

PICU Early Mobilization and Impact on Parent Stress

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ABSTRACT

BACKGROUND AND OBJECTIVES: Early mobilization of critically ill children may improve outcomes, but parent refusal of mobilization therapies is an identified barrier. We aimed to evaluate parent stress related to mobilization therapy in the PICU.

METHODS: We conducted a cross-sectional survey to measure parent stress and a retrospective chart review of child characteristics. Parents or legal guardians of children admitted for ≥ 1 night to an academic, tertiary-care PICU who were proficient in English or Spanish were surveyed. Parents were excluded if their child's death was imminent, child abuse or neglect was suspected, or there was a contraindication to child mobilization.

RESULTS: We studied 120 parent-child dyads. Parent mobilization stress was correlated with parent PICU-related stress ($r_s [119] = 0.489; P \leq .001$) and overall parent stress ($r_s [110] = 0.272; P = .004$). Increased parent mobilization stress was associated with higher levels of parent education, a lower baseline child functional status, more strenuous mobilization activities, and mobilization therapies being conducted by individuals other than the children's nurses (all $P < .05$). Parents reported mobilization stress from medical equipment (79%), subjective pain and fragility concerns (75%), and perceived dyspnea (24%). Parent-reported positive aspects of mobilization were clinical improvement of the child (70%), parent participation in care (46%), and increased alertness (38%).

CONCLUSIONS: Parent mobilization stress was correlated with other measures of parent stress and was associated with child-, parent-, and therapy-related factors. Parents identified positive and stressful aspects of mobilization therapy that can guide clinical care and educational interventions aimed at reducing parent stress and improving the implementation of mobilization therapies.

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Admission to the PICU is associated with considerable morbidity for children and stress for parents and families.^{1,2} Adult survivors of critical illness face long-term decrements in functional status and quality of life related to weakness, cognitive impairment, and neuropsychological dysfunction termed postintensive care syndrome.³ Up to one-third of children admitted to the PICU demonstrate functional impairment on discharge persisting in up to 13% of children at 2-year follow-up.⁴ In addition to morbidity in children after admission to the PICU, parents and families are faced with substantial stress when their children are admitted to the PICU¹ and are at risk for developing postintensive care syndrome in pediatrics (PICS-p), which is a recently described framework to understand surviving childhood critical illness with a focus on the interdependence of children and their families.^{5,6} Parents identify stress surrounding a change in their children's appearance and behavior and especially due to an alteration in their parental role when their children have been admitted to the PICU.^{1,7} Parent stress continues after discharge from the hospital⁷ and can include psychiatric disorders.^{2,8,9}

Mobilization therapies improve outcomes in critically ill patients, and a multitude of benefits have been demonstrated in adults who are treated with early mobilization, including reduced length of stay (LOS),^{10–13} decreased delirium,^{12,14} fewer ventilator days,¹⁴ improved functional outcomes,^{10,12–16} and more discharges from the hospital.¹⁰ A recent qualitative study of families of critically ill children revealed that families support early mobilization, and researchers highlight the importance of family engagement in these therapies.¹⁷ In our PICU, we have had a goal-directed early-mobilization protocol in place for >3 years and have found that parent refusal is a barrier to mobilization in 10% of cases in which barriers contributed to protocol failure.¹⁸ Researchers in previous studies have also listed parent refusal as a barrier to mobilization,¹⁷ although several barriers to improving early mobilization exist at both the patient and institutional levels.^{19,20} Parent refusal of therapies is potentially modifiable and may be particularly

important in institutions with protocols in place to overcome other frequently identified systems barriers.

In this study, we aimed to evaluate parent stress as it relates to mobilization therapies to further explore parent refusal of therapies and whether educational interventions to reduce parent stress could be used to decrease the refusal of therapies in future studies. We hypothesize that parent stress surrounding mobilization therapies is measurable and associated with modifiable factors related to parent and clinical factors.

METHODS

Setting

We conducted a written, self-administered survey and medical chart review among 120 parents or guardians of children (subsequently described as parents or parent-child dyads) admitted for PICU hospitalization over 13 weeks in 2016. The combined cardiac and medical-surgical PICU is part of an academic, tertiary-care center and children's hospital located in an urban area and serves as a referral center for several states. A standardized, goal-directed early-mobilization protocol was implemented in the PICU as part of a quality-improvement project 18 months before the initiation of this study. The early-mobilization protocol applies to all patients admitted to the PICU and defines minimum goals for mobility standardized to patient severity of illness and age.¹⁸ Thus, all parents participating in the survey had children who were selected for mobilization therapy per the protocol.

