ABSTRACT

EVALUATION OF A PEDIATRIC FALL RISK ASSESSMENT TOOL

Patient falls and related injuries are being recognized as an indicator of patient safety for health care organizations. Pediatric healthcare organizations have had significant challenges implementing effective fall reduction programs due to the current lack of supportive research. Currently there are several published fall risk assessment tools for screening hospitalized pediatric patients, although few have been validated. The objective of this study was to identify the predictive ability of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool to identify hospitalized children at risk for falling.

A pair matched case-control methodology was used to identify significant risk factors between 106 hospitalized pediatric patients who fell and 106 non-fallers matched according to age, gender, and diagnosis. Physiological, environmental variables, fall risk status, and additional information pertaining to the fall event were abstracted.

The study revealed that children who fell frequently were less than four years of age and had a more severe illness with secondary co-morbid conditions. An evaluation of the current Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool identified a sensitivity rate of 64%, and a specificity of 53%, indicating a revision of the tool is needed. A more accurate tool would facilitate a reduction in fall rates, improve the efficiency and effectiveness of care and promote a safe environment for patients.

Carole Lynn Cooper
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EVALUATION OF A PEDIATRIC FALL RISK ASSESSMENT TOOL

by

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APPROVED

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I thank my husband, whose love and support throughout my nursing career, understands the time I have taken from him to promote the safety and wellbeing of children receiving care at Children’s Hospital Central California, Madera, California.
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CHAPTER 1: INTRODUCTION

The purpose of this study was to appraise relationships between the Children’s Hospital Central California Humpty Dumpty Falls Screening Tool as currently developed, and the actual event of an acute care pediatric fall, using a matched case-control design. A secondary aim is to determine the relative importance of predictor variables identified in the current fall risk screening tool in relation to the presence or absence of a fall event in the acute care setting at Children’s Hospital Central California, Madera, California (Children’s Hospital).

Unintentional falls are the leading cause of nonfatal injury among children (3,420 per 100,000) of all age groups 14 years and under in the United States resulting in approximately 2.8 million emergency room visits each year during the period 2004-2006. Children ages 15-19 and ages 4 and under are at the greatest risk of fall-related death (0.4 per 100,000), representing 2% of unintentional injury deaths among children (Borse et al., 2008).

Falls are identified as the fourth-leading mechanism of injury in the United States, occurring twice as frequently among the non-Hispanic white population then the Hispanic or non-Hispanic black population, for whom the rates were similar (U.S. Department of Health and Human Services, 2008). Injuries associated with falling are directly related to the developmental stage, ambulation capabilities of the child, and mechanism of fall (Borse et al., 2008).

The most common mechanism of falls in infants is from furniture, infant carriers, falls down stairs with or without an infant walker, and those occurring when they are dropped. Falls from being dropped occur most frequently in infants 0 to 2 months old, whereas falls from furniture occur most frequently among
children from 3 to 47 months (Agran et al., 2003; Flavin, Dostaler, Simpson, Brison, & Pickett, 2006; Pickett, Streight, Simpson, & Brison, 2003).

Common injuries associated with falls include bruising, superficial lacerations, dislocations and fractures of the extremities, and skull fractures. Head injuries in children are associated with significant morbidity and mortality, especially among infants (Greenburg, Bolte, & Schunk, 2009; Tarantino, Dowd, & Murdock, 1999), and boys are twice as likely as girls to die from fall-related injuries (Borse et al., 2008).

**Problem Statement**

Falls among children occur most frequently in the home or within sports facilities (Singer, Cichocki, Schalamon, Eberl, & Hollwart, 2008); they also occur within the hospital setting. Patient falls constitute a major proportion of incidents occurring in a hospital, with the potential to cause personal injury, extended length of stay, and increased health care costs (Rutledge, Donaldson, & Pravikoff, 2003). Preventing patient falls and related injuries has become a significant challenge for many healthcare organizations. The Joint Commission has identified falls and fall related injuries as a national health priority and in 2006 established the ninth national patient safety goal, to reduce the risk of patient harm resulting from falls. All healthcare organizations are expected to implement a fall reduction program. Implementation expectations require a risk assessment to be performed on individual patients, risk reduction strategies to be developed, the provision of patient education, and evaluation of the effectiveness of the program (Joint Commission, 2009). Fall research has focused primarily on the etiology of falls and fall prevention in the elderly population. Fall research on the pediatric population has been predominantly focused on epidemiological studies. Pediatric
healthcare organizations have had significant challenges implementing effective fall reduction programs due to the current lack of supportive research.

