

## Psychological Consequences in Pediatric Intensive Care Unit Survivors: The Neglected Outcome

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### ABSTRACT

**Objectives:** To determine whether Pediatric Intensive Care Unit (PICU) hospitalization results in adverse psychological effects and to identify the contributory factors. **Setting:** Level III PICU of a tertiary center. **Design:** Prospective cohort study. **Methods:** Consecutive patients 5 years or older admitted to PICU for at least 48 hours constituted the study population. Controls were age and sex matched children hospitalized in the pediatric wards for at least 48 hours. Severity of illness was assessed by the Pediatric Risk of Mortality (PRISM) score. Level of therapeutic intervention was determined by the Therapeutic Interventions Scoring System (TISS – 76 score). Temperament Measurement Schedule was used to assess the premorbid temperament. Psychological assessment was performed using Impact of Event Scale (IES), Birleson Depression Scale and the Self-Esteem Scale. Follow-up evaluation was done one month after discharge. **Results:** There were 30 children each in the study and control groups. They had comparable pre-morbid temperament as well as scores on the self-esteem and depression scales. Significantly higher proportion of patients in PICU had intrusive thoughts (43%) as compared to controls (6.7%). Development of intrusive thoughts correlated significantly with the degree of intervention. Demographic parameters, nature of the disease, duration of hospitalization and severity of illness did not correlate with the psychological outcome. One month after discharge, scores in both groups were comparable. **Conclusions:** Children subjected to therapeutic interventions in the PICU develop transient psychological impairment manifested by experiencing intrusive thoughts that resolve within a month.

**Key words:** Pediatric intensive care, Psychological outcome.

### INTRODUCTION

A physiologically unstable child is exposed to numerous procedures and technology in the Pediatric Intensive Care Unit (PICU) and a disturbed environment(1-3). This makes children vulnerable to stress experienced at a physical, psychological and social level(4,5). Thus in a temperamentally 'at risk' child, admission to PICU can be akin to psychological trauma(6). It is presumed that sicker the child, greater the interventions and more the psychological

trauma(7). This trauma can have repercussions in the form of a post-traumatic stress disorder(5,8). Children may not verbalize such distress(3). Therefore their anguish may not be detected and the outcome of unresolved psychological trauma might be detrimental(3,7).

Attention is seldom directed towards the emotional well being of children in PICUs in India. If care of children in the PICU is to be holistic, there is a need to investigate presence of psychological

morbidity in survivors so that remedial measures can be introduced. The objective of this study was to determine whether PICU hospitalization is associated with adverse psychological outcome; to identify factors contributing to psychological distress; and to determine whether the effects continue beyond the period of hospitalization.

## METHODS

A prospective cohort study was performed over 8 months from November 2003 through June 2004 after approval by the Institutional Ethics Committee. Almost all admissions to PICU are from the emergency ward and pediatric wards and are unscheduled. Neonates and surgical patients are not admitted. There is no formal counseling to prepare children for PICU admission. One guardian is permitted to stay in PICU. Soft toys and piped music are provided for recreation. For patient care, five senior staff members supervise 12 resident doctors working in shifts of eight hours. Two nurses trained in pediatrics work in shifts of eight hours each. Patient to doctor ratio is 2:1 and patient to nurse ratio is 4.5:1. The three-year average of annual number of admissions was 516. The bed occupancy throughout the year was 100% with average stay of 6.2 days. The average annual mortality varies from 25% to 29%.

Consecutive children admitted to the PICU and fulfilling inclusion criteria (age  $\geq 5$  years, absence of neurological abnormalities precluding interview and duration of stay of at least 48 hours) were enrolled as Cases. Readmitted survivors were excluded. Controls were age and sex matched children from the pediatric ward without previous PICU admission and ward stay of at least 48 hours. Demographic data, duration of hospitalization and nature of disease was recorded. Socioeconomic status was determined using the modified Kuppuswamy scale(9). Pediatric Risk of Mortality-III (PRISM) score obtained at 24 hours of admission was used to grade severity of illness in patients to correlate with the psychological outcome(10). Therapeutic Intervention Scoring System (TISS-76)(11) was also recorded for each patient to objectively record intensity of critical care.

