

Original research article

Association of Delirium with Mortality in Critically Ill Children

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Abstract

Objectives: To describe the association of delirium with pediatric intensive care unit (PICU) outcome, including mortality.

Method: A prospective observational study in which all consecutive patients admitted to the PICU over a period of 12 months were screened daily for delirium using the Cornell Assessment of Pediatric Delirium (CAPD) score. Treatment-related and demographic variables were collected and analysed.

Results: 20.2% of subjects screened positive for delirium. The development of delirium was associated with higher mortality among study subjects ($p < 0.001$) and a longer length of PICU stay was seen in delirious subjects ($p < 0.001$).

Conclusion: Delirium is a frequent complication in critically ill children, associated with negative outcomes.

Keywords: delirium; pediatric; mortality; Pediatric Intensive Care Unit

Introduction

Introduction

Delirium is a manifestation of acute cerebral dysfunction due to a serious underlying illness. It has been linked to increased mortality, prolongation of hospital stay, and long-term disabilities [1]. An extensive literature exists describing the incidence, risk factors, subtypes, duration, and outcomes of delirium in adults, but there are very few prospective longitudinal studies in critically ill children that describe the natural history of pediatric delirium [2,3]. This study was designed to describe the association of delirium with pediatric intensive care unit (PICU) outcome, including mortality.

Methods:

This prospective observational study was conducted at a tertiary care, medical PICU. All patients of age ranging from 1 month to 14 years admitted to the PICU for at least 24 hours during the study period of 12 months (from 1st April 2020 to 31st March 2021) were included in the study after taking informed consent from a guardian of the child. Demographic data,

including age, sex, primary diagnosis, and developmental status were collected upon admission at the PICU.

All subjects included in the study were screened once daily by the investigating physician using the Richmond Agitation-Sedation Scale (RASS score), followed by the Cornell Assessment of Pediatric Delirium (CAPD score) for assessment of delirium during their PICU stay [4,5]. As per the calculated scores, subjects were categorized into “Comatose” (subjects with a RASS score of -4 or -5 , who were under deep sedation or unarousable to verbal or physical stimulation and therefore impossible to assess for delirium), “Delirious” (CAPD score ≥ 9) or “Non-delirious”. Comatose patients were excluded from the study.

The final outcome of the PICU stay of the patient was noted as Discharged, Mortality, or Other (Left against medical advice/Abscond).

Demographic variables were reported as counts and percentages, or median and interquartile range. A p-value of less than 0.05 was considered statistically significant in analyses. The association of delirium and various contributing factors with mortality was also evaluated with multivariate logistic regression analysis to rule out the effect of those confounding factors.

Results:

The study was conducted among 476 subjects, out of which 20.2% ($n=96$) of subjects screened positive for delirium. Baseline demographic characteristics are depicted in **Table-I**.

Table I: Baseline demographic characteristics of study subjects

| Characteristics | Delirious ($n=96$), n (%) | Non-delirious ($n=380$), n (%) | p -value |
|----------------------|----------------------------------|---------------------------------------|------------|
| Sex, Male | 55 (57.3) | 210 (55.3) | 0.73 |
| Age (in years) | | | |
| <2 | 55 (57.3) | 144 (37.9) | 0.001 |
| 2-5 | 14 (14.6) | 108 (28.4) | |
| 6-10 | 18 (18.7) | 81 (21.3) | |
| >10 | 9 (9.4) | 47 (12.4) | |
| Outcome of PICU stay | | | |
| Discharge | 50 (52.1) | 325 (85.5) | <0.001 |
| Death | 38 (39.6) | 9 (2.4) | |
| Other | 8 (8.3) | 46 (12.1) | |

Data expressed as n (%), PICU=Pediatric Intensive Care Unit

Out of 96 delirious subjects, mortality occurred in 39.6% ($n=38$). The factors associated with higher mortality were respiratory failure (p -value<0.001), shock (p -value<0.001) and the presence of delirium (p -value<0.001). On evaluating these factors with a multivariate logistic regression analysis [**Table-II**], the independent factors associated with higher mortality were respiratory failure [AOR=6.86, p -value<0.001] and presence of delirium itself [AOR=7.85, p -value<0.001].

Table II: Multivariate logistic regression analysis of risk factors associated with the development of mortality

| <i>Characteristics</i> | <i>Adjusted Odds Ratio (95% CI)</i> | <i>p-value</i> |
|-----------------------------|-------------------------------------|----------------|
| Respiratory failure | 6.86 (2.38-19.77) | <0.001 |
| Shock | 1.98 (0.69-5.65) | 0.20 |
| Presence of delirium | 7.85 (3.17-19.40) | <0.001 |

Discussion:

Delirium is a frequently occurring condition in critically ill patients. It has been recognized and characterized well in critically ill adults and some studies on pediatric delirium have been performed as well, which have described an association of delirium with negative outcomes [2].

The incidence of delirium in this study was found to be 20.2% among 476 subjects. This is in accordance with other studies performed by Traube et al., who reported the incidence of pediatric delirium as 17.3% [2]. A study undertaken by Silver et al. reported the prevalence of pediatric delirium as 21% [1]. Study subjects of the age group of less than 2 years had the highest incidence of delirium (57.3%).

The presence of delirium was independently associated with higher mortality among study subjects. This was in accordance with a study by Traube et al. [2] in which they reported significantly higher mortality among delirious subjects, and other studies have also reported similar results [1,10].

This study has some limitations as well. Delirium as an independent risk factor for mortality needs to be studied by controlling for the probability of mortality using a score like PRISM-III (Pediatric Risk of Mortality-III).

Conclusion:

Delirium is a common condition in the PICU, which adversely affects the patient outcomes in terms of increased mortality. Further multi-institutional studies on various aspects of delirium, including its effects on long-term neurocognitive impairment, are required to improve our understanding of pediatric delirium.

Ethical clearance: The approval was obtained from the Institutional Ethical Committee of the Gandhi Medical College, Bhopal (Letter No. 530/MC/IEC/2020; dated 04/01/2020)

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