Screening for factors influencing parental psychological vulnerability during a child's PICU admission R2

Authors:

Francesca A Woolgar[a*] (ClinPsyD), Lucy Wilcoxon[a] (ClinPsyD), Nazima Pathan[b] (PhD), Esther Daubney[b] (BSc) , Deborah White[b] (MSc), Richard Meiser-Stedman[a] (PhD) and Gillian A Colville[c] (PhD)

[a]Department of Clinical Psychology, Norwich Medical School, University of East Anglia, Norwich Research Park, Norwich, Norfolk, NR4 7TJ, UK

[b] Department of Paediatrics, Addenbrookes Hospital, Hills Road, Cambridge, CB2 0QQ, UK

[c] Paediatric Psychology Service, St George's Hospital, Blackshaw Road, London, SW17 0QT, UK

[*]Corresponding author: Francesca Woolgar, Department of Clinical Psychology, Norwich Medical School, University of East Anglia, Norwich, Norfolk, NR4 7TJ, UK. Francesca.Woolgar@nhs.net, +44 (0)1603 591709

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Abstract

Objectives: To identify the risks of developing posttraumatic stress disorder (PTSD) and/or depression in parents following their child's Pediatric Intensive Care Unit (PICU) admission using a brief screening instrument and to examine the associations with these risks.

Design: A cross-sectional parental survey.

Setting and Subjects: One hundred and seven parents of 75 children consecutively admitted to a general 13-bed PICU at a large teaching hospital.

Measurements: All parents completed the 10-item Posttraumatic Adjustment Screen (PAS) before discharge. The PAS assesses risk factors known to be associated with poorer psychological outcome, including psychosocial variables pre-trauma and peri-trauma, and acute stress.

Main Results: Parents' scores on the PAS indicated that 64 (60%) were at risk of developing PTSD and 80 (75%) were at risk of developing depression following their child's admission. Univariate analyses suggested that psychosocial variables, such as pre-existing stressors and a history of previous mental health problems, were more strongly associated with PAS risk scores for PTSD and depression than medical or socio-demographic factors. In logistic regression analyses a history of previous mental health problems was significantly associated with risk of developing PTSD and depression ($p<0.001$) explaining 28% and 43% of the variance in these outcomes.

Conclusions: This study suggests that a significant number of parents on PICU are potentially at risk of developing PTSD and/or depression post-discharge and that psychosocial factors, pre-trauma and peri-trauma, are stronger determinants of this risk, and of acute distress, than other variables. Identification of vulnerable parents during admission, using a measure such as the PAS, could facilitate the targeting of support and monitoring, acutely and post-discharge, at those who might be most likely to benefit.

(271 words)

Keywords: Post-traumatic Stress Disorder (PTSD); depression; outcomes; Post Intensive Care Syndrome (PICS); Post Intensive Care Syndrome–Family (PICS-F); Post Intensive Care Syndrome-pediatric (PICS-p)

Twitter: Psychosocial variables pre-trauma and peri-trauma are more strongly associated than other factors with acute stress in parents on #pedsICU and with their risk of developing PTSD and depression.

Box ‘At the Bedside’

- Establishing the presence of pre-admission stress may be helpful during admission, as it is associated with increased risk of psychological problems in parents during and after PICU discharge
- It is important to clarify parents’ understanding and beliefs about their child’s condition. Parents’ fears about prognosis are more strongly associated with their acute distress on PICU and later psychological outcomes than objective measures of illness severity
- Report of previous trauma or mental health difficulties by parents should be regarded as an indication that they may benefit from enhanced support and monitoring during and after admission

Box ’Research in context’

- A significant minority of parents report persistent symptoms of Post-traumatic Stress Disorder (PTSD) after their child's admission to PICU
- The wider research literature on risk factors associated with the development of PTSD has consistently shown that pre-existing trauma history and mental health problems are more predictive than objective indices of trauma severity
- This study suggests that the use of a brief validated screening instrument such as the Posttraumatic Adjustment Screen (PAS) can be used to identify parents at risk of developing psychological problems following their child's PICU admission