Patients were interviewed by SBB under the supervision of PS within 24 hours of discharge from

PICU. Controls were interviewed on the day of discharge. A second interview was scheduled a month later. The Temperament Measurement Schedule is a standardized itemized questionnaire, which was administered to the parent/guardian to assess premorbid temperament(12). Five domains were judged: sociability, emotionality, energy, distractibility and rhythmicity. Impact of Event Scale (IES), a questionnaire of 15 items was administered to determine psychological outcome. It explores intrusive symptoms (nightmares, imagery, insomnia and emotional reactions) and avoidance behavior (numbing, avoidance and staying away from reminders) and together provides a subjective score. This has been validated for children over eight years of age(13). Impairment on IES was graded as follows: 0 to 8 – sub clinical, 9 to 25 – mild, 26 to 43 – moderately severe and  $>44$  – severe. The Birleson depression Self-Rating Scale(14) is an 18-item questionnaire exploring symptoms like sleep, appetite, pain, interest and mood. A score of  $\geq 13$  establishes presence of depression. The scale is validated for children 7-13 years old. Self-esteem was determined by the ten-item Self-Esteem Scale (SES) of Rosenberg(15). A score of  $<23$  denotes low self-esteem(16). All questionnaires were administered in the vernacular and simplified by converting Likert scale to visual analogues. Children in either group demonstrating abnormalities were referred to the psychiatric service.

## RESULTS

Amongst 337 PICU admissions, 34 children fulfilled inclusion criteria. Four patients could not be interviewed due to absence of recollection of PICU stay or language barrier. The final study population was 30 Cases (10 males, 20 females; M:F ratio 1:2) and an equal number of Controls (16 males, 14 females; M: F ratio 1:0.87). Their mean age was  $8.5 \pm 5.2$  years (range: 5-12) and  $8.9 \pm 6.2$  years (range: 6-12), respectively. Cases and controls were comparable with respect to demographic parameters and socioeconomic status. Duration of ward stay ( $11 \pm 11.8$  days) exceeded that of PICU ( $6.6 \pm 4.9$  days) but the difference was not significant ( $P=0.064$ ). The pattern of disease differed significantly between the two study groups: infectious disease (including five patients

with tetanus), cardiovascular disease like complications of rheumatic heart disease and neurological disorders were most frequent accounting for 33%, 23% and 20% of the cases respectively. Genitourinary (nephrotic syndrome or glomerulonephritis), hemato-logical and respiratory diseases were common amongst Controls (27%, 20% and 17% respectively).

The mean PRISM score was  $3.27 \pm 3.44$  (maximum score: 18). Means of the TISS score in Cases was  $8.97 \pm 4.22$  (range: 4-18) [highest score] and  $5.85 \pm 2.80$  (range: 3-15 [average score] while that in Controls was  $1.4 \pm 1.59$  (range: 0-8) [highest score] and  $0.9 \pm 0.74$  (range: 0-3) [average score]; both scores were significantly greater in Cases than in Controls ( $P < 0.05$ ).

The premorbid temperament of children in both groups was comparable in all domains except energy. One case and seven controls had high energy levels and five cases and one control scored low. However, this difference did not influence the psychological outcome.

The mean IES score in cases was  $1.56 \pm 2.18$ , while controls had a significantly lower score of  $0.10 \pm 0.40$  ( $P = 0.002$ , unpaired *t* test). When individually analyzed, the mean intrusion score in cases ( $1.1 \pm 1.83$ ) was significantly higher than controls ( $0.10 \pm 0.40$ ,  $P = 0.005$ ) but avoidance scores ( $0.15 \pm 0.61$  and  $0.0$  respectively) did not differ significantly. Higher proportion of cases (13, 43%) developed intrusive thoughts as compared to controls (2, 6.7%) ( $P = 0.001$ ). The intrusive thoughts reported were images related to PICU hospitalization (12