Extensive research of falls in patients aged 65 years and over has provided research-based fall risk assessment tools, best practice fall prevention guidelines, and additional information to support development of a fall prevention program for hospitalized adult patients. Strategies for preventing fall injuries are based on identifying risk factors that can be modified, and providing appropriate education to care providers. Several studies have demonstrated that a continuing education program on fall prevention, utilization of a validated research-based fall risk assessment tool to identify patients at risk for falls, and the application of a standardized nursing plan of care can significantly reduce the frequency of patient falls within a group of hospitalized adult patients (Dykes, Carroll, & Hurley, 2009; Rutledge et al., 2003; Schmid, 1990).

**Significance for Nursing**

Collaboration with nurse researchers among children’s hospitals within the United States have identified that there are multiple actions that can be implemented to help reduce the rate of patient falls (Child Health Corporation of America Nursing Falls Study Task Force, 2009). Accurately identifying patients at risk for falling, implementing strategies that prevent falls and fall-related injuries and critically evaluating the predictive validity of pediatric risk assessment tools can protect patients from harm. Continual efforts to identify effective strategies to involve other healthcare disciplines and families in fall prevention efforts are needed. Monitoring trends in fall data and utilizing external benchmarks to guide performance improvement initiatives within health care
organizations should help to reduce the rate of falls among hospitalized children (Kingston, Bryant, & Speer, 2010).

Ensuring the pediatric fall risk screening tool utilized at Children’s Hospital accurately predicts patients at highest risk for falling will promote effective utilization of nursing resources and contain costs. Further studies to validate the reliability and validity of the fall risk screening tool used at Children’s Hospital will improve the efficiency and effectiveness of care and promote a safe environment for pediatric patients.

**Purpose of the Study**

The proposed study aims to identify significant variables that differentiate children who fell during hospitalization and those who did not at Children’s Hospital.

The purpose of this research study is threefold:

1. To identify the statistically significant variables associated with children at risk for falling at Children’s Hospital
2. To identify the demographic, physical and environmental characteristics associated with pediatric falls of hospitalized children at Children’s Hospital
3. To identify the prevalence of falls in hospitalized children 0-18 years of age at Children’s Hospital

Data collected from the study will support refinement of the fall-risk screening tool utilized at Children’s Hospital. The revised fall-risk screening tool will more accurately identify children at high risk for falling. Accurately identifying hospitalized children at highest risk for falling will facilitate a
reduction in fall rates, improve the efficiency and effectiveness of care and promote a safe environment for patients.

Theoretical Framework

An effective fall prevention program requires a multifaceted approach. Identifying patients with modifiable risks for falling requires nurses to consistently utilize the nursing process. Individual patient risks must be identified with age appropriate patient interventions applied to protect them from harm. Nurses must appropriately assess each patient for potential risk factors, establish a nursing diagnosis of low, moderate or high fall risk, develop an appropriate plan of care, implement appropriate interventions and evaluate patient outcomes. Effective nursing care and collaboration between the health care providers, and the patient and/or patient’s family is essential to protect patients at risk of falls from harm.

The nursing process theory developed by Jean Orlando and Imogene King’s theory of goal attainment (Tomey & Alligood, 2008) provides the framework for an effective fall prevention program. Preventing falls in a hospital setting requires a continuous analysis and validation of the patient’s needs and response to his/her environment. To prevent harm, the nurse and patient/patient family must engage into a safety contract with mutual goal setting. King’s theory of goal attainment provides the theoretical knowledge that is used to implement the nursing process method of assess, diagnose, plan, implement and evaluate nursing care. Goal attainment requires ongoing evaluation. If established goals are not attained, the nurse must re-examine the process of nursing, utilizing critical thinking and transaction (Khowaja, 2006) to identify additional interventions needed to protect the patient from harm.
Major elements in King’s theory lie within the interpersonal system “in which two people…come together…to help and be helped to maintain a state of health that permits functioning in roles” (King, 1981, p. 142). King’s concepts of communication, growth and development, interaction, perception, role, self, space, stress, time, and transaction are applicable for Pediatric Fall Prevention Programs. Decision making is a shared collaborative process in which the nurse and patient/family provide each other information, identify goals, and explore means to attain established goals (see Figure 1).

