

Pediatric Falls: State of the Science

Child Health Corporation of America
Nursing Falls Study Task Force

Falls in the adult inpatient hospital population are an identified safety concern associated with significant morbidity, mortality, prolonged length of stay, and even death. Yet, little is known about falls among pediatric inpatients. A survey of Child Health Corporation of America hospitals was conducted to determine current fall-related practices in pediatric hospitals. The 29 (69%) responding hospitals were found to vary in their definition, classification, and measurement of fall and injury rates. Variability was also described in type of risk assessment tools used, with only six indicating use of a validated tool. A variety of prevention strategies were also described. These findings highlight the need for consensus in a definition of pediatric falls in order to appreciate the prevalence of falls among pediatric inpatients, greater application and testing of published risk assessment tools, and evidence-based prevention strategies among inpatient pediatric patients.

Patient safety in the hospital environment is a priority for all health care organizations. To promote a culture of safety and to elevate the level of commitment to safe practices, an organization must promote a culture that supports safety, builds teamwork, uses safe practices consistently, and involves patients and families in safety efforts (Griffith & White, 2007). The hospital environment is different from the home environment, and the inherent risk for falls is greater due to physiologic factors, medications, toileting needs, and use of equipment.

In 2002, the Joint Commission introduced the first set of National Patient Safety Goals designed to define problematic areas within the environment of care and identify evidence-based solutions to reduce the risk of harm. A Joint Commission initiative that emerged in 2005 targeted risk reduction from patient harm resulting from falls. Organizations are

required to assess and reassess the patient's risk for falls and develop an action plan to address any identified risks. Beginning in 2006, hospitals were required to implement a fall reduction program and evaluate the efficacy of the program (Joint Commission, 2007).

Other organizations also note falls as a nursing-sensitive indicator that warrants monitoring. For example, the Magnet™ Recognition Program requires that Magnet-designated hospitals conduct an evaluation of nursing-sensitive quality indicators specific to patient falls, as well as benchmarking at the broadest possible level. Interim monitoring reports must also include a narrative report describing fall trends, interventions implemented to reduce the risk of falling, their impact, and a discussion regarding scoring ranges and how one's organization compares to the upper quartile or best-in-class (C.A. Hagstrom, personal communication, February 26, 2007).

Falls in the inpatient population have long been identified as a safety concern. It is known that falls in the hospital environment can contribute to significant morbidity, mortality, prolonged length of stay, increased health care costs, and even death in adults (Bates, Pruess, Souney, & Platt, 1995; Bergeron et al., 2006; Foss, Palm, & Kehlet, 2005; Nadkarni, Iyengar, Dussa, Watwe, & Vishwanath, 2005). The National Database of Nursing Quality Indicators (NDNQI) defines a fall as any unplanned descent to the floor with or without assistance

(American Nurses Association, 1996). This patient safety issue has also been identified as a nursing-sensitive quality indicator for the adult population with benchmarking through databases such as NDNQI, Maryland Indicator Project, California Nursing Outcomes Coalition (CalNOC), and National Quality Forum (NQF). Inpatient falls are also a Joint Commission National Patient Safety Goal.

Review of the Literature

Although falls have been studied extensively in the adult population, it is not clear that these findings can be extended to the pediatric population. There are developmental issues not relevant to adult and geriatric patients that have yet to be addressed; however, there is a paucity of literature regarding falls in the hospitalized pediatric population. Current literature primarily includes reports of the incidence and nature of pediatric falls derived from community or emergency department-based surveillance studies; only a few studies were located that reported the nature of pediatric falls within the hospital setting. Levene and Bonfield (1991) conducted a multi-site survey of 8 hospitals to determine the incidence of accidents in the hospital occurring in children under the age of 16. Although the study was not limited to falls or to patients, they found that the majority (42%) of hospital accidents were the result of falls.

In a retrospective, case-matched

Editor's Note: Members of the Child Health Corporation of America Nursing Falls Study Task Force who contributed to this article are found on the following page.

Statement of Disclosure: The authors reported no actual or potential conflict of interest in relation to this continuing nursing education article.