cases, 1 control), bad dreams (9 cases, 2 controls), strong feelings (5 cases), thoughts (3 cases), difficulty falling asleep because of images or thoughts related to PICU (1 case). The score for each item was 1 (rarely experienced) in all except 2 patients who scored 3 (sometimes experienced). Presence of intrusive thoughts correlated with the TISS score (Spearman's analysis; coefficient of correlation 0.507,  $P = 0.004$  for highest score and  $P < 0.001$  for average score). Avoidance and low self-esteem was present in two cases and none of the controls while depression was present in 4 cases (13.3%) and one control (3.3%). These differences were not significant. Cases and controls were comparable with respect to scores on the self-esteem and depression scales and the TISS scores did not correlate with these parameters.

Age, socioeconomic status, education, nature of illness, severity of disease, duration of PICU hospitalization and premorbid temperament did not influence the psychological outcome.

Seventeen cases and 22 controls were available for follow-up. Two cases had expired after discharge from PICU and 11 did not follow-up. In the control group, eight did not follow-up. Overall, the Cases and Controls were now comparable with respect to the psychological scores (mean IES-Intrusion score: Cases  $0.28 \pm 0.57$  versus Controls  $0.05 \pm 0.22$ ,  $P = 0.097$ ; mean depression scores: Cases  $5.00 \pm 3.74$  versus controls  $5.29 \pm 1.98$ ,  $P = 0.766$ ). Moreover, it was observed that in the cases, scores on all the scales were lower as compared to those obtained immediately following discharge from PICU (**Table I**).

**TABLE I** PSYCHOLOGICAL SCORES FOLLOWING DISCHARGE FROM PICU

Scales	Mean	SD	<i>P</i> value
IES-Intrusion	1.56	2.18	
IES-Intrusion after a month	0.28	0.57	0.017
IES-Avoidance	0.24	0.75	
IES-Avoidance after a month	0.00	0.00	0.216
Depression	6.88	3.96	
Depression after a month	5.00	3.74	0.001

*IES: Impact of Event Scale*

**WHAT IS ALREADY KNOWN?**

- Children are vulnerable to stress secondary to physical, mental or social trauma.

**WHAT THIS STUDY ADDS?**

- Hospitalization in PICU causes acute psychological stress in a child manifested by development of intrusive thoughts, proportionate to the intensity of therapeutic interventions; the stress resolves within a month of discharge from PICU.

**DISCUSSION**

Early studies on behavioral response of children to PICU hospitalization have identified abnormalities like anxiety, withdrawal, fear, anger and hostility(7). Such subjective studies may not be relevant to the current milieu of PICU where sicker children are surviving due to intensive and invasive monitoring and management supported by increasing reliance on equipments.

Our study convincingly documents psychological stress in children surviving PICU. We hypothesized that negative experiences in PICU could lead to psychological stress in a child ill equipped with mature coping mechanisms(3,7). Children evidently remember experiences in PICU. At least one bad experience was recorded in 50% of children in a PICU in Mumbai(2). Proportion of children expressing negative feelings about PICU was 24%(2). Such feelings may be underestimated or neglected, as children would express such feelings only if asked(3).

PICU survivors in the present study developed intrusive thoughts despite lower TISS scores. Rennick, *et al.*(7) demonstrated that children in PICU exposed to greater number of invasive procedures (cut-off score of  $\geq 121$ ) constitute a high-risk group for adverse psychological sequelae. Our study suggests that even minimally invasive interventions adversely impact psychological well-being of PICU survivors. However, scores on follow-up were comparable with controls indicating that psychological abnormalities resolved within a month. Thus, children in our study probably had an acute stress reaction not amounting to post traumatic stress disorder(16). Early resolution of psychological stress could probably be due to low intensity of

invasiveness. Higher scores on the invasiveness scale recorded by Rennick, *et al.* could have led to a greater impact persisting beyond six weeks(7,8).

