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PREDICTORS OF PARENT'S KNOWLEDGE OF HOSPITAL-BASED PEDIATRIC FALLS

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Ethics approval statement

This study received Human Research Ethics Committee approval and ratification by an academic Human Research Ethics Committee.

PREDICTORS OF PARENTS' KNOWLEDGE OF HOSPITAL-BASED PEDIATRIC FALLS

ABSTRACT

Purpose: This study aimed to validate and to determine the individual characteristics and demographic factors associated with parents' knowledge of hospital-based pediatric falls and to identify parent populations more likely to report low levels of falls-related knowledge.

Design: Validation of a questionnaire and a cross sectional survey design

Methods: Parents (n=200) of hospitalized children admitted to a tertiary specialist pediatric hospital in Australia completed an online questionnaire. Parents were asked to rate their hospital-based falls knowledge using a Likert scale (1-5). The questionnaire was administered to parents across six hospital wards, one day a week, from May to August 2019. Validation of the questionnaire involved factor analyses and reliability tests. Finally, descriptive analysis measured parent's knowledge and a multivariate logistic regression analysis reported factors associated with parents' falls knowledge. All data were analyzed into SPSS (V27). Ethical approval was received for all stages.

Results: The final version of the parent knowledge of falls questionnaire consisted of 23 questions across 5 domains (Cronbach $\alpha=0.929-0.70$). Parents' knowledge of hospital-based falls ranged from 2.5-4.5 while knowledge that children may fall during parental presence rated the lowest score. Knowledge of inpatient falls was higher if their child had a high risk of falls (OR 2.1, $p=0.04$) and they were Australian-born parents (OR 1.9, $p=0.05$).

Practice implications:

The parent knowledge of falls questionnaire is an evidence-based instrument developed for a pediatric hospital setting. Findings highlight knowledge gaps and parent groups with the highest risk of having inadequate hospital-based falls knowledge. The questionnaire enables pediatric nurses and educators to measure parent's knowledge of hospital-based falls accurately and consistently, and so to identify gaps and subsequently, develop, implement and evaluate falls education using an evidence-based approach.

Keywords

Pediatric inpatient falls, patient safety, parent education, parent knowledge, risk-factors

What is currently known?

- Hospital-based falls are largely preventable, yet persist.
- Previous studies report that parents are unaware that paediatric hospital-based falls occur and have poor knowledge of specific falls related risks and prevention strategies.
- To date, falls related educational programs have been based on nurses' perception of parents learning needs and are not evidence based.

What does this article add?

- The Parent Knowledge of Falls questionnaire provides a validated tool to measure parent's knowledge of hospital-based falls using an evidence-based approach.
- Findings from this study highlight parents' knowledge gaps and populations at risk of poor knowledge.

PREDICTORS OF PARENTS' KNOWLEDGE OF HOSPITAL-BASED PAEDIATRIC FALLS

INTRODUCTION

Hospital-based pediatric falls are largely preventable, yet falls continue to occur resulting in significant hospital-acquired harm or death (Almis, Bucak, Konca, & Turgut, 2017; Feuerlicht, Agaliotis, & Hinchcliff, 2020; Jamerson et al., 2014; Wallace, 2014). The first epidemiological study to describe pediatric hospital-based falls (Rasmus, Wilson, Smith, & Newman, 2006) highlighted that there are clear differences in the incidence and the type of risk factors attributed to pediatric falls compared to adult populations. Overall, the reported incidence of pediatric falls is considerably lower (Feuerlicht et al., 2020; Feuerlicht, Sheppard-Law, & Hinchcliff, 2018; Jamerson et al., 2014) with rates of 0.77 to 1.36 per 1,000 patient-days (Feuerlicht et al., 2018; Fujita, Fujita, & Fujiwara, 2013; Harvey, Kramlich, Chapman, Parker, & Blades, 2010) or a mean rate of 0.87 per 1,000 patient days (Kingston, Bryant, & Speer, 2010). The lower pediatric incident rates contrast adult fall rates of 3.3-11.5 falls per 1,000 patient days in the United States of America, 6.3 falls per 1000 bed days in the United Kingdom and 3.7 harm related falls per 1000 separations in Australia (Australian Institute of Health and Welfare, 2021; Bouldin et al., 2013; Parsons, Cramb, & McPhail, 2021). Risk factors that are unique to pediatrics include a child's developmental age, male gender, a history of falls, and the presence of a parent and/or a carer at the bedside (Feuerlicht et al., 2020; Kingston, Bryant, & Speer, 2010; Schaffer et al., 2012; Wallace, 2014). Although there is no evidence of significance to report a causal relationship between parental presence at the time of a fall and the incidence of a fall, hospital based falls have occurred during parent supervision in 84% (n = 133) of infants to