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Figure 1. Nurse/patient interactions

King’s theory is applied through the nursing process as the nurse gains information during the initial admission interview and ongoing assessments. For example, potential fall risks are identified based on the child’s age and development, disease process, and medications. With a goal to ensure patient safety and prevent injury from falls the nurse identifies appropriate interventions based on patient needs. Through transaction (mutual goal setting) appropriate interventions are identified and communicated. King’s systems framework is applicable to the performance improvement and patient safety process integrating three interacting systems: (a) personal systems, (b) interpersonal systems, and (c) social systems. A personal system (understanding the individual as a whole) includes the concepts of body image, growth and development, perceptions, self, space and time. Interpersonal systems refer to groups of individuals, including
dyads, triads, or small or large groups. King (1981) defines social systems as “an organized boundary system of social roles, behaviors, and practices developed to maintain values and the mechanisms to regulate the practices and rules” (p. 115). To prevent falls the nurse must interact with the pediatric patient and their parents in the hospital setting. The pediatric nurse uses specialized knowledge of growth and development, disease processes, and the hospital environment to identify appropriate interventions to promote safety and prevention of injury during the hospitalization.

If perceptual accuracy is present in nurse-pediatric patient interactions, transactions will occur. If transactions occur, goals will be obtained with effective nursing care along with increased patient/family satisfaction. If role expectations and role performance as perceived by nurse and patients are congruent, transactions will occur. If nurses with special knowledge and skills communicate appropriate information to pediatric patients/families, mutual goal setting and goal attainment will occur. If goals are set within the nurse-patient interactions, growth and development will be enhanced. However, if role conflict is experienced by nurse, patient/parent or both, stress in nurse-patient interactions will occur (King, 1981).

**Scope of the Study**

This study was a retrospective matched case-control study conducted at Children’s Hospital, an independent pediatric 338 bed tertiary care hospital. Children’s Hospital is the 10th-largest freestanding children’s hospital in the United States and the only children’s hospital serving a 10-county 45,000 square mile region between Los Angeles and Sacramento (Children’s Hospital Central California, n.d.). Children’s Hospital is dedicated to improving the health of
children and offers inpatient care as well as emergency and surgical services to children from newborn to eighteen years of age. A continuum of care is delivered to patients as they enter the system from either, the Emergency Department, Outpatient Clinic or Day Surgery Unit.

Emergency services are provided in a 30-bed emergency department. Patients come from a variety of sources including paramedic ambulance, referrals and transfers from other facilities, private physicians and other hospitals. The emergency department registered over 67,262 visits in 2009 (Children’s Hospital Central California, 2010).

Surgical services are provided by a specially trained pediatric surgical team who performs a wide spectrum of general pediatric surgical procedures and specialty services. A full range of services are provided to include diagnostic and surgical treatment of the head, neck, chest and abdomen, as well as acquired problems including oncology and trauma. Specialty surgeries include cardiovascular surgery, neurosurgery, orthopedic surgery, urologic surgery and others. There are over 9,000 surgical procedures performed each year within the seven surgical suites (Children’s Hospital Central California, 2010).

Each of the medical and surgical acute care units has 36 beds designed to care for children in a family-centered environment. Starship Apollo provides respiratory care for children with asthma, cystic fibrosis, bronchiolitis, and other respiratory disorders. Starship Craycroft provides care to children with diabetes, hematologic, oncologic, or nephrologic disorders. Starship Craycroft also participates in clinical trials, allowing children with cancer, sickle cell and hemophilia to receive the most up-to-date treatment options available. Starship Discovery supports care to medically complex children and children with acute and chronic illness. The Starship Explorer supports care to children in need of
surgical services. The 18-bed inpatient Medical Rehabilitation Center is accredited by the Rehabilitation Accreditation Commission for Pediatric/Family Centered Rehabilitation and Comprehensive Medical Inpatient Rehabilitation and provides a comprehensive approach to care for children with physical, sensory and cognitive impairments. Together these units have provided care to over 13,000 patients each year (Children’s Hospital Central California, 2010).