Objectives and the
CNE posttest can be
found on pages 232-233.

contrd study, Graf (2004) reviewed inpatient pediatric charts for the presence of 38 variables identified in the literature as fall risk factors. Only 20 variables were deemed significant; these were entered into a principal cluster analysis in order to identify predictor variables that were further analyzed by logistic regression. Five significant risk factors were identified: a) length of stay greater than five days, b) an orthopedic diagnosis, c) the need for physical/occupational therapy, d) the administration of seizure medication, and e) being IV/heparin lock-free. These factors served as the basis for development of a fall risk assessment scale, the General Risk Assessment for Pediatric Inpatient Falls (GRAF PIF©). In this study, Graf (2004) also tested the Morse, Tylko, and Dixon (1987) classification of falls and found that about one-third of inpatient pediatric falls are accidental (such as related to environmental factors). Another 6% are attributable to unpredicted physiologic factors (such as undiagnosed disorders, including epilepsy) or undetected conditions (such as low blood pressure); 61% of falls were anticipated in part due to normal child growth and development patterns.

A study conducted by Razmus, Wilson, Smith, and Newman (2006) was also designed to identify factors associated with risk of falls in pediatric patients and determine the usefulness

of extant adult-validated tools for identification of risk. They noted that the adult tools poorly predicted the risk of pediatric falls, and the variable definitions on these tools were often not applicable to children. Using logistic regression procedures, the authors identified history of fall, impaired gait, mental status, and episodes of disorientation as significant predictors of risk for fall in pediatrics. From these factors, a risk assessment tool labeled CHAMPS was developed and is currently undergoing validation testing.

In 2007, Cooper and Nott reported trends in falls that occurred prior to and after implementation of a fall prevention program at Children's Hospital Central California. Initial data derived from retrospective review of risk occurrence reports revealed that falls occurred more in males (63%) than females, with little difference in age group of inpatient/outpatient status. In data collected prospectively after implementation of the program, findings were similar except that falls occurred more in females than males. At both time points, parents were noted to be in attendance for a majority of the falls, and common sites were the emergency department, physical therapy department, and oncology unit. The incidents usually involved a fall out of bed or while ambulating, a slip on a wet surface, or a trip over an item. Approximately half of the events resulted in a minor injury. No inferen-

tial statistics were conducted to determine the significance of their findings.

These studies validate the significance of pediatric falls in the hospital setting. Yet, there are few evidence-based pediatric guidelines or resources in existence (see Table 1 for a listing of extant resources). Recognition of this gap prompted chief nursing officers (CNOs) of hospitals belonging to the Child Health Corporation of America (CHCA) to create a task force to explore and understand the significance of pediatric falls. Headquartered in Shawnee Mission, Kansas, CHCA functions as a cooperative, owned and operated by 43 children's hospitals, providing value-added business support services (such as group purchasing, insurance services, data analysis, education), and acts as a catalyst to enable its hospitals to improve quality and enhance performance. All member hospitals are freestanding North American pediatric institutions. Together, the institutions represent the majority (86%) of hospitals within this category.

The task force commissioned by the CNOs consisted of 20 individuals charged with the review of the evidence in support of best practices related to pediatric falls. When insufficient evidence was identified, the group developed the survey described in this article to obtain information from the major pediatric hospitals within the country.

Members of the Child Health Corporation of America Nursing Falls Study Task Force

Patricia A. Jamerson, PhD, RN, CRA, is the Director of Research, St. Louis Children's Hospital, St Louis, MO.

Kathleen Adlard, MN, RN, CCNS, is a Clinical Nurse Specialist, Children's Hospital of Orange County, Orange, CA.

Mari Akre, PhD, RN, is Director, Practice Informatics and Research, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN.

Sharon Jackson Barton, PhD, RN, CNS-BC, is a Nurse Researcher, Children's Hospital of Philadelphia, Philadelphia, PA.

Crystal Bennett, DNSc, RN, is Director of Research, Outcomes, and Regulations for Patient Care Services, Children's Hospital Los Angeles, Los Angeles, CA.