57% (n = 104) of adolescents and 82.8% (n=82) of all aged children respectively (Jamerson et al., 2014; Razmus et al., 2006) while newborns have been accidentally dropped from hospital beds or chairs while being held by a parent or breastfed (Helsey, 2010; Matteson, Henderson-Williams, & Nelson, 2013; Monson, Henry, Lambert, Schmutz, & Christensen, 2008). Previous studies have attributed falls of this nature to parents' perception that hospital-based falls do not occur, lack of falls education, distractions at the bedside, parental exhaustion, or emotional parent and/or child distress (Bagnasco, Sobrero, Sperlinga, Tibaldi, & Sasso, 2010; Fujita et al., 2013; Jamerson et al., 2014; Matteson et al., 2013; Razmus et al., 2006; Shala, Brogan, Cruickshank, Kornman, & Sheppard-Law, 2019).

Pediatric patient safety strategies, such as parent education, require a multi-faceted strategic approach. Previous studies highlight the benefits of providing falls education to parents resulting in behavioral changes and a reduction in falls incident rates (Almis et al., 2017; Lee, Yip, Goh, Chiam, & Ng, 2013; Monson et al., 2008; Tung, Liu, Yang, Syu, & Wu, 2009). However, the educational content to date has been limited to clinicians' perceptions of parental learning needs. Given that parents' lack of knowledge regarding falls has been previously shown (Shala et al., 2019) targeted education that is informed by parents' knowledge and learning needs may be a prudent and proactive strategy. Empowering parents with falls prevention knowledge that is content relevant and dynamic is fundamental to improving patient safety and enables parents to share the responsibility as partners in care and to minimize and/or mitigate falls risk (Tobiano, Chaboyer, & McMurray, 2013). The importance of measuring parents' knowledge and/or adjusting the educational content to meet parents' knowledge and learning needs are

not well understood (Benning & Webb, 2019; Lee et al., 2013). This study aimed to validate a developed questionnaire to measure parent's knowledge of hospital-based falls with the view to identify knowledge gaps and parent population groups at most risk of having lower levels of hospital-based falls knowledge.

METHODS

The development and validation of the parent knowledge of falls (PKOF) questionnaire involved three stages (Supplementary file) with the third stage involving psychometric testing of the questionnaire using a cross-sectional survey design. For this study, a hospital-based fall was defined as a sudden unintentional descent to the floor from a standing, sitting or other position with or without harm to the patient (World Health Organisation, 2011). The study site is the largest pediatric hospital network in Australia, geographically positioned across two hospital campus sites (34 kilometers apart). It receives state-wide and interstate admissions, and/or transfer for specialist care, of critically ill children or children that have chronic and/or complex care needs (NSW Ministry of Health, 2017). It additionally has a catchment of the population that live in relative proximity to the network of hospitals location.

Sample

Parents were recruited from six inpatient surgical or medical wards on one day each week from May to August 2019. To test the validity of the questionnaire, 10 participant responses per item were sought, hence we aimed to recruit 230-280 participants to complete the cross-sectional survey (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018b; MacCallum, Widaman, Preacher, & Hong, 2001; MacCallum, Widaman, Zhang, & Hong, 1999; Pett, Lackey, & Sullivan,

2003). Potential parents were considered eligible if their child had been an inpatient for more than 24 hours, and could speak English proficiently. Parents were excluded if their children were admitted to an intensive/critical care unit, emergency, or acute mental health units, or if their child's health had deteriorated.

Questionnaire

The questionnaire was reduced from 38 to 23 items during three stages of questionnaire development and validation (Supplementary file). The latter stage of validation of the questionnaire involved a factor analyses and reliability tests. During this stage, parents were asked to rate items using a Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire asked questions about parent's awareness and knowledge of hospital-based falls. The questionnaire further collected parent reported data related to the child's hospitalization and the parent's demographic information. Child's hospitalization information included: gender, age of the child, mobility, previous falls history, total length of time hospitalized, number of hospital admissions, number of siblings living at home. Demographic information included the participant's relationship to the hospitalized child, country of birth, and preferred language spoken at home.