One parent of a child aged 0 to 17 years admitted to the PICU for ≥ 1 night was surveyed. Surveys were administered in English or Spanish to parents who were present at the bedside during the study team's predetermined schedule until 120 surveys were collected. Children were excluded if they had strict bed rest orders superseding the mobilization protocol or if the children's death was imminent. Parents were excluded if they were not legal guardians of their children, if they were not proficient in writing and speaking English or Spanish, or if there was suspicion of child

abuse or neglect. On the basis of PICU census data, 25% of all PICU admissions were surveyed during the study period. The study was approved by the Oregon Health and Science University Institutional Review Board and participants provided verbal consent.

Survey Sample and Design

The survey packet consisted of 4 main components: the Mobilization Survey, the Parental Stressor Scale: PICU (PSS-PICU),²¹ the Perceived Stress Scale 10-item form (PSS-10),²² and the Demographic Questionnaire. The PSS-PICU is a 37-item measure of PICU-related parent stress.²² The PSS-10 is a 10-item measure of general parent stress.

Because there are no published measures of parent stress related to mobilization in the PICU, the Mobilization Survey was created by a multidisciplinary group of pediatric critical-care physicians, child psychologists, and survey researchers through an iterative process. Items underwent iterative cognitive testing²³ with a small sample of parents ($n = 13$) to ensure clarity of questions.

The Mobilization Survey contains 7 questions with a Likert-type scale for 3 questions (Supplemental Fig 2). There are 3 subscales: "person involved" (5 items), "movement activity" (7 items), and "parent worry" (8 items). The survey includes a question regarding the level of communication about movement activity and 2 qualitative items in which parents identify the 3 most concerning and 3 most positive aspects regarding their children's mobilization activities. The final question is open-ended with a free-text option. The person involved subscale involves questions regarding the level of stress experienced by parents when their children were moved by staff and parents and when the children moved independently. The movement activity subscale involves questions regarding parent stress related to increasing degrees of activity in which a child may engage, such as the basic movement of being turned to the advanced movement doing physical therapy exercises. The parent worry subscale included questions regarding parent worry about different factors

associated with child movement, including child pain and discomfort, difficulty breathing, and equipment concerns. On the person involved and movement activity subscales, each item was scored on a Likert-type scale as follows: “not at all stressful” = 1, “not very stressful” = 2, “somewhat stressful” = 3, and “very stressful” = 4. On the parent worry subscale, each item was scored on a Likert-type scale as follows: “not at all worried” = 1, “not very worried” = 2, “somewhat worried” = 3, and “very worried” = 4. If a child did not engage in the activity or a parent left an item blank, that item was not scored as part of the analysis.

The Demographic Questionnaire was created for this study by using a similar iterative process, review by the same multidisciplinary group, and pilot on the same sample of parents. For the Demographic Questionnaire, previously published questions were used whenever possible.²⁴ Demographic items included questions about the child’s previous hospital admissions and chronic medical conditions, parent education history, and parent and child ethnicity.

Survey Procedure

Research staff reviewed the PICU patient census daily as available to identify parent-child dyads who met inclusion and exclusion criteria and who had not yet been surveyed. Appropriate participants were discussed with the bedside nurse and/or PICU physician to ensure the eligibility of the parent-child dyad in the study. Packets were distributed during daytime hours and retrieved within 24 hours.

Medical-Record Review

Medical-record data were extracted in real time at the time of survey-packet distribution, including the patient’s age, sex, Pediatric Overall Performance Category (POPC),²⁵ hospital and PICU LOS, intubation status, mobilization level, and severity of illness (per the early-mobilization protocol¹⁶). Additional data were extracted later via retrospective chart review, including Pediatric Index of Mortality score²⁶ assigned on admission, reason for

admission, primary diagnosis, secondary diagnoses, type of medical condition (acute condition, complex chronic condition, or noncomplex chronic condition²⁷), surgical versus medical admission, primary organ system involved, consults placed for occupational therapy and/or physical therapy during admission, ethnicity, and private versus public insurance.