Melanie A. Brewer, DNSc, FNP, is a Nurse Researcher, Phoenix Children's Hospital, Phoenix, AZ.

Gina Bufe, PhD, RN, is Director of Nursing for Education, Quality, and Research, Morgan Stanley Children's Hospital of New York-Presbyterian, New York, NY.

Carole L. Cooper, MHA, RN, BC, CPN, CAN, is Program Manager, Nursing Professional Practice, Children's Hospital Central California, Madera, CA.

Heidi W. Fields, MSN, RN, CPNP, is an Advanced Practice Nurse, Professional Practice, St. Louis Children's Hospital, St Louis, MO.

Elaine Graf, PhD, PNP, is the Research and Funding Coordinator, Children's Memorial Hospital, Chicago, IL.

Rebecca Kerby, BSN, RN, is a Clinical Nurse, Phoenix Children's Hospital, Phoenix, AZ.

Deborah Hill-Rodriguez, MSN, ARNP, CS-BC, is the Magnet Project and Clinical Outcomes Coordinator, Miami Children's Hospital, Miami, FL.

Methods

To meet the CNO objectives, the task force designed and distributed a survey to CNOs of all 42 CHCA-member hospitals at the time of development. The survey (see Figure 1) consisted of both fixed and open-ended questions designed to determine how member hospitals defined pediatric falls and pediatric fall-related injury. Respondents were also asked to describe their pediatric fall taxonomy systems and metrics, as well as current practices regarding identification of patients at risk and interventions used to prevent falls. Descriptive statistics were used to analyze the fixed-item responses. Qualitative data were categorized by response.

Results

Measurement and Definition

Of the 42 hospitals belonging to the consortium, 29 (69%) returned their surveys. Of these, 28 (97%) reported

Table 1.
Fall Resources

| Web Sites | Web Address |
|---|--|
| National Patient Safety Goals (Joint Commission, 2007) | www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals |
| National Database Nursing Quality Indicators (2007) | www.nursingquality.org |
| Safe Kids Worldwide-Injury Facts/Falls (2007) | www.safekids.org |
| Inpatient Falls: Lessons from the Field (Hendrich, 2006) | www.psqh.com/mayjun06/falls.html |
| Falls in Hospitals, The Joanna Briggs Institute | www.joannabriggs.edu.au |
| United States Department of Veterans Affairs. National Center for Patient Safety 2004 Falls Toolkit | www.va.gov/ncps/SafetyTopics/fallstoolkit/index.html |
| Pediatric Health/Safety & Injury Prevention/Falls/Injury Statistics and Incidence Rates. (Yale Medical Group, 2007) | http://ymghealthinfo.org |

| Pediatric Fall Risk Assessment Tools | Contact Person/Organization |
|--------------------------------------|---|
| CHAMPS | Ivy Razmus Saint Francis Hospital, Tulsa, OK |
| GRAF-PIF | Elaine Graf Children's Memorial Hospital, Chicago, IL |
| Humpty Dumpty | Deborah Hill-Rodriguez Miami Children's Hospital, Miami FL |
| I'M SAFE | Jenae Neiman The Children's Hospital, Denver, CO |

Responses included type of fall, severity/injury, activity at time of fall, attributing factors (health status at time of fall, response to medication or treatments, presence of environmental hazards, developmental level), where object fell from, role of restraints/side rails, parental attendance, preventability, and score/level on a fall risk assessment tool.

Figure 1.
Child Health Corporation Pediatric Hospital Fall Survey

At your hospital:

- Do you currently measure the number of pediatric falls? No/Yes
- What is the definition of a pediatric fall?
- How do you classify pediatric falls?
- Do you calculate a fall rate? No/Yes
- If yes, how do you calculate your rate?
- Do you publicly report your rate? No/Yes
- Do you use a tool to identify pediatric patients at risk for falls? No/Yes
- If yes, which tool do you use?
- If a homegrown tool, how was it developed?
- Have you evaluated the tool for sensitivity/specificity or reliability/validity?
- What type of information do you collect about the individuals who fall?
- Do you measure the number of injuries related to pediatric falls? No/Yes
- What is the definition of a fall-related injury?
- How do you classify fall-related injuries?
- If classified by severity, what is the definition for each classification?
- Do you calculate a fall-related injury rate? No/Yes
- How do you calculate a fall-related injury rate?
- If a child is determined to be at high risk, what interventions are considered for implementation?
- What are you doing to successfully prevent falls that works?
- What have you done to try and prevent falls that didn't work?