Introduction

The concept of Post Intensive Care Syndrome (PICS)[1] has recently been extended to encompass the experiences of *relatives* of ICU patients, as well as the patients themselves, resulting in the new term 'Post Intensive Care Syndrome-Family' (PICS-F)[2]. In the paediatric context, research has highlighted the long-term psychological impact a child's PICU admission can have on parents, who are four times more likely to screen positive for Post-traumatic Stress Disorder (PTSD) after discharge than parents of children admitted to general wards[3], with between 18% and 45% reporting clinically significant symptoms of PTSD [4] and many also reporting significant levels of anxiety and depression[5-7]. Importantly, early distress in parents after PICU admission has also been found to be associated with longer term psychological problems in their children[8]. However, the majority of parents do not develop serious mental health difficulties post-discharge, making it important to establish the risk and protective factors that influence parents' vulnerability to developing adverse outcomes. To date, the association between medical variables and psychological outcomes has remained unclear[9]. However, parental appraisal of life threat to their child has been found to be related to later symptoms of PTSD[10] and parental coping styles and the presence of peri-traumatic dissociation have been found to be associated with later PTSD and depression[6]. Other factors such as difficulties with acceptance and coping may also contribute to a parent's longer term psychological adjustment but the majority of studies in this field to date have not investigated relevant pre-trauma and peri-trauma psychological factors.

It would be helpful to have a way to determine acutely which parents might be at increased risk of poorer psychological outcome. The theoretically driven Posttraumatic Adjustment Screen (PAS)[11] has been found to predict clinical caseness in hospitalised adult injury survivors at 12 months and was recently adapted for use with PICU parents as a triage tool in

an intervention study[12]. In the present study the proportions of parents scoring at risk of PTSD and depression, as determined by the PAS, are described and the associations with these risks examined. On the basis of the literature, it was hypothesised that a significant proportion of parents would meet the PAS cut-off criteria for PTSD and depression.

Method

Design: This was a cross-sectional questionnaire-based study focusing on the acute psychological responses of parents during their child's PICU admission. It formed part of an ongoing prospective longitudinal cohort study which aims to follow up parents and children for up to 18 months post-discharge. The project was granted ethical approval from the local Research Ethics Committee (East of England-Cambridge South reference:18/EE/0035).

Participants: The sample was recruited from a consecutive cohort of families of children who were admitted to a 13-bed PICU at a large teaching hospital, over a period of 18 months. Inclusion criteria were a) emergency referral and b) mechanical ventilation >= 48 hours. Families were excluded if a) the child died during admission, b) there were any safeguarding concerns, or c) the family were not fluent English speakers.

Procedure: A research nurse provided eligible families with an information sheet about the study. All participants gave informed consent after having at least 24 hours to consider this information and were reminded that they could withdraw from the study at any point, without this affecting their child's care. They were also provided with information about how to access further support. Medical information, such as initial illness severity[13], length of stay, medical diagnosis and duration of mechanical ventilation, was extracted from the medical

record along, with child age and gender. Parents provided further socio-demographic information and were also asked if their child had been admitted to PICU before, if they had any history of mental health problems and if there had been any recent pre-admission family stressors.

Measures: Parents completed the Posttraumatic Adjustment Screen (PAS)[11] during their child's admission. This 10-item questionnaire is a screening instrument based on known risk factors for the development of PTSD and depression after a traumatic experience, and is designed to be administered in acute hospital settings by staff without mental health qualifications. The PAS assesses a) *pre*-trauma variables relating to history of previous trauma and mental health problems and access to social support (items 1 to 4); b) *peri*-trauma variables relating to beliefs and thoughts about the traumatic situation (items 5 and 6) and c) acute stress reactions, such as those relating to anger or difficulty accepting what is happening (items 7 to 10). With the authors' permission, the phraseology of three items (numbers 6, 9 and 10) was adapted for this study in order to clarify that the potentially traumatic event in this situation was the child's PICU admission (see Table 1). Respondents were asked to rate the level of their agreement with each item using a scale of 0 to 4. Responses were then summed to produce an overall score, termed PAS-P (range 0-40), and a depression risk score, PAS-D, which is the sum of scores for items 1, 2, 5, 7 and 8 (range 0-20,). A PAS-P score of 16 or higher has been found to indicate elevated risk of developing PTSD and a PAS-D score of 4 or higher has been found to indicate elevated risk of developing depression, as assessed by clinical interview 12 months after trauma. The PAS has a sensitivity and specificity of 0.82 and 0.84 respectively, when predicting PTSD and 0.72 and 0.75, for predicting depression[11]. It has also been found to predict distress at 6 weeks in emergency room attenders[14] and in parents 6 months after their child's discharge

from PICU[12]. Finally, for the purposes of the exploratory analyses detailed below, the sum of the pre-trauma items, peri-trauma items and acute stress items on the PAS were also separately calculated.