Data Analysis

Descriptive statistics were used to describe parent and child characteristics as percentages and median with interquartile range (IQR) for continuous variables. Cronbach’s α was used to determine the internal consistency of the Mobilization Survey. A Total Parent Mobilization Stress Score was derived by calculating the average stress or worry rating across each of the 20 items from each of the 3 subscales. The vast majority of parents reported receiving adequate explanation regarding mobilization procedures, and this item was found to have 0 variance during a reliability statistical analysis; therefore, this item was not included in the Total Parent Mobilization Stress Score. Spearman’s rank correlation coefficients (r_s) were also performed to determine the relationship of the Total Mobilization Stress Score with other measures of parent stress, parent demographic variables, and child demographic and clinical variables. Because of the use of rating scales and possibility of data nonnormality, a series of Wilcoxon rank tests were performed as a nonparametric repeated measures test. Mann-Whitney U tests were conducted to test for differences between independent groups for post-hoc analysis. Pairwise comparisons were made across each parent’s identified level of stress based on the individual helping to move the child and level of activity. Significance levels were set at $P \leq .05$. To control for type 1 errors, a Bonferroni adjustment to the α value was conducted for the Wilcoxon rank tests for each group of comparisons to $P < .05$, and results below include those with and without the Bonferroni adjustment. A thematic analysis was conducted on responses to the free-text question at the end of the Mobilization Survey.²⁸ Parent comments were used to

construct thematic networks and identify global themes. Exploration and a description of thematic networks were used to identify patterns within the data for interpretation. Quotations were included as representative examples of global themes to enrich detail. All analyses were performed with Data Editor 24 (IBM SPSS Statistics, IBM Corporation).

RESULTS

Sample

Characteristics of the 120 parents-child dyads are displayed in Table 1. Parents responding to the survey predominantly identified as women ($n = 99$; 83%) and white ($n = 85$; 71%). The median parent age was 32 years (IQR 27–39 years). This was the first PICU admission for 88 patients (73%). Most children had normal functional status (POPC 1 or 2) at baseline ($n = 94$; 78%). The median LOS in the hospital was 2 days (IQR 1–3.5 days), whereas the median LOS in the PICU was 1 day (IQR 1–3 days). Admissions were for acute conditions in 39 (33%) children, noncomplex chronic conditions in 16 (13%), and complex chronic conditions in 64 (54%).²⁷ Respiratory, neurologic, and cardiac diseases were the most common primary diagnosis systems. Twenty-nine (24%) patients were intubated at the time of survey.

Mobilization Survey Properties

The Mobilization Survey showed high internal consistency (20 items; $\alpha = .82$). In addition, the internal consistency on the specific subscales of the Mobilization Survey was also high: person involved subscale $\alpha = .90$ (5 items), Mobilization Activity subscale $\alpha = .89$ (7 items), and parent worry subscale $\alpha = .76$ (8 items).

Overall Mobilization Stress

The distribution of the Total Parent Mobilization Stress Scores is shown in Fig 1. Most parents reported mobilization activities as being not at all stressful or not very stressful ($n = 97$; 81%). The mean Total Parent Mobilization Stress Score on the Mobilization Survey was correlated with the mean PSS-PICU and PSS-10 scores. There was a statistically significant positive association between the mean Total Parent

TABLE 1 Parent and Child Characteristics

Characteristic	Result (N = 120)
Parent	
Women, <i>n</i> (%)	99 (83)
Parent age, y, median (IQR)	32 (27–39)
Highest level of education, <i>n</i> (%)	
Less than high school	12 (10)
High school	28 (24)
Some college	36 (31)
College degree or more	42 (35)
Race and/or ethnicity, <i>n</i> (%)	
White	85 (71)
Hispanic	23 (19)
Other	22 (18)
Spanish speaking, <i>n</i> (%)	7 (6)
Child	
Girls, <i>n</i> (%)	52 (43)
Age, y, median (IQR)	3 (0.6–9)
Ethnicity, <i>n</i> (%)	
White	79 (66)
Hispanic	22 (19)
Other	18 (15)
POPC, ^a <i>n</i> (%)	
1 or 2	94 (78)
≥3	25 (21)
First PICU admission, <i>n</i> (%)	88 (73)
Public (Medicaid) insurance, <i>n</i> (%)	63 (53)
Hospital LOS, d, median (IQR)	2 (1–3.5)
PICU LOS, d, median (IQR)	1 (1–3)
Type of medical condition, ^b <i>n</i> (%)	
Acute	39 (33)
Noncomplex chronic	16 (13)
Complex chronic	64 (54)
Admitted after surgical procedure, <i>n</i> (%)	39 (33)
Intubated at time of survey, <i>n</i> (%)	29 (24)
Primary organ system involved, <i>n</i> (%)	
Respiratory	41 (35)
Neurologic	25 (21)
Cardiovascular	23 (19)
Endocrine	7 (6)
Other organ system ^c	6 (5)
PSS-10 score, median (IQR)	14 (5–23)
PSS-PICU score, median (IQR)	2.2 (1.4–3)