Procedure

Ethical approval was gained for all stages of the study (LNRSSA/18/37) and ratified by an academic institution (ETH18-2329). Eligible parents were invited to participate in the study and provided with an information sheet. A verbal willingness to complete the questionnaire was assumed as consent. Permission to approach parents on the day of recruitment was discussed with the Nurse Unit Manager giving ethical consideration to individual family healthcare needs

and stresses. The interviewer was an external researcher unknown to ward-staff, patients and/or families to minimize selection bias. Fourteen parents of those approached declined to participate in the cross-sectional survey due to tiredness (n=5), a lack of confidence (n=1), working at the child's bedside (n=1) and playing computer games with their child (n=3). The remaining four parents were preparing to leave the ward for recreational and/or personal purposes. Once consented, the anonymous Parents Knowledge of Falls (PKOF) questionnaire including demographic questions was administered by the first author at the patient bedside. Participant responses were entered online into SurveyMonkey via an iPad. All questions required a response.

Data management

At the completion of recruitment, data were imported into a Statistical Package for the Social Sciences (SPSS) database for cleaning and recoding. All categorical data such as the reason for admission, country of birth, or preferred language spoken at home were grouped and recoded in SPSS. Children scoring ≥ 12 points were classified as having a high risk of falling as per the Humpty Dumpty risk assessment tool (Pauley, Houston, Cheng, & Johnston, 2014). The median value was used to determine the binary endpoints. Knowledge across the population was considered adequate if the mean score was 3 or more. Parents' knowledge was categorized into binary endpoints where responses >3 (somewhat agree to strongly agree) were taken as adequate knowledge.

Data Analysis

Mean values and standard deviations were calculated for continuous data, and frequencies reported for categorical data. A principal component analysis of the 28 items for all participant

responses was performed to measure the association between items and a factor and to define the part of the construct that could be grouped (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018a; Cohen & Swerdlik, 2005). Factor analysis seeks to cluster a collection of items into a natural collection of groups (Kirkwood & Sterne, 2003; Tavakol & Dennick, 2011a). Examination of the screen plot identified a six-factor solution. We retained factors that had an eigenvalue >1 with a primary loading cut off of 0.4 using a varimax rotation (Boateng et al., 2018b).

A mean score for each of the parent's knowledge of hospital-based falls questions and factorial domains were calculated and are summarized in Table 2. The internal consistency for six factorial domains were tested with a Cronbach's alpha score of at least ≥ 0.70 accepted as adequate internal consistency (Boateng et al., 2018b; Tavakol & Dennick, 2011b). Reliability and internal consistency scores were high for five domains (range Cronbach alpha=0.929-0.70). The five factors were; Knowledge of risk (8 items), Providing supervision (4 items), Perceptions of safety (5 items), Developmental falls risk (3 items) and Preventing falls (3 items). The sixth domain 'Worry' consisting of two items received a Cronbach alpha score of 0.44 and these two items were subsequently excluded from the final questionnaire. Despite the exclusion of the sixth factor containing item 25 and 26, the overall internal consistency of the questionnaire remained high. The low Cronbach alpha score for 'Worry' is probably because parents' 'worry' or concern that falls occur are unlikely to influence parents' knowledge or perceived falls risk. The total reliability score for the questionnaire was moderately high with a Cronbach alpha=0.79 (Cohen

& Swerdlik, 2005). The final questionnaire consisted of 23 questions with five factors extracted explaining 63.8% variance.

Finally, data was entered in a univariate logistic regression analysis to measure the association between parent demographics factors and child hospital admission related factors with parents' total knowledge of hospital-based falls and prevention. Factors significantly associated with parents' knowledge in a univariate analyses were entered into a multivariate logistic regression analysis. The significance level was set at $p=0.05$. Sensitivity and specificity were calculated.

Results

The Parent Knowledge of Falls (PKOF) 23 item five-factor questionnaire reliability and validity are acceptable. Internal consistency for the five-factor domains and overall questionnaire was considerably high (Boateng et al., 2018b; Cohen & Swerdlik, 2005). The demographic characteristics of parents of inpatient children ($n=200$) who agreed to complete the online questionnaire are reported in Table 1. Parents reported that their children were, on average, 8 years and 2 months old (SD 5.1) ranging from 2 months – 17 years old, most of whom were able to walk independently at home ($n=145$, 72.5%). Children were admitted for varied reasons (Table 1) for a mean of 8.8 nights (SD 29.1) A child's calculated risk of falls ranged from 7 to 18 with 30% ($n=59$) of children classified as having a high risk (score ≥ 12) of a hospital-based fall.