Data analyses: The data were analysed using the Statistical Package for Social Sciences (SPSS version 25.0, Armonk, NY IBM Corp 2016). Descriptive statistics were used to summarise sample characteristics. Mann Whitney tests, Pearson Chi Square tests and Pearson Bivariate correlations were conducted to examine associations with the two primary outcomes, positive PTSD risk and positive depression risk. Factors associated at significance level of $p<0.20$ were entered into two logistic regression models in order to investigate their impact on the risk of developing a) PTSD as assessed by PAS-P and b) depression, as assessed by PAS-D. Finally, further exploratory correlational analyses were conducted examining associations with the three different types of item on the PAS (pre-trauma, peri-trauma and acute stress).

Results

Participants: A total of 156 children met the eligibility criteria during the study period (April 2018 to October 2019). Twenty-one children were discharged before consent could be obtained. A further 25 children were excluded for the following reasons: safeguarding concerns, such as suspected non-accidental injury (n=12); language barrier (n=8); withdrawal of care or death (n=5). Parents of a further 31 children did not consent to participate. In total, parents of 79 children consented to take part. Following consent, one child died during admission and three further parents did not complete the questionnaire. In total, 107 parents

of 75 children completed the PAS before discharge. In the case of 32 children, data were provided by both parents. (See Table 2 for sample characteristics.)

A total of 105 parents provided details of pre-trauma mental health problems, of those 54 had mental health difficulties which included depression only (n=10), anxiety only (n=15) and mixed anxiety and depression (n=22). A further five parents reported PTSD with at least one additional difficulty including anxiety and depression. Two parents did not specify the type of pre-trauma mental health difficulties. 106 parents provided details of pre-trauma stressors. 56 parents reported having pre-trauma stressors which included: work only (n=10), family only (n=9), financial only (n=5) and health only (n=2). A further 20 parents reported financial stressors with at least one additional stressor including work, health, family or other. Seven parents reported stressors related to their family in addition to either work or health stressors. Three parents reported "other" stressors which included bereavements, house moves and academic study.

Primary outcomes: Prevalence of parents scoring at risk of developing PTSD and depression: In total 64 (60%) parents scored above the cut-off PAS-P score of >=16, which denotes a positive risk of developing PTSD relating to their child's admission and 80 (75%) scored above the PAS-D cut-off >=4, indicating they were at risk of developing depression.

Secondary outcomes: Associations with risk of developing PTSD and depression: Positive risk of developing PTSD and depression were both significantly associated with report of recent pre-admission stressors and of previous mental health problems ($p<0.01$). In addition, home ownership was associated with a *lower* risk of developing depression

(p=0.021). No other significant differences were found in relation to medical or socio-demographic factors (see Table 3).

The five *v*ariables found to be associated at p<0.2 with the two primary outcomes (younger age of parent; male child gender; *not* owning their home, presence of recent pre-admission stressors and of previous mental health problems) were entered into separate logistic regression models, with a) positive screen on PAS-P and b) positive screen on PAS-D as the dependent variables. As shown in Table 4, both models explained a significant amount of variance in the outcomes studied (PAS-P: R^2=0.277, *p*<0.001; PAS-D: R^2=0.429, *p*<0.001). However, in both cases only the presence of previous mental health problems remained significant when all five variables were entered simultaneously. This variable was associated with a five-fold increase in screening positive in terms of the risk of developing PTSD and a twenty-fold risk of developing depression (PTSD: OR = 5.802; 95% CI, 2.208-15.247; *p*<0.001; depression: OR = 20.070; 95% CI 4.093-98.410; *p*<0.001)

Exploratory correlational analyses: An examination of the associations between the two psychosocial variables most strongly associated with PAS score (pre-existing stressors and previous mental health problems) and the three different types of PAS item (pre-trauma, peri-trauma and acute stress) are provided in Table 5. The presence of pre-existing stressors was significantly correlated with the sum of pre-trauma items and the sum of acute stress items, but previous mental health problems were more strongly associated with these items as well as with *peri-trauma* items, which included an item assessing the degree to which the parent feared that the child might die. Report of pre-existing stressors and previous mental health problems were also significantly correlated (r=0.294, p=0.002).