that they tracked the incidence of pediatric falls. However, the definition of pediatric falls varied. Most prevalent among the 25 respondents was the NQF definition of "an unplanned descent to the floor" (88%). Other published definitions adopted by the responding hospitals included those of American Nurses Credentialing Center Magnet Recognition Program®,

CalNOC, and the Kellogg Work Group for Prevention of Falls. Common to most definitions was a statement that the event was "unplanned" or "unintentional," and the event involved a "descent."

Fall Classification

Similarly, there was wide variation in how the hospitals classified falls.

Fall Rates

When asked if the hospital calculated a fall rate, 26 (72%) responded yes, with the majority counting the number of falls per 1,000 patient days. Some further analyzed their fall rates by age groups or inpatient/outpatient status. Only 6 (27%) hospitals indicated that they publicly reported their fall rate; of the others, 4 reported to CalNOC, and 1 reported to other hospitals.

Risk Identification

In response to the question, "Do you use a tool to identify pediatric patients at risk for falls?", 26 (89.7%) hospitals indicated yes, but of these, the majority (81%) used a fall risk assessment tool that was developed internally, 4 (11.5%) used the GRAF PIF, and 2 (7.7%) used the Humpty Dumpty Falls Assessment Tool. The institutions using tools developed internally primarily used a retrospective review of fall events to identify common factors and predictors. Another common practice was to glean information from other hospitals or the Joint Commission. When asked about validation of the risk tools, only 6 of the 27 (22%) hospitals indicated using a validated tool.

Data Collected

All but one hospital indicated that it collected patient-specific information. Hospitals reporting to CalNOC had

pre-specified data collection requirements. Others reported collecting date, age, gender, unit, type of fall/description, diagnosis, fall-prevention category at time of fall, presence of family/caregiver, degree of injury, and contributing factors.

Fall-Related Injuries

The majority of the hospitals (83%) indicated that they tracked the number of injuries resulting from pediatric falls, but again, the definition for fall-related injury was found to vary. Almost half (53%) defined injury as any harm occurring as a result of the fall; some (14%) adopted the definition of Miami Children's Hospital or one of the classification systems. One institution defined injury in terms of a need for intervention or death. Another institution included any adverse event. The majority (62%) of institutions, however, did not calculate a fall-related injury rate. Of those that did, the calculation was based on number of falls per 1,000 patient days. When asked if the institution classified injury by severity, the majority (75%) did. Common responses are listed in Table 2.

Prevention Strategies

When asked to list the interventions used to prevent pediatric falls, 26 of the hospitals provided information. Their suggestions are listed in Table 3. Given the perceived low fall rate, however, few hospitals were able to identify strategies that did not work.

Discussion

The responses to this survey provided insight into the fall assessment and prevention practices of major pediatric hospitals in the United States. Through this survey, it was noted that currently there is no standard definition for pediatric fall, pediatric fall-related injury, or standard calculations for rates of either. Significant variation also existed in the tools used to identify pediatric risk of fall and the practices employed to prevent falls.

Razmus and colleagues (2006) suggest that children may have a greater opportunity or propensity to fall, and based on the findings of Levene and Bonfield (1991) and numerous emergency department and community studies, falls are a significant safety issue in the pediatric population that warrants attention. Therefore, monitoring of falls *should* be a priority on nursing quality dashboards (Donaldson, Brown, Aydin, Bolton, & Rutledge, 2005). This current survey provides