^a POPC is a method of assessing the general functional status of a child via a qualitative assessment of performance based on the Glasgow Outcome Scale.¹⁸

^b As defined by Feudtner.²⁰

^c Other organ systems include the dermatologic; gastrointestinal; genetic; gynecologic; hematologic; immunologic; infectious; injury, poisoning, and/or adverse event; metabolic; oncologic; ophthalmologic; orthopedic; psychiatric; renal and/or genitourinary; and rheumatologic system.

Mobilization Stress Scores and their rating on the PSS-PICU (r_s [119] = 0.489; $P \leq .001$) and the PSS-10 (r_s [110] = 0.272; $P = .004$).

Table 2 includes the correlations between parent and child characteristics and Total Parent Mobilization Stress Scores. An increased Total Parent Mobilization Stress Score was significantly associated with lower baseline functional status of the child (POPC ≥ 3 compared with POPC 1 or 2), increased parent education (college or graduate education compared with lower levels of education), the child being moved by individuals other than the nurse (nurse compared with PICU staff or parent or child moving independently), and with more strenuous activity (standing or walking compared with turning or repositioning; all $P < .05$).

Causes of Mobilization Stress

Analysis of the Mobilization Survey revealed that parents identified sources of mobilization stress as medical equipment (79%), subjective pain and fragility concerns (75%), and perceived dyspnea (24%). Parent-reported positive aspects of mobilization were clinical improvement of their child (70%), parent participation (46%), and increased alertness (38%). Parents overwhelmingly (91%) described the quality of explanation about movement activities as being “good.” Thirty-eight parents (32%) provided free-text comments on the Mobilization Survey that were used for thematic analysis. Examples of parent comments are included in Table 3. There was substantial heterogeneity in responses, but 2 global themes emerged: (1) parents believed mobilization was a beneficial part of PICU care, and (2) parent stress surrounding mobilization could be overcome with provider communication. In fact, 21 comments (55%) praised mobilization activities and/or staff, whereas only 6 (16%) expressed concerns about child discomfort, the parent or child feeling stress, and/or the type of mobilization activity. Specific sources of stress highlighted by parents included alarms, lines, equipment, and disease- and/or patient-specific concerns. Twelve (32%) parents commented on the importance of communication and staff providing

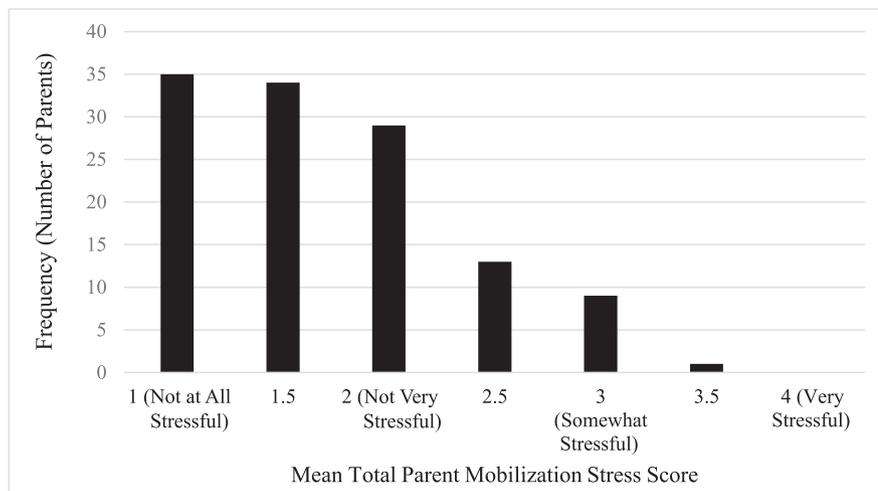


FIGURE 1 Frequency of parents reporting mean Total Parent Mobilization Stress Scores. Total Parent Mobilization Stress Scores ranged from 1 to 4, in which 1 is not at all stressful and 4 is very stressful.