Discussion

These results provided a unique snapshot of parents' psychological vulnerability, in relation to their child's admission to PICU, indicating that many were at significant risk of developing both PTSD and a depressive disorder following this potentially traumatic experience. The finding that the strongest associations with these two elevated risks were *psychosocial*, rather than medical or socio-demographic, is consistent with a number of previous studies on PICU parents[9], as well as with the wider literature on the complicated nature of the relationship between the degree of physical injury and the extent of associated psychological trauma[15-18]. The finding that pre-admission psychosocial factors were associated with acute stress during admission is consistent with another study[19] which used the Parental Stressor Scale: PICU (PSS: PICU)[20] to assess acute stress in parents. Recent work has also established a link with acute stress in *children* during PICU admission for pre-admission psychosocial factors[21].

The findings are consistent with evidence that it is the subjective experience of a potentially traumatic event that determines whether it is traumatic for that individual[10,22] in line with the cognitive model of PTSD[23], which proposes that appraisals of a traumatic event play a crucial role in the development, maintenance and recovery of PTSD. They are also consistent with the Pediatric Medical Traumatic Stress model[24] which illustrates how pre-existing factors, such as ongoing family stressors, can contribute to an individuals' subjective experience, perception and appraisals of the events relating to a child's treatment in hospital.

The fact that the screening instrument used in this study was based on established risk factors drawn from the trauma literature, was a particular strength of the study. Further advantages of the PAS were that it was brief, was specifically designed for use in acute healthcare settings by staff without specific mental health training, and was developed as a *predictive* tool,

unlike most screens which assess *concurrent* risk of meeting criteria for a psychiatric diagnosis[25]. Its focus on risk of parental depression as well as PTSD, was another noteworthy feature.

The prevalence of parents at risk of developing PTSD in this study (60%), was however higher than that reported in another group of *n*=209 PICU parents (37%), who were also assessed just before PICU discharge, using the same screening tool[12]. This difference may be due to the inclusion criteria of emergency admission and ventilation >=48 hours in the current study, and may indicate that the level of distress in this sample was higher than might be the case in other units. Delaying administration of the PAS until after discharge may have yielded lower acute stress scores, but would have risked further losses to recruitment. Other limitations to this study were that mothers and fathers of the same child were included in analyses in some cases, that only half of eligible families took part, it was based at a single site, the questionnaire was adapted and that there may have been other important risk factors that were missed. Although research has shown that single parenthood is a risk factor for parental posttraumatic stress after a child's hospital admission[26] this finding did not emerge as significant in this study, this may be due to the small number of single parents in our sample. Also, the true value of this screening measure will only be apparent once follow-up data are available. The analysis of the main longitudinal study, of which this was the first part, will provide further insight into the medium and long-term trajectories of parental distress[27] in this situation and the sensitivity and specificity of the PAS as a prediction tool in this particular context. Finally, although national guidance on psychological intervention for PTSD suggests that early intervention should be offered to those most at risk[28], it is important to note a limitation of the PAS, acknowledged by its developers, who caution that its relatively low positive predictive value means that it is best used as an initial triaging tool to

identify those who should be monitored further in relation to their later requirement for support.

This study has implications for the screening of parents, the provision of acute support and for monitoring their well-being post-discharge, thereby facilitating referral for those who might benefit from formal treatment, such as trauma-focused cognitive behavioural therapy[29]. The results suggest that more attention should be given to parents' prior experiences and to their thoughts and beliefs during admission when determining which families might require additional support.

Future studies could also further evaluate the usefulness and feasibility of screening tools such as the PAS. Other screening measures have also been shown to predict later distress in parents after PICU[10,30,31] Promising measures include the full[20] and short form[31] of the Parental Stressor Scale: PICU, the Acute Stress Disorder scale[32], the PICU Family Stress Screening Tool[33] and the Psychosocial Adjustment Tool[34], which is widely used in pediatric oncology settings. Parents could also usefully be screened for protective factors such as resilience[35].

More research is also needed on effective interventions both to prevent and to treat psychological distress in this group[36,37], given the growing acknowledgment of the phenomenon of Post Intensive Care Syndrome in relatives of ICU patients generally (PICS-F)2 and specifically in pediatric settings, where the use of the term PICS-p[38] recognises the particular dependency of children on their parents' emotional wellbeing for their recovery. Support during admission from nursing staff at the bedside, and also ideally from embedded

psychologists or social workers where required, should promote psychological recovery of the parent in the longer term, better enabling them to support their recovering child.