Parent knowledge

Parents' overall knowledge of hospital-based falls by item ranged between a mean score of 2.5 to 4.5 (out of a maximum score of five). Questions (n=3) relating to developmental related risk and one question relating to parents' perception that a child will not fall out of bed whilst a parent is present at the bedside rated the lowest mean scores. By domain, parents' knowledge of hospital-based falls and prevention strategies across the five falls-related factor domains ranged from a mean score of 2.7 to 4.1 (Table 2). Parents' knowledge of the developmental risk of a fall occurring was particularly low for an infant (0-2 years), child (3-12 years) or teenager (>13 years). The perception that teenagers are at risk of falling reported a low mean score of 2.5 (SD 0.8).

Factors associated with parent knowledge of falls

Demographic characteristics of parents and children associated with a parent's hospital-based falls knowledge in a univariate analysis are shown in Table 3. Controlling for factors significant at $p=0.05$ in univariate analysis, multivariate analysis indicated that parents of children with high falls risk (OR 2.1, $p=0.04$ 95%CI 1.0-3.4) were twice more likely to report a knowledge score > 3 compared to parents of children with low falls risk. Similarly, Australian-born parents (OR 1.9, $p=0.05$ 95%CI 0.3-1.1) were 1.9 times more likely to be knowledgeable about hospital falls compared to parents who reported migrating to Australia. The sensitivity and specificity for the regression model were 84.1% and 38.5% respectively.

DISCUSSION

To our knowledge, our study is the first to measure parents' knowledge and identify knowledge gaps and parent populations more likely to report falls knowledge using a validated questionnaire. The PKOF questionnaire fills an important gap in the literature enabling pediatric clinicians and educators to measure parent's knowledge of hospital-based falls, identify gaps and subsequently, develop, implement and evaluate falls education using an evidence-based approach. Gaps in parental knowledge were identified and include the developmental related falls risks and parental presence at the hospital bedside. Australian-born parents and parents of children who were categorized as having a high falls risk reported higher levels of falls knowledge.

Parents' need for knowledge is integral to support hospital safety, and is likely to change over time reflecting the dynamic nature of a hospital environment, equipment, and parent populations that attend the hospital. Therefore, it is important to measure parents' knowledge regularly using a validated questionnaire and to adapt the content of falls prevention education accordingly. Previous studies highlight the benefits of providing falls education to parents resulting in behavioral changes and a transient reduction in falls incident rates (Almis et al., 2017; Lee et al., 2013; Monson et al., 2008; Tung et al., 2009). Given that hospital-based fall incidents persist (Almis et al., 2017; Feuerlicht et al., 2020; Jamerson et al., 2014), targeted education informed by parent's measured learning needs may be a more sustainable and proactive strategy to reduce hospital-based falls. Measuring and identifying what parents don't know about hospital-based falls ensures that content is targeted, family-centered and relevant to parents' learning needs.

In this study, parents' knowledge gaps were identified across one of the five-factor domains: developmental risk. Parents' perceived knowledge that the developmental stage of an infant /preschooler (<5 years), child (>5 to <12 years) or adolescent rated poorly (Table 2). However, the low mean score for this factor domain is likely to reflect parents' knowledge of their child's risk of a hospital-based fall rather than an understanding of the risks associated across all age-groups. Increased parent knowledge of age-related risks may pre-empt the implementation of prevention strategies for visiting siblings and/or other hospitalized children. Parents' knowledge that teenagers are at risk of falling in a hospital setting rated the lowest score and suggest that falls prevention messages may not be developmentally appropriate to teenage behavior and falls risk. A lack of knowledge is a potential barrier and impedes parents' capacity to implement falls prevention interventions (Lee et al., 2013), identify near-miss scenarios (Daniels et al., 2012), and change their child's behaviour or their own to prevent hospital-related harm such as falls. Strategies to improve parents' knowledge of all age-related risks are therefore necessary to minimize the risk of fall-related harm.

Parents' knowledge that their bedside presence presents a risk of a fall rated the lowest mean score (mean=3.3) for the 'knowledge of risk' questionnaire domain (Table 2). Whilst the rated response is encouraging, close to half of participating parents did not know or were unaware of the risk associated with parent's bedside presence (parents with a score <3) highlighting an area where persistent education is necessary to sustain and/or improve parent's knowledge of risk (AlSowailmi et al., 2018; Jamerson et al., 2014; Razmus et al., 2006). A key finding from a previous Australian qualitative study of twenty-three parents was the disparity between the

high level of fall risk reported in the literature and parents' perception that their bedside presence will prevent a fall (Shala et al., 2019).