“encouraging,” “kind,” and “detailed” explanations surrounding mobilization. Four (11%) parents provided specific

recommendations for improving communication about mobilization activities.

TABLE 2 Variables Associated With Differences in Overall Parent Mobilization Stress

Characteristic	Total Parent Mobilization Stress Score, Mean (SD) ^a	P
Child POPC ^b		
1 and 2	1.87 (0.06)	Reference
≥3	2.18 (0.12)	.013
Parent education ^b		
College degree or more	2.13 (0.49)	Reference
Some college	1.76 (0.60)	.005 ^c
High school	1.86 (0.51)	.044
Less than high school	1.78 (0.87)	.022
Who moved the child ^d		
Child's nurse	1.61 (0.83)	Reference
PICU staff	1.69 (0.90)	.005 ^c
Child moved independently	1.71 (0.93)	.001 ^c
Other parent	1.74 (0.94)	.239
Responding parent	1.84 (0.94)	.002 ^c
Type of mobilization activity ^d		
Turn and/or reposition	1.77 (0.87)	Reference
Sitting	1.63 (0.83)	.827
Parent holding	1.64 (0.88)	.320
Range of motion activity	1.67 (0.95)	.127
PT and/or OT	1.67 (0.92)	.414
Walking	1.84 (0.93)	.029
Standing	1.85 (0.89)	.032

OT, occupational therapy; PT, physical therapy.

^a Mobilization stress scores range from 1 to 4, in which 1 is not at all stressful and 4 is very stressful.

^b Mann-Whitney *U* test.

^c Remained significant after Bonferroni adjustment.

^d Wilcoxon rank test.

DISCUSSION

To our knowledge, this is the first study in which researchers characterize parent responses to early-mobilization therapies for critically ill children. Notably, we found that although admission to the PICU is a difficult experience for families,⁷ most parents did not experience significant stress related to mobilization therapy. A subset of parents did experience significant mobilization stress, and we found that parent mobilization stress was correlated with parent preadmission and PICU-related stress. Certain factors were associated with increased parent mobilization stress, including higher levels of parent education, low baseline function of the child, more strenuous mobilization activities, and mobilization therapies being conducted by individuals other than the child's nurse. Qualitative analysis revealed that parents in our study viewed mobilization as important, and we highlight effective and encouraging communication as a tool to help overcome stress related to mobilization.

Interestingly, most parents did not experience significant mobilization stress. In addition, more than half of the parents' written survey comments praised mobilization activities and/or staff. This may reflect adequate anticipatory guidance provided to families before mobilization activities. Thematic analysis revealed that parents viewed mobilization as an important therapy in the PICU. This highlights the importance of bedside nurse communication with families about mobilization therapies and is supported by other studies in which researchers examine collaboration between parents and staff during early mobilization.^{17,29,30}

Parent mobilization stress was correlated with parent preadmission and PICU-related stress. There is substantial morbidity for parents of children admitted to the PICU, including the development of not only parent stress but also PICS-p and psychiatric disorders.^{1-3,8,9} Families rated participating in the care of their children as important³¹ and feel that their presence is critical to their children's emotional and physical welfare and helps relieve anxiety and fear related to hospitalization.³² In

TABLE 3 Examples of Parent Comments From Mobilization Survey

Category	Quote
Mobilization activities as a beneficial part of PICU care	<p>"I know movement is important to healing. I have no issue with moving my son. Even if he's uncomfortable, I know it's important for his healing."</p> <p>"There should be a white board of activities approved and [a] must-do-every-d checklist."</p> <p>"I believe they are very important for the child and the parents."</p> <p>"I feel that holding my baby as much as possible is the most important thing after his stabilization."</p>
Communication beneficial in overcoming stress surrounding mobilization activities	<p>"The nurse really encouraged me to hold him and assured me it would be fine. ... Getting the reassurance from the nurse made me not feel stressed to hold him at all."</p> <p>"I feel that the PICU covers every detail and explains everything to parents before the child or children are moved."</p> <p>"The nurse really encouraged me to hold him and assured me it would be fine. It made me feel happy since the nurse made it seem more than okay to do so. Getting the reassurance from the nurse made me not feel stressed to hold him at all."</p> <p>"When things are explained, then everything is easier on everyone. [It] helped us stay positive and [ask for] help when appropriate."</p> <p>"I was hesitant because I thought he was in pain, but they insisted on continuing, and I'm very glad they did; it helped a lot!"</p> <p>"The encouragement to hold my child was great. And I was helped with all the wires, which was a concern to me."</p>

signs. However, these findings should be viewed cautiously given the small sample size and the exploratory nature of this study.