In conclusion, this study found a high proportion of the parents of PICU patients scored above the threshold for being at risk of developing PTSD and/or depression, on an established screening tool. Pre-existing psychosocial variables were more significant in terms of determining acute stress and risk of developing a disorder, than medical or demographic factors. By identifying families at greater risk using such measures as the PAS, clinicians should be in a better position to target preventative support acutely and to offer appropriate monitoring and signposting to those deemed most vulnerable. In doing so, they will not only help parents, but also their vulnerable children, who depend so much on their adult carers for their own emotional and physical recovery[39,40].

References

1. Needham DM, Davidson J, Cohen H, et al. Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. Crit Care Med. 2012;40:502-509.
2. Davidson JE, Jones C, Bienvenu OJ. Family response to critical illness: postintensive care syndrome-family. Crit Care Med. 2012;40:618-624.
3. Rees G, Gledhill J, Garralda ME, Nadel S. Psychiatric outcome following paediatric intensive care unit (PICU) admission: a cohort study. Intensive Care Med. 2004;30(8):1607-1614.
4. Nelson LP, Gold JI. Posttraumatic stress disorder in children and their parents following admission to the pediatric intensive care unit: a review. Pediatr Crit Care Med 2012;13(3):338-347.
5. Board R, Ryan-Wenger N. Long-term effects of pediatric intensive care unit hospitalization on families with young children. Heart Lung 2002;31(1):53-66.
6. Bronner MB, Kayser A-M, Knoester H, Bos AP, Last BF, Grootenhuis MA. A pilot study on peritraumatic dissociation and coping styles as risk factors for posttraumatic stress, anxiety and depression in parents after their child's unexpected admission to a Pediatric Intensive Care Unit. Child Adolesc Psychiatry Ment Health 2009;3.
7. Colville G, Pierce C. Patterns of post-traumatic stress symptoms in families after paediatric intensive care. Intensive Care Med 2012;38:1523-1531.
8. Le Brocque RM, Hendrikz J, Kenardy JA. The course of posttraumatic stress in children: examination of recovery trajectories following traumatic injury. J Pediatr Psychol 2010;35:637-645.

9. Yagiela LM, Carlton EF, Meert KL, Odetola FO, Cousino MK. Parent Medical Traumatic Stress and Associated Family Outcomes After Pediatric Critical Illness: A Systematic Review. Pediatr Crit Care Med 2019;20:759-768.

10. 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.

11. O'Donnell ML, Creamer MC, Parslow R, et al. A predictive screening index for posttraumatic stress disorder and depression following traumatic injury. J Consult Clin Psychol. 2008;76(6):923-932.

12. Samuel VM, Colville GA, Goodwin S, Ryninks K, Dean S. The Value of Screening Parents for Their Risk of Developing Psychological Symptoms After PICU: A Feasibility Study Evaluating a Pediatric Intensive Care Follow-Up Clinic. Pediatr Crit Care Med 2015;16:808-813.

13. Slater A, Shann F, Pearson G. PIM2: a revised version of the Paediatric Index of Mortality. Intensive Care Med. 2003;29(2):278-285.

14. Jaramillo S, Suffoletto B, Callaway C, Pacella-LaBarbara M. Early Screening for Posttraumatic Stress Disorder and Depression Among Injured Emergency Department Patients: A Feasibility Study. Acad Emerg Med. 2019;26:1232-1244.

15. Blanchard EB, Hickling EJ, Mitnick N, Taylor AE, Loos WR, Buckley TC. The impact of severity of physical injury and perception of life threat in the development of post-traumatic stress disorder in motor vehicle accident victims. Behav Res Ther. 1995;33(5):529-534.

16. Ehlers A, Mayou RA, Bryant B. Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. J Abnorm Psychol. 1998;107(3):508-519.

17. Pynoos RS, Frederick C, Nader K, et al. Life threat and posttraumatic stress in school-age children. Arch Gen Psychiatry. 1987;44(12):1057-1063.

18. March JS. What constitutes a stressor? The “Criterion A” issue. Posttraumatic stress disorder: DSM-IV and beyond. 1993:37-54.

19. Alzawad Z, Marcus Lewis F, Ngo L, Thomas K. Exploratory model of parental stress during children's hospitalisation in a paediatric intensive care unit. Intensive Crit Care Nurs. 2021 Jul 8:103109. doi: 10.1016/j.iccn.2021.103109. Epub ahead of print.

