APACHE III score) are employed to assess the severity of illness and predict the risk of mortality in ICU settings. This also helps in planning about timing of discharge from PICU. No such scoring was done on patients in this study due to limitation of resources. There is a need for further research to establish specific guidelines which should be followed while planning to discharge children from PICU. This will prevent the readmissions and decrease the mortality of these critically ill patients, especially in resource limited countries like Pakistan.

### REFERENCES


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**Table I: Causes of readmission in PICU (n=24).**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>15 (62.5%)</td>
</tr>
<tr>
<td>Tachypnea / Increased work of breathing</td>
<td>7 (29.2)</td>
</tr>
<tr>
<td>Desaturation</td>
<td>5 (20.8)</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>3 (12.5)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>4 (16.5%)</td>
</tr>
<tr>
<td>Tachycardia / bradycardia</td>
<td>2 (8.3)</td>
</tr>
<tr>
<td>Cardiac failure</td>
<td>1 (4.1)</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>1 (4.1)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>3 (12.5%)</td>
</tr>
<tr>
<td>Poor perfusion / slow capillary refill</td>
<td>2 (8.3)</td>
</tr>
<tr>
<td>Circulatory shock</td>
<td>1(4.2)</td>
</tr>
<tr>
<td>Neurological</td>
<td>2 (8.3%)</td>
</tr>
<tr>
<td>Low GCS / coma</td>
<td>1 (4.2)</td>
</tr>
<tr>
<td>Seizures</td>
<td>1 (4.2)</td>
</tr>
</tbody>
</table>

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