This study has several limitations, including the creation and use of a novel tool to measure parent mobilization stress. To our knowledge, there is no previously published tool to which the Mobilization Survey could be compared, but the iterative design and correlation with other measures of parent stress support the consistency of this novel tool.

The sampled population was heterogeneous, which may mask trends in parent mobilization stress and limit generalizability to specific populations. We designed the inclusion and exclusion criteria to allow for most parent-child dyads admitted to the PICU to be eligible for this study because it would best reflect our PICU population, to which the early-mobilization protocol applies.

One challenge inherent to a survey study is the potential bias of participants included in the study. Undersampling some parent populations may bias our results because these parents may have experienced more stress related to mobilization.

Further research is needed to better characterize subpopulations of parents who experience increased mobilization stress, such as a targeted survey of parents of children who are mobilized to higher activity levels. We plan to create an intervention to help reduce parent mobilization stress to improve the family experience, which would align with the patient- and family-centered care model,³⁴ and test this intervention to determine if it improves the early mobilization of critically ill children admitted to the PICU.

CONCLUSIONS

We found that parent mobilization stress was correlated with other measures of parent stress, and certain child-, parent-, and therapy-related factors were associated with increased parent mobilization stress. These factors may be modifiable with interventions to help decrease parent stress and refusal of mobilization therapies in the future. Parents identified positive and stressful aspects of mobilization therapy

addition, recent guidelines for family-centered care of patients admitted to ICUs recommend that family members be incorporated into caring for their children to improve family psychological health during ICU admission and postdischarge.³³ Our parents highlighted the importance of provider and parent communication with detailed and encouraging words to help them overcome stress related to mobilization therapies. Given that we found that a subset of parents experience significant mobilization stress, interventions to increase parent involvement in mobilization activities may help to alleviate both parent mobilization stress and overall stress, possibly minimizing the development of PICS-p and other morbidities.

Factors such as higher levels of parent education, lower child baseline function, more strenuous mobilization activities, and mobilization therapies being conducted by individuals other than the child's nurse were associated with increased parent mobilization stress. In addition, equipment-related concerns were prevalent among families, as illustrated by the qualitative questions and written survey comments. These variables provide targets to improve education or communication with families or other interventions surrounding early-mobilization activities, such as specifying what parents should expect in the mobilization activity, setting appropriate alarm limits to minimize alarms, or describing anticipated changes in vital

that can be used in clinical care and future research of mobilization therapies in the PICU. Educational interventions may improve the implementation of mobilization protocols and reduce parent stress related to PICU mobilization therapies.