20. Carter MC, Miles MS. The Parental Stressor Scale: Pediatric Intensive Care Unit. Matern Child Nurs J. 1989;18(3):187-198.

21. Nelson LP, Lachman SE, Goodman K, Gold JI. Admission Psychosocial Characteristics of Critically Ill Children and Acute Stress. Pediatr Crit Care Med. 2021;22:194-203.

22. Stuber ML, Kazak AE, Meeske K, et al. Predictors of posttraumatic stress symptoms in childhood cancer survivors. Pediatrics. 1997;100(6):958-964.

23. Ehlers A, Clark DM. A cognitive model of posttraumatic stress disorder. Behav Res Ther. 2000;38(4):319-345.

24. Kazak AE, Kassam-Adams N, Schneider S, Zelikovsky N, Alderfer MA, Rourke M. An integrative model of pediatric medical traumatic stress. J Pediatr Psychol. 2006;31(4):343-355.

25. Brewin CR. Systematic review of screening instruments for adults at risk of PTSD. J Trauma Stress. 2005;18:53-62.

26. Franck LS, Wray J, Gay C, et al. Predictors of parent post-traumatic stress symptoms after child hospitalization on general pediatric wards: a prospective cohort study. Int J Nurs Studies 2015;52:1021.

27. Muscara F, McCarthy MC, Thompson EJ, et al. Psychosocial, Demographic, and Illness-Related Factors Associated With Acute Traumatic Stress Responses in Parents of Children With a Serious Illness or Injury. J Trauma Stress. 2017;30(3):237-244.

28. National Institute for Health and Care Excellence. Post-traumatic Stress Disorder: National Guideline no 116. London: NICE; 2018 available from https://www.nice.org.uk/guidance/ng116

29. Colville GA. Narrative exposure therapy with parents who have been traumatized in pediatric settings: a case series. Clin Pract Pediatr Psychol 2017;5:161–169.

30. Colville GA, Cream PR, Kerry SM. Do parents benefit from the offer of a follow-up appointment after their child's admission to intensive care?: an exploratory randomised controlled trial. Intensive Crit Care Nurs 2010;26:146-153.

31. Rodríguez-Rey R, Alonso-Tapia J. Development of a screening measure of stress for parents of children hospitalised in a Paediatric Intensive Care Unit. Aust Crit Care 2016;29:151-157.

32. Bryant RA, Moulds ML, Guthrie RM. Acute Stress Disorder Scale: a self-report measure of acute stress disorder. Psychol Assess 2000;12(1):61-68.

33. Liaw KR, Cho J, Devins L, Daly J, Sklenar D, Al-Qaqaa Y. Co-designed PICU Family Stress Screening and Response System to Improve Experience, Quality and Safety. Pediatr Qual Safe 2019;4:e145

34 Kazak AE, Hwang WT, Chen FF, et al. Screening for Family Psychosocial. Risk in Pediatric Cancer: Validation of the Psychosocial Assessment Tool (PAT) Version 3. J Pediatr Psychol. 2018;43(7):737-748.

35. Rothschild CB, Rychlik KL, Goodman DM, Charleston E, Brown ML, Michelson KN. Association Between Resilience and Psychological Morbidity in Parents of Critically Ill Children. Pediatr Crit Care Med 2020;21(4):e177-e185.

36. Baker SC, Gledhill JA. Systematic Review of Interventions to Reduce Psychiatric Morbidity in Parents and Children After PICU Admissions. Pediatr Crit Care Med 2017;18:343-348

37. National Institute for Health and Care Excellence. Rehabilitation After Critical Illness for adults: Clinical Guideline no 83. London: NICE, 2009 available from https://www.nice.org.uk/guidance/cg83

38. Manning JC, Pinto NP, Rennick JE, Colville G, Curley MAQ. Conceptualizing Post Intensive Care Syndrome in Children-The PICS-p Framework. Pediatr Crit Care Med 2018;19:298-300

39. Morris A, Gabert-Quillen C, Delahanty D. The association between parent PTSD/depression symptoms and child PTSD symptoms: a meta-analysis. J Pediatr Psychol 2012;37:1076-1088

40. Abela KM, Wardell D, Rozmus C, LoBiondo-Wood G. Impact of Pediatric Critical Illness and Injury on Families: An Updated Systematic Review. J Pediatr Nurs 2020;51:21-31

Table 1 The Posttraumatic Adjustment Screen (PAS) adapted for use with PICU parents

This questionnaire asks you questions that relate to factors that occurred before, during or after your child's admission to PICU. Circle the response that best describes how much you **agree** with the following statements.