The 65-bed Neonatal Intensive Care Unit (NICU) is a Level III unit designed to provide state of the art intensive care to infants, many born prematurely. Patients are received from over 50 referring hospitals. An expertly trained transport team performs over 1,100 transports each year utilizing specially designed ground ambulances and the Air George helicopter (Children’s Hospital Central California, 2010).

The 34-bed Level I Pediatric Intensive Care Unit provides care to children who have life-threatening medical conditions and those recovering from cardiac surgery. The unit is equipped for technologically advanced monitoring, assessment and treatment of the critically ill pediatric patient. As the only Pediatric Intensive Care Unit between Los Angeles and Sacramento many patients are transferred to Children’s Hospital the pediatric transport team (Children’s Hospital Central California, 2010).

Children’s Hospital offers a variety of specialties and services that cover a broad base of care to promote the well-being of children. Pediatric specialties include orthopedics, gastroenterology, oncology, hematology, nephrology, and urology. Supportive services include bloodless surgery and medicine, laboratory medical imaging, pain management, pediatric research, prenatal detection, and homecare. Ambulatory services provided specialized care during 114,994 visits in 2009 (Children’s Hospital Central California, 2010).
Children’s Hospital provides care to a culturally diverse population. The ethnic mix for children who received inpatient care during 2009 was as follows:

- Hispanics 50.2%
- Caucasians 31.4%
- African Americans 4%
- Asians 4.3%
- American Indian/Alaska Native 0.2%
- Others 9.9% (Children’s Hospital Central California, 2010)

During 2009 a higher percentage of males (56.2%) compared to females (43.8%) received care in the inpatient areas. The majority of inpatients were less than 4 years of age. Age cohorts for inpatient encounters were comprised of the following:

- < 1 52%
- 1-4 17%
- 5-9 11%
- 10-14 11%
- 15-18 9%
- >20 1% (Children’s Hospital Central California, 2010)

Care is provided in a family-centered care environment in which nursing care encompasses all aspects of the nursing process: assessment; nursing diagnosis; planning; intervention; and evaluation. The Registered Nurse ensures patient care services are planned, coordinated and provided through appropriate delegation of duties to unlicensed assistive personnel, as appropriate to individual scope of practice (Children’s Hospital Central California, 2010)
CHAPTER 2: REVIEW OF LITERATURE

The amount of published literature regarding adult fall risk screening tools and fall prevention is extensive. Fall risk screening tools have been a key component of fall prevention programs and identified as an effective intervention by adult facilities to reduce the rate of inpatient falls (Coker & Oliver, 2003; Hendrich, Bender, & Nyhus, 2003; Morse, 2009; Tinetti, 2003).

Fall risk assessment has been utilized in various settings to identify adults at greatest risk for falls and fall related injuries. There are three categories of fall risk assessment tools: (1) comprehensive medical assessments performed by physicians or nurse practitioners in long term care facilities or outpatient settings; (2) nursing fall risk assessments performed in hospitals and long term care facilities; and (3) functional mobility assessments completed by physical therapists or physicians in an outpatient setting (Perell, 2002). Each type of fall risk assessment has advantages and disadvantages based on the setting, the time it takes to complete the assessment and goals of the assessment.

The comprehensive medical assessment is generally used by care providers to evaluate and treat patients at risk for falls or who have recently fallen. Nursing fall risk assessments utilize fall risk screening tools. Functional assessments are used to identify gait and balance deficits. Nursing fall risk screening assessments are utilized most frequently in the inpatient hospital settings.

**Adult Fall Risk Assessment Tools**

Each adult patient is assessed using the fall risk screening tool. A score that identifies potential fall risk is assigned to each patient. The scores are divided into low risk, moderate risk, and high risk. Significant fall risk factors identified in the adult population include (a) previous history of falls, (b) certain
medications, especially sedative hypnotics, pain and barbiturate medication, (c) seizures, (d) neurological impairments, (e) agitation, confusion or impaired judgment, (f) gait instability, (g) poor balance, (h) lower limb weakness, (i) urinary incontinence or need for assisted toileting, (j) orthopedic surgeries, (k) visual impairments, (l) history of dizziness/vertigo, (m) 24 hours or less post surgery, (n) intravenous line in place, (o) syncope, (p) nocturia, (q) walking aids/devices, (r) age, and (s) length of stay (Morse, Morse, & Tylko, 1989; Myers, 2003; Oliver, Daly, Martin, & McMurdo, 2004; Yauk et al., 2004). Specific nursing interventions are then identified relative to the individual risk score.