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REFERENCES

- Shudy M, de Almeida ML, Ly S, et al. Impact of pediatric critical illness and injury on families: a systematic literature review. *Pediatrics*. 2006;118 (suppl 3):S203–S218
- Nelson LP, Gold JL. 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
- 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(2):502–509
- Ong C, Lee JH, Leow MK, Puthuchery ZA. Functional outcomes and physical impairments in pediatric critical care survivors: a scoping review. *Pediatr Crit Care Med*. 2016;17(5):e247–e259
- 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(4):298–300
- Watson RS, Choong K, Colville G, et al. Life after critical illness in children—toward an understanding of pediatric post-intensive care syndrome. *J Pediatr*. 2018;198:16–24
- 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
- Shears D, Nadel S, Gledhill J, Garraalda ME. Short-term psychiatric adjustment of children and their parents following meningococcal disease. *Pediatr Crit Care Med*. 2005;6(1):39–43
- Tomlinson PS, Harbaugh BL, Kotchevar J, Swanson L. Caregiver mental health and family health outcomes following critical hospitalization of a child. *Issues Ment Health Nurs*. 1995;16(6):533–545
- Klein K, Mulkey M, Bena JF, Albert NM. Clinical and psychological effects of early mobilization in patients treated in a neurologic ICU: a comparative study. *Crit Care Med*. 2015;43(4): 865–873
- Morris PE, Goad A, Thompson C, et al. Early intensive care unit mobility therapy in the treatment of acute respiratory failure. *Crit Care Med*. 2008;36(8): 2238–2243
- Needham DM, Korupolu R, Zanni JM, et al. Early physical medicine and rehabilitation for patients with acute respiratory failure: a quality improvement project. *Arch Phys Med Rehabil*. 2010;91(4):536–542
- Titsworth WL, Hester J, Correia T, et al. The effect of increased mobility on morbidity in the neurointensive care unit. *J Neurosurg*. 2012;116(6): 1379–1388
- Schweickert WD, Pohlman MC, Pohlman AS, et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet*. 2009;373(9678): 1874–1882
- Bailey P, Thomsen GE, Spuhler VJ, et al. Early activity is feasible and safe in respiratory failure patients. *Crit Care Med*. 2007;35(1):139–145
- Burtin C, Clerckx B, Robbeets C, et al. Early exercise in critically ill patients enhances short-term functional recovery. *Crit Care Med*. 2009;37(9): 2499–2505
- Zheng K, Sarti A, Boles S, et al. Impressions of early mobilization of critically ill children—clinician, patient, and family perspectives. *Pediatr Crit Care Med*. 2018;19(7): e350–e357
- Colwell BRL, Williams CN, Kelly SP, Ibsen LM. Mobilization therapy in the pediatric intensive care unit: a multidisciplinary quality improvement initiative. *Am J Crit Care*. 2018;27(3):194–203
- Choong K, Koo KK, Clark H, et al. Early mobilization in critically ill children: a survey of Canadian practice. *Crit Care Med*. 2013;41(7): 1745–1753
- Wieczorek B, Ascenzi J, Kim Y, et al. PICU Up!: impact of a quality improvement intervention to promote early mobilization in critically ill children. *Pediatr Crit Care Med*. 2016;17(12): e559–e566
- Carter MC, Miles MS. The parental stressor scale: pediatric intensive care unit. *Matern Child Nurs J*. 1989;18(3): 187–198
- Cohen S, Williamson G. Perceived stress in a probability sample of the United States. In: Spacapan S, Oskamp S, eds. *The Social Psychology of Health: Claremont Symposium on Applied Social Psychology*. Newbury Park, CA: Sage; 1988:31–67
- Fowler FJ Jr. *Improving Survey Question: Design and Evaluation*. Thousand Oaks, CA: Sage Publications; 1995
- Data Resource Center for Child and Adolescent Health. The National Survey of Children's Health. Available at: www.childhealthdata.org/learn/NSCH. Accessed January 1, 2016
- Fiser DH. Assessing the outcome of pediatric intensive care. *J Pediatr*. 1992; 121(1):68–74
- Slater A, Shann F, Pearson G; Paediatric Index of Mortality Study Group. PIM2: a revised version of the Paediatric Index of Mortality. *Intensive Care Med*. 2003; 29(2):278–285
- Feudtner C, Christakis DA, Connell FA. Pediatric deaths attributable to complex chronic conditions: a population-based study of Washington State, 1980–1997. *Pediatrics*. 2000;106(1, pt 2):205–209
- Attride-Stirling J. Thematic networks: an analytic tool for qualitative research. *Qual Res*. 2001;1(3):385–405

29. Melnyk BM. Intervention studies involving parents of hospitalized young children: an analysis of the past and future recommendations. *J Pediatr Nurs.* 2000;15(1):4–13
30. Harbaugh BL, Tomlinson PS, Kirschbaum M. Parents' perceptions of nurses' caregiving behaviors in the pediatric intensive care unit. *Issues Compr Pediatr Nurs.* 2004;27(3):163–178
31. Fisher MD. Identified needs of parents in a pediatric intensive care unit. *Crit Care Nurse.* 1994;14(3):82–90
32. Coyne IT. Partnership in care: parents' views of participation in their hospitalized child's care. *J Clin Nurs.* 1995;4(2):71–79
33. Davidson JE, Aslakson RA, Long AC, et al. Guidelines for family-centered care in the neonatal, pediatric, and adult ICU. *Crit Care Med.* 2017;45(1):103–128
34. Committee on Hospital Care; Institute for Patient- and Family-Centered Care. Patient- and family-centered care and the pediatrician's role. *Pediatrics.* 2012;129(2):394–404

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