		Not at all	To a small extent	To a moderate extent	To a large extent	Totally
1	I have needed professional help to deal with emotional problems in the past.	0	1	2	3	4
2	Previously traumatic events have impacted negatively on my life in the past (e.g. assault, sexual abuse, previous combat duty, natural disasters, witnessing traumatic events).	0	1	2	3	4
3	In the past I was able to talk about my thoughts and feelings with my family members or friends.	4	3	2	1	0
4	In the past I was satisfied with the support that I had from my friends and family.	4	3	2	1	0
5	At the time of the event, I felt terrified, helpless or horrified.	0	1	2	3	4
6	During the event, I thought *my child*[a] was about to die.	0	1	2	3	4
7	I have felt irritable or angry since the event.	0	1	2	3	4
8	I have found it difficult to concentrate on what I was doing or things going on around me since the event.	0	1	2	3	4
9	I am confident that I can deal with the financial stressors that may arise as a consequence of *my child being on PICU.*[a]	4	3	2	1	0
10	I can accept what happened to *my child*.[a]	4	3	2	1	0

Risk of Post-traumatic Stress Disorder (PAS-P) determined by score of >=16 on the PAS, and risk of depression (PAS-D) determined by score of >=4 on sum of PAS items 1, 2, 5, 7 and 8.[9] [a]Wording was adapted slightly, with permission from developers, to reflect the fact that the potential psychological trauma under consideration was PICU admission.

Table 2 Sample characteristics

	n /median	% /IQR
Parents (n=107[a])		
Male gender	39	(36%)
Age group (years)		
18-29	19	(18%)
30-34	36	(34%)
35-39	23	(21%)
40-44	13	(12%)
>=45	16	(15%)
Ethnicity		
White British	91	(85%)
Relationship status[(n=104)]		
Single parent	9	(8%)
Home owner	63	(59%)
Educated beyond age of 16y[(n=93)]	78	(84%)
Previous PICU experience	32	(30%)
Pre-existing stressors	56	(52%)
Previous mental health problems[(n=105)]	54	(51%)

Children (n=75[a])

Male gender	40	(53%)
Age (years)	1.3	(0.3-8.4)
Length of stay (days)	6.1	(4.9-10.9)
Days ventilated[(n=74)]	4.6	(3.4-7.6)
Emergency admission	67	(89%)
Illness severity (PIM-2)	3.2	(1.1-5.5)
Type of admission		
Respiratory Infections	25	(33%)
Respiratory Other	12	(16%)
Neurology	19	(25%)
Surgical	13	(17%)
Oncology	3	(4%)
Sepsis	2	(3%)
Trauma	1	(1%)

IQR=interquartile range; PIM-2=Paediatric Index of Mortality-2; [a]unless otherwise stated

Table 3 Univariate associations with parental risk of developing a) post-traumatic stress disorder and b) depression, as measured by the Posttraumatic Adjustment Screen (n=107[a])

	Risk of post-traumatic stress disorder (PAS-P)			Risk of depression (PAS-D)		
	Negative screen	*Positive screen*		*Negative screen*	*Positive screen*	
	n=43	*n*=64	*p*[b]	*n*=27	*n*=80	*p*[b]
	n (%)	*n* (%)		*n* (%)	*n* (%)	
Parent variables						
Male Gender	17 (40%)	22 (34%)	0.587	12 (44%)	27 (34%)	0.359[b]
Age <35y	18 (42%)	37 (58%)	0.106	10 (37%)	45 (56%)	0.084
White British Ethnicity	37 (86%)	54 (84%)	0.812	22 (81%)	69 (86%)	0.544
Homeowner	29 (67%)	34 (53%)	0.140	21 (78%)	42 (53%)	0.021
Educated beyond age 16y [(n=93)]	36 (84%)	42 (84%) [n=50]	0.971	23 (85%)	55 (83%) [(n=66)]	1.000
Single parent[(n=104)]	4 (9%)	5 (8%) [n=61]	1.000	2 (7%)	7 (9%)[(n=77)]	1.000
Previous PICU experience	13 (30%)	19 (30%)	0.952	6 (22%)	26 (33%)	0.841
Pre-admission stressors	15 (35%)	41 (64%)	0.003	7 (26%)	49 (61%)	0.001
Previous mental health problems[(n=105)]	11 (26%)[n=42]	43 (68%)[n=63]	<0.001	2 (8%)[n=26]	52 (66%)[n=79]	<0.001

	n (%)	*n* (%)		*n* (%)	*n* (%)	
Child variables						
Male Gender	19 (44%)	37 (58%)	0.166	10 (37%)	46 (57%)	0.066
Emergency admission	38 (88%)	59 (92%)	0.518	26 (96%)	71 (89%)	0.466
	median (IQR)	median (IQR)		median (IQR)	median (IQR)	
Age (yrs)	0.9 (0.3-9.8)	1.1 (0.3-7.2)	0.821	1.2 (0.3-9.8)	1.0 (0.3-7.3)	0.738
Length of stay	5.9 (4.8-11.4)	5.9 (4.9-10.6)	0.675	6.0 (4.2-12.6)	5.8 (4.9-10.0)	0.755
Days ventilated$^{(n=105)}$	4.0 (3.3-7.0)	4.6 (3.4-7.6)	0.423	4.0 (3.1-9.1)	4.5 (3.6- 6.9)	0.570
PIM-2 score	2.3 (1.0-4.7)	3.2 (1.1-5.5)	0.473	3.4 (1.2-5.5)	2.5 (1.0-5.5)	0.380

PAS-P = sum of all items on the Posttraumatic Adjustment Scale and denotes risk of post-traumatic stress disorder if >=16; PAS-D = sum of items 1, 2, 4, 7, and 8 on the PAS and denotes risk of depression if >=4; PIM-2 = Paediatric Index of Mortality; [a]unless otherwise stated; [b]significance level of association using Mann Whitney test for continuous variables and Pearson's Chi Square/Fisher's Exact test for categorical variables

Table 4 Logistic regression models of associations with positive screen for risk of developing a) PTSD and b) depression, on the Posttraumatic Adjustment Scale (PAS)

	B	**SE**	**Odds ratio**	**95% CI**	***p***
PAS risk of PTSD[a]					
Constant	-0.882	0.608	0.414		0.147
Parent age > 35y	-0.691	0.510	0.501	0.184-1.360	0.175
Male child gender	0.158	0.468	1.171	0.468-2.928	0.736
Homeowner	0.510	0.547	1.665	0.570-4.859	0.351
Pre-admission stressors	0.859	0.471	2.361	1.335-7.338	0.068
Previous mental health problems	1.758	0.493	5.802	2.208-15.247	<0.001
MODEL	X^2 =24.048, R^2=0.277, *p*=<0.001				
PAS risk of depression[b]					
Constant	-0.207	0.706	0.813		0.769
Parent age > 35y	-0.711	0.612	0.491	0.148-1.630	0.245
Male child gender	0.479	0.564	1.615	0.535-4.877	0.395
Homeowner	0.147	0.685	1.158	0.302-4.433	0.830
Pre-admission stressors	1.016	0.584	2.761	0.879-8.677	0.082
Previous mental health problems	2.999	0.811	20.070	4.093-98.410	<0.001
MODEL	X^2=35.829, R^2=0.429, *p*=<0.001				

PTSD=Post-traumatic stress disorder; [a]risk of developing PTSD determined by score of >=16 on the PAS; [b]risk of developing depression determined by score of >=4 on sum of PAS items 1, 2, 5, 7 and 8

Table 5 Correlations with pre-existing stressors and previous mental health problems for pre-trauma, peri-trauma and acute stress items on the Posttraumatic Adjustment Scale (PAS)

Psychosocial variables	Sum of *pre-trauma* PAS items[a] r (95% CI)	*p*	Sum of *peri-trauma* PAS items[b] r (95% CI)	*p*	Sum of *acute stress* PAS items[c] r (95% CI)	*p*
Pre-existing stressors	.319 (.138, .480)	0.001	.082 (-.110, .267)	0.404	.273 (.088, .440)	0.004
Previous mental health problems	.488 (.327, .621)	<0.001	.214 (.023, .389)	0.029	.419 (.247, .565)	<0.001

[a]sum of items 1 to 4; [b]sum of items 5 and 6; [c]sum of items 7-10