Table 2.
Variation in Fall Classifications

| Severity |
|--|
| 1 = None/no injury 2 = Mild/minor 3 = Moderate 4 = Major 5 = Death |
| 0 = No injury 1 = Contusion, abrasion, small skin tear, or laceration involving little or no care or observation. 2 = Sprain, large or deep laceration, skin tear, or minor contusion with medial and/or nursing intervention. Forms of intervention include suturing, ace bandage, splint, or ice bag. 3 = Fracture, loss of consciousness, change in mental or physical status requiring medical intervention or consultation. |
| 1 = Circumstances or events that have the capacity to cause error or harm. 2 = An error occurred but did not affect the patient. 3 = An error occurred that reached the patient but did not cause patient harm. 4 = An error occurred that resulted in increased patient monitoring and/or minimal patient harm. 5 = An error occurred that resulted in treatment or intervention and or caused temporary patient harm. 6 = An error occurred that resulted in initial or prolonged hospitalization and caused temporary patient harm. 7 = An error occurred that resulted in permanent patient harm. 8 = An error occurred that resulted in a near-death event. 9 = An error occurred that resulted in patient death. |
| 0 = No harm – No diagnostic testing or treatment required. 1 = Minimal harm – Assessment and superficial treatment required for injury. 2 = Moderate Harm – Diagnostic testing and/or treatment required for injury. 3 = Significant Harm – Diagnostic testing and/or treatment required for permanent harm. |
| Not seen by MD Seen by MD, no treatment Seen by MD, additional treatment required |
| Type of Fall |
| Accidental |
| Unanticipated/anticipated |
| Developmental |
| Preventable – Not preventable |

evidence that monitoring pediatric falls within the hospital setting is common; however, a lack of consensus in definition makes it difficult to appreciate the incidence of pediatric falls and fall-related injuries, and to compare results across populations. Lack of consistency delays the ability to compare results across populations, prevents or delays the establishment of appropriate fall rate thresholds, and in turn, makes it difficult to determine fall program effectiveness beyond organizational historical data.

Using a consistent classification system will also aid in determining if there are repatterns to the falls that happen with

patient populations or on specific units. There are several noted fall taxonomies (Association of Maryland Hospitals and Health Systems, 2000; Morse et al., 1987), but neither of these taxonomies fully address pediatric falls as they relate to normal developmental falls in infants, toddlers, and preschoolers learning to stand, walk, run, and pivot.

Similarly, standardization of fall calculation formulas across pediatric hospitals is imperative in order to determine true fall rates, establish valid fall rate thresholds, and compare effectiveness of fall prevention programs. Standardization of fall injury calculations is also necessary to determine

Table 3.
Suggested Measures to Prevent Pediatric Falls

- Complete fall risk screen; Reassess if changes in physiologic/motor/sensory/cognitive status.
- Identify at-risk patients with sticker, ID band, symbol.
- Adhere to institutional safety protocols:
 - Orient child/parent to room/bed.
 - Use assistive devices properly.
 - Maintain surveillance of floors and surfaces for fluids/objects.
 - Assist with ambulation as needed.
 - Place call light, telephone, and personal articles within reach.
 - Use cribs, high chairs, and infant seats properly.
 - Use side rails and protective device (crib hood, gait belt, etc.) appropriately.
 - Keep beds/cribs/stretchers in the lowest, locked position.
 - Use wheel locks when indicated.
 - Keep environment uncluttered and free of obstacles.
 - Provide adequate lighting.
- Individualize standardized care plan.
- Wear non-slip footwear when up.
- Offer patient assistance to the bathroom/place commode at bedside.
- Evaluate medication administration times.
- Frequent monitoring/keep door open.
- Caregiver/Sitter at bedside/Room assignment that provides more direct observation.
- Assess parents'/primary caregivers' ability to set appropriate behavioral/activity limits.
- Education of parents/primary caregivers regarding:
 - Fall risk factors.
 - Appropriate transfer/ambulation needs.
 - Appropriate use of side rails.

injury severity and preventability. Adoption of formulas that mirror those used for adult fall rates would allow for comparison across populations.

The most commonly used formula for inpatient falls is number of falls per 1,000 patient days. Some suggest the formula multiplier should be smaller (100 vs. 1,000); anecdotal evidence suggests pediatric falls result in little to no injury. Keeping the multiplier constant, however, allows for a full comparison across hospitals.

Fall risk screening tools have been the most effective intervention used by adult facilities to maintain sustained improvement in fall prevention programs. The ability to identify those pediatric patients at risk for fall, however, is in question. There was great variability in the number of fall risk screening tools used by the hospitals in the survey, and many of the tools in use had never been tested for reliability or validity. Therefore, it is unknown whether the risk of fall is being over or underestimated, and whether prevention strategies are being appropriately implemented. Using fall risk assessment tools without established validity and reliability may

result in more harm than good; limited nursing resources and time may be misappropriated without showing a clear impact on fall data outcomes.

Although this survey did not provide insight into best practices regarding the identification of risk or the measurement of falls and fall-related injury, it provided valuable insight into the need for consensus in definitions in order to identify the prevalence of falls among hospitalized pediatric patients, the need for greater application and testing of published risk assessment tools, and the need for evidence-based interventions for prevention of falls in the pediatric population. In response to these findings, the CHCA Nursing Research Collaborative has crafted a definition of pediatric fall and launched a multi-site research initiative to address some of the gaps currently identified. Further research and development of risk assessment tools and evidence-based practice interventions are needed, however, to define, identify, and prevent falls and fall-related injuries in hospitalized pediatric patients.

References

- American Nurses Association. (1996). *Nursing quality indicators: Definitions and implications*. Washington, D.C.: Author.
- Association of Maryland Hospitals and Health Systems. (2000). *Patient fall indicator*. Elkridge, MD: Author.
- Bates, D.W., Pruess, K., Souney, P., & Platt, R. (1995). Serious falls in hospitalized patients: Correlates and resource utilization. *The American Journal of Medicine*, 99, 137-143.
- Bergeron, E., Clement, J., Lavoie, A., Ratte, S., Bamvita, J.M., Aumont, F., et al. (2006). A simple fall in the elderly: Not so simple. *Journal of Trauma*, 60(2), 268-273.
- Cooper, C.L., & Nott, J.D. (2007). Development of an evidence-based pediatric fall prevention program. *Journal of Nursing Care Quality*, 22, 107-112.
- Donaldson, N., Brown, D.S., Aydin, C.E., Bolton, M.L., & Rutledge, D.N. (2005). Leveraging nurse-related dashboard benchmarks to expedite performance improvement and document excellence. *Journal of Nursing Administration*, 35, 163-172.
- Foss, N.B., Palm, H., & Kehlet, H. (2005). In-hospital hip fractures: Prevalence, risk factors and outcome. *Age and Ageing*, 34(6), 642-645.
- Graf, E. (2004). *Identifying predictor variables associated with pediatric inpatient fall risk assessments*. Proceedings from the 5th National Conference on Evidence-Based Fall Prevention, Clearwater, FL, March 2004.
- Griffith, J.R., & White, K.R. (2007). Clinical performance. In J.R. Griffith & K.R. White (Eds.), *The well-managed healthcare organization* (6th ed.) (pp. 155-201). Chicago, IL: Health Administration Press.
- Hendrich, A. (2006). *Inpatient falls: Lessons from the field*. Retrieved July 24, 2009, from www.psqh.com/mayjun06/falls.html
- Joint Commission. (2007). *The Joint Commission national patient safety goals*. Retrieved June 23, 2009, from http://www.jointcommission.org/PatientSafety/NationalPatientSafetyGoals/05_cah_nps_gs.htm
- Levene, S., & Bonfield G. (1991). Accidents on hospital wards. *Archives of Disease in Childhood*, 66, 1047-1049.
- Morse, J.M., Tylko, S.J., & Dixon, H.A. (1987). Characteristics of the fall prone patient. *The Gerontologist*, 27, 516-522.
- Nadkarni, J.B., Iyengar, K.P., Dussa, C., Watwe, S., & Vishwanath, K. (2005). Orthopaedic injuries following falls by hospital inpatients. *Gerontology*, 51(5), 329-333.
- Razmus, I., Wilson, D., Smith, R., & Newman, E. (2006). Falls in hospitalized children. *Pediatric Nursing*, 32, 568-572.