Rennick, *et al.*(8) found no significant difference between PICU and ward hospitalization. This was attributed to the effect of sedation or analgesia administered to PICU patients in diminishing the impact. In India, sedation/ analgesia may not be used as liberally. This could have contributed to the difference in scores obtained between cases and controls in the present study.

The study does have some limitations. The IES scale is an adult scale also used in children(13,17). The depression scale is created for children older than seven years. Despite these limitations it is clear that even low intensity of interventions in PICU leads to acute albeit transient distress. It is desirable to prevent this by ensuring positive recollections of PICU stay and judicious use of sedation and analgesia. PICU staff must recognize manifestations of psychological distress(5). Services of a child psychologist or psychiatrist must be ensured. A warm and empathetic atmosphere, play therapy and permitting a parent especially the mother to stay with the child would be fitting(6,18).

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## REFERENCES

1. Playfor S, Thomas D, Choonara I. Recollection of children following intensive care. *Arch Dis Child* 2000; 83: 445-448.
2. Karande S, Kelkar A, Kulkarni M. Recollections of Indian children after discharge from an intensive care unit. *Pediatr Crit Care Med* 2005; 6: 303-307.
3. Vidyasagar D. Stress of admission to pediatric intensive care unit on children. *Pediatr Crit Care Med* 2005; 6: 374-376.
4. Davidson JE, Powers K, Hedayat KM, Tieszen M, Kon AA, Shepard E, *et al.* Clinical practice guidelines for support of the family in the patient-centered intensive care unit: American College of Critical Care Medicine Task Force 2004-2005. *Crit Care Med* 2007; 35: 605-622.
5. Stuber ML, Shemesh E. Post-traumatic stress response to life-threatening illnesses in children and their parents. *Child Adolesc Psychiatr Clin North Am* 2006; 15: 597-609.
6. Jones SM, Fiser DH, Livingston RL. Behavioral changes in pediatric intensive care units. *Am J Dis Child* 1992; 146: 375-379.
7. Rennick JE, Morin I, Kim D, Johnston CC, Dougherty G, Platt R. Identifying children at high risk for psychological sequelae after pediatric intensive care unit hospitalization. *Pediatr Crit Care Med* 2004; 5: 358-363.
8. Rennick JE, Johnston CC, Dougherty G, Platt R, Ritchie JA. Children's psychological responses after critical illness and exposure to invasive technology. *J Dev Behav Pediatr* 2002; 23: 133-144.
9. Mishra D, Singh HP. Kuppaswamy's socio-economic status scale – a revision. *Indian J Pediatr* 2003; 70: 273-274.
10. Pollack MM, Ruttimann UE, Getson PR. Pediatric risk of mortality (PRISM) score. *Crit Care Med* 1988; 16: 1110-1116.
11. Keene AR, Cullen DJ. Therapeutic intervention scoring system: Update 1983. *Crit Care Med* 1983; 11: 1-3.
12. Malhotra S. *Child Psychiatry in India*. 1st Ed. New Delhi: Macmillan India; 2002.
13. Horowitz MJ, Wilner N, Alvarez W. Impact of event scale: A measure of subjective stress. *Psychosom Med* 1979; 41: 209-218.
14. Birlleson P. The validity of depression disorders in childhood and the development of a self-rating scale: a research report. *J Child Psychol Psychiatr* 1981; 22: 73-88.
15. Rosenberg M. *Society and the Adolescent Self-Image*. Middletown, CT: Wesleyan University Press; 1989.
16. Balluffi A, Kassam-Adams N, Kazak A, Tucker M, Dominguez T, Helfaer M. Traumatic stress in parents of children admitted to the pediatric intensive care unit. *Pediatr Crit Care Med* 2004; 5: 547-553.
17. Husain SA, Nair J, Holcomb W, Reid JC, Vargas V, Nair SS. Stress reactions of children and adolescents in war and siege conditions. *Am J Psychiatr* 1998; 155: 1718-1719.
18. Prugh DG, Staub EM, Sands HH, Kirschbaum RM, Lenihan EA. A study of emotional reactions of children and families to hospitalization and illness. *Am J Orthopsychiatr* 1953; 23: 70-106.