**Pediatric Fall Risk Assessment Tools**

Although there has been extensive research regarding fall risk screening tools and fall prevention strategies in adults, the published literature in the pediatric population is sparse. Currently there are four published fall risk screening tools for hospitalized pediatric patients, two of which have been validated. The General Risk Assessment for Pediatric Inpatient Falls (GRAF PIF©) (Child Health Corporation of America Nursing Falls Study Task Force, 2009) and the Humpty Dumpty Falls Scale (HDFS©) (Hill-Rodriuez et al., 2009) have been validated using a retrospective pair-matched case-control method of research. A fall risk assessment tool labeled CHAMPS (Razmus, Wilson, Smith, & Newman, 2006) and the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool (Cooper & Nolt, 2007) were developed using an evidence-based approach and have not been validated.

The GRAF PIF© tool was developed by Graf (2005) in a retrospective, matched case-control study in which 100 medical records from patients who had fallen during hospitalization were reviewed for the presence of 38 variables
identified as fall risk factors. Of these 38 variables, five significant risk factors were identified through logistic regression analysis: (a) length of stay greater than 5 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 (Child Health Corporation of America Nursing Falls Study Task Force, 2009). Sensitivity and specificity of the tool was identified as 0.75 and 0.76, respectively (Graf, 2008).

The Humpty Dumpty Falls Scale (HDFS©) is a fall risk screening tool developed by an interdisciplinary team of expert clinical nurses from Miami Children’s Hospital, Florida. The instrument is comprised of seven assessment items: (a) age, (b) gender, (c) diagnosis, (d) cognitive impairments, (e) environmental factors, (f) response to surgery or sedation/anesthesia, and (g) medication usage. Sensitivity and specificity of the tool was evaluated in a retrospective pair matched case-control study. The reported sensitivity and specificity was 0.85 and 0.24, respectively, with the positive predictive power at 0.53 and negative predictive power at 0.63. The overall percentage of patients correctly classified as to their risk of a fall was 59.3% (Hill-Rodriguez et al., 2009).

The CHAMPS risk assessment tool was developed in a study conducted by Razmus et al. (2006). Using logistic regression procedures the significant predictors of falls for pediatric patients identified include (a) history of fall, (b) impaired gait, (c) mental status, and (d) episodes of disorientation. The CHAMPS tool is currently undergoing validation testing (Child Health Corporation of America Nursing Falls Study Task Force, 2009).

In April 2006, Children’s Hospital implemented a pediatric fall prevention program that was developed utilizing available research and supporting evidence.
A fall risk screening tool was developed by expert pediatric nurses who were members of the Nursing Research committee. At the time of development, published research on inpatient pediatric fall prevention and risk assessment tools were non-existent. Fall risk factors for the Children’s fall risk screening tool were abstracted from the adult literature and identified through case reports from October 1, 2003, to December 31, 2005 in which a total of 214 falls were reported. The study identified that a higher percentage of falls occurred in males (63%). The majority of falls occurred in toddlers aged 1-2 years (25%) and adolescents aged 11-18 years (23%). There was a nominal difference between inpatient (49.5%) and outpatient (50.5%) falls. Falls usually involved falling out of bed, falling while ambulating, slipping on wet floors, or tripping over equipment or clutter, with many falls occurring while parents were present. Approximately half of the fall events resulted in minor injury such as a bruise or abrasion, with no life threatening injuries occurring (Cooper & Nolt, 2007).