Factors associated with falls knowledge

Our findings suggest that parents of children having a low risk of falls (calculated by hospital staff as per hospital policy) may be overlooked. Parents of children having a high falls risk were twice more likely to report falls knowledge consistent with a previous study that reported a link between parents' knowledge of falls and a child's calculated risk (high versus low) (Shala et al., 2019). Parents of a child having a high risk of a fall were described as risk-aware and knowledgeable about falls and therefore mitigated the risk by managing the hospital environment accordingly (Shala et al., 2019). Lower falls incidence rates have been attributed to Japanese hospitals that share falls information with the families of high-risk patients (Fujita et al., 2013). Although this study did not measure knowledge, the findings suggest that an emphasis on education may be directed towards children classified as a high falls risk. Given the implications of our findings and considering that a child's falls risk may change from high to low or vice versa, implementation of educational strategies to all parents of hospitalized children should be based on evidence of parent knowledge gaps and tailored accordingly rather than clinicians' perception of what parents need to know.

Our study found that Australian-born parents were twice as likely to know about falls and falls prevention strategies. This suggests that current strategies and falls prevention education may not address the diverse learning needs of migrating parents. More than 30% of parents

reported migrating to Australia however, only 17% of the study cohort reported speaking a language other than English at home. It is therefore possible that a parent's country of birth is a surrogate marker for poor English proficiency and/or health literacy levels. Low literacy is associated with stigma and may contribute to an underreporting of patient's native language spoken at home and /or literacy levels (Easton, Entwistle, & Williams, 2013). The diversity in culture and language pose a potential communication challenge to the nursing workforce and to consumer and parent education. To meet the changing needs of diverse inpatient populations, nurses will need to research, plan, implement and evaluate patient safety messages that are appropriate to patient populations. English language proficiency of parents play a pivotal role in hospital-based patient safety and therefore nurse's awareness of a family's preferred language spoken at home and their level of English proficiency is necessary (Crawford et al., 2017; Jatrana et al., 2018; Sawrikar & Katz, 2008; Verdon S, McLeod S, & A., 2014). Our study highlights the need for nurses to understand parents' communication needs; the responsibility to communicate healthcare information in a way that is understood by child consumers and their parents lies with them (Australian Commission on Safety and Quality in Health Care, 2013). Lee et al (2013) demonstrated the effectiveness of simple falls messaging and the use of a multi-lingual poster to improve parent's retention of falls prevention information (Lee et al., 2013).

Limitations

The main strength of this study is the use of a validated questionnaire to measure parent's knowledge of hospital-based falls. Additionally, the use of the questionnaire in combination with demographic information provides an opportunity for nurse educators to identify parent

populations most at risk of poor knowledge. However, the demographic information that was collected was limited and future studies should include more detail such as the number of years since migration to Australia. The results of this study should be interpreted in light of some potential limitations including recruitment of participants from a specialist tertiary pediatric hospital, and only those with proficient English reading skills. Our findings may not be generalizable to non-specialist pediatric settings and warrants further exploration. While the sample size is considered adequate (MacCallum et al., 2001; Pett et al., 2003), recruitment was constrained by funding and time.

Conclusion

The parent knowledge of falls questionnaire is an evidence-based instrument that measured and identified parent knowledge gaps and parent groups with the highest risk of having inadequate hospital-based falls knowledge. Findings have implications for nursing practice in the way that future falls education is researched, developed and evaluated. Measuring what parents don't know about hospital-based falls provides an evidence-based approach to develop falls education programs for parents that is relevant and targeted to parent's learning needs and population groups.

How might this information affect nursing practice?

This study uses an evidence-based approach to determine what parents don't know about hospital-based falls. The Parents' Knowledge of Falls (PKOF) validated questionnaire enables pediatric nurses and educators to measure parent's knowledge of hospital-based falls accurately

and consistently, and so to identify gaps and subsequently, develop and/or revise, implement and evaluate falls education programs. Hospital environments are dynamic by nature as are the parent populations that utilize the hospital services and therefore patient safety education and strategies require regular review. The findings of this study and future studies of local data will be important to inform key patient safety messages regarding hospital-based falls for different population groups and time periods.

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Conflict of interest

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