Significant fall risk factors integrated into the fall risk screening tool included (a) ambulation with IV pole and/or oxygen, (b) seizures or neurological impairment, (c) administration of identified narcotic analgesic, anxiolytic, or sedative/hypnotic medication, (d) history of fall at home prior to admission or during hospitalization, (e) impaired mobility with use of assistive device for ambulation, (f) administration of identified Vinca Alkaloid, (g) administration of multiple anti-hypertensive medications, (h) age, (0-24 months), (i) rehabilitation patient, (j) impaired safety judgment, or demonstrated noncompliance to safety standards, (k) developmental disabilities, and (l) impaired mobility or sensory deficit. The fall risk screening tool was piloted in one acute care medical unit for 2 months, during which time three falls occurred.
During implementation of the fall prevention program reference tools were developed and staff received education on use of the fall risk screening tool. Quarterly monitoring has demonstrated a 95% compliance rate with completion of the tool. However, outcome data suggest that the fall prevention program has had minimal impact on reducing the rate of falls in hospitalized children. Prior to implementation of the Children’s Hospital fall prevention program in 2006, the inpatient fall rate was identified as 0.8 inpatient falls per 1000 patient days. In 2008, the inpatient fall rate was 1.2 falls per 1000 patient days, identifying a slight increase, which is likely due to increased incident reporting than to an actual increase in patient falls. Reported fall rates for other children’s hospitals range from 0.64 to 1.54 falls per 1,000 patient days (Graf, 2008).

Conclusions

Although the research on falls in pediatric hospitals has increased over the past 5 years, there are limitations. The current pediatric fall risk screening tools that have been tested for reliability and validity have demonstrated variable results, making it difficult to develop accurate assessments to determine children at highest risk of falling. There are also a variety of variables identified in each tool, making accurate assumptions that the measures are representative of children at risk for falling, difficult to ascertain. The identified risk assessment tools were developed in single study sites, thereby limiting generalizability of the findings.

The Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool was originally developed utilizing an evidence-based approach. Key variables were abstracted from the adult literature and identified by pediatric clinicians to have clinical significance in predicting children at risk for falling during hospitalization. The tool has been utilized throughout the organization
since April 2006, demonstrating minimal impact. Further research and development of the risk assessment tool would ensure children at greatest risk for falling are properly identified triggering the need to implement appropriate interventions to protect the child from injury.
CHAPTER 3: FRAMEWORK

A fall is defined as a sudden unexpected descent from a standing, sitting or horizontal position, including slipping from a chair to the floor with or without injury to the patient (National Database of Nursing Quality Indicators, 2008). Patient falls are a complex phenomenon and the result of both intrinsic factors, such as physiological changes and medication usage, and extrinsic factors, such as environmental characteristics (e.g., lighting, floor surfaces, and equipment) (Cooper & Nolt, 2007; Schmid, 1990; Tideiksaar, 2002). Falls occurring in hospitals are frequently classified as either accidental, anticipated physiological, unanticipated physiological (Morse, 1996), and most recently in the pediatric population as a developmental fall (Graf, 2005), based on contributing factors. An accidental fall is a fall due to errors in judgment or environmental hazards. Anticipated physiological falls are falls that occurred in a patient identified as fall-prone due to one or more factors identified in a validated fall-risk assessment tool, and unanticipated physiological falls are those falls that may be attributed to physiological causes or conditions, such as seizures or fainting, that cannot be predicted before the first fall (Morse, 2009). A developmental fall is a fall that occurred in a pediatric patient that is not accidental, but a normal part of learning how to walk, pivot or run and has not resulted in injury (Graf, 2005).

The Children’s Hospital Central California Humpty Dumpty Risk Screening Tool is comprised of multiple variables identified by pediatric clinicians to increase the risk of falling in hospitalized children. Variables identified to place the child at moderate risk for falling include the following:

- Ambulation with an IV pole and/or oxygen
- Intermittent administration of identified narcotic analgesic by any route
- Administration of an anxiolytic, sedative/hypnotic medication, including but not limited to benzodiazepines, by any route
- Administration of identified Vinca Alkaloid
- Administration of multiple anti-hypertensive medications
- Patient is an infant. (0-24 months)
- Patient has impaired safety judgment
- Impaired mobility/sensory deficit

Variables identified to place the child at high risk of falling include the following:

- Seizures/neurological impairment
- Impaired mobility with use of assistive device for ambulation
- History of fall at home prior to admission or during hospitalization
- Continuous IV infusion of narcotic analgesic
- Post continuous epidural analgesic with local anesthetic and/or narcotic analgesic
- Rehabilitation/Physical Therapy/Occupational Therapy patient
- Developmentally delayed
- Noncompliance to safety standards

Each patient has a fall risk assessment completed by the registered nurse upon admission to the hospital, during transfer of care at the beginning of each shift, and upon transfer to another location. Appropriate interventions are to be implemented, based on the child’s identified risk. Each patient and family member is to receive fall prevention education, based on the needs of the child. The child’s risk for falling, appropriate interventions to prevent falling, and the patient family education provided, is then documented in the interdisciplinary plan.
of care, a section of the medical record (Children’s Hospital Central California, 2008).

Adequately identifying children at risk for falling requires the proper identification of validated risks. The purpose of the study was to evaluate if the current Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool is a reliable and valid tool.

Definition of Terms

For the purpose of the study, the following terms were used to support validation of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool:

Research Terms

Case-control study design: a research design used to provide descriptive information on the characteristics of cases and estimate the strength of the association between each predictor variable and the presence and absence of the disease (Hulley et al., 2001).

Predictive validity: identifies the degree to which an instrument can predict future performance (Houser, 2008).

Sensitivity of screening test: identifies the accuracy of a screening test to identify the proportion of the patients who have a positive result or true positive (Houser, 2008).

Specificity of a screening test: identifies the accuracy of a screening test to identify the proportion if patients who have a negative result or true negative (Houser, 2008).
Fall-Risk Assessment Terms

For the purpose of the study, operational definitions were abstracted from the literature and developed by the researcher, who has had 30 years of experience caring for hospitalized children. The following terms were utilized as defined:

**Accidental fall:** A fall due to errors in judgment or environmental hazards (Morse, 2009).

**Administration of identified Vinca Alkaloid:** includes Vincristine, Vinblastin, Vindesine, Vinorelbine, and the anthracyclines (Doxorubicin and Daunorubicin) that may result in neurotoxicity.

**Administration of multiple anti-hypertensive medications:** includes the administration of two or more diuretics, beta-blockers, calcium channel blockers and vasodilators used to reduce hypertension in the pediatric patient.

**Age (0-24 months):** Excludes infants residing in the Neonatal Intensive Care Unit at Children’s Hospital Central California, Madera.

**Anticipated physiological falls:** A fall that occurred in a patient identified as fall-prone due to one or more factors identified in a validated fall-risk assessment tool (Morse, 2009).

**Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool:** A screening tool utilized by nurses to identify potential fall risk of pediatric patients at Children’s Hospital Central California, Madera.

**Developmental delay:** the child has been identified by the parents or care provider to demonstrate a physical, cognitive, or psychosocial delay based on gestational age resulting in a developmental disability. The delay may be due to general retardation, pathological factors such as deafness or neurological impairment or familial pattern of slow development in one or more areas (Shevell, 2008).
**Developmental fall:** A fall that occurred in a pediatric patient that is not accidental, but a normal part of learning how to walk, pivot or run and has not resulted in injury (Graf, 2005).

**Fall event:** A sudden unexpected descent from a standing, sitting or horizontal position, including slipping from a chair to the floor with or without injury to the patient. Includes assisted falls, where an individual guides the falling individual to the floor (National Database of Nursing Quality Indicators, 2008).

**History of falling:** The patient has been identified to have had a previous fall recorded during the present hospitalization, or an immediate history of physiological falls prior to admission.

**Impaired mobility with use of assistive device for ambulation:** The child may have difficulty rising from the chair, attempts to rise by pushing on the arms of a chair or requires assistance maintaining an upright posture. The child’s head is down, demonstrates poor balance and grasps onto furniture, a support person or walking aid during ambulation. The steps are short and the child shuffles. Ambulatory aids include crutches, a walker, splints, or assistance by a care provider/parent.

**Impaired safety judgment, or demonstrated noncompliance to safety standards:** A child or parent who is not compliant to safety standards, e.g., proper use of side rails, running, jumping or climbing. A child diagnosed with attention-deficit/hyperactivity disorder (ADHD), hyperactivity, or impetuousness. A child/adolescent who overestimates his/her ambulatory ability and has demonstrated a disregard for established interventions to prevent a fall.

**Inpatient:** An individual, male or female, who is under the age of 18 and is receiving nonepisodic care, treatment of services in an inpatient setting at
Children’s Hospital Central California, Madera. Infants receiving care in the Neonatal Intensive Care are excluded.

**IV pole and/or oxygen:** The patient has an intravenous apparatus (infusion pump) or a portable oxygen apparatus attached during ambulation.

**Narcotic analgesic, anxiolytic, or sedative/hypnotic medication:** includes natural occurring alkaloids (morphine, codeine); semi synthetic opiates (hyrocodone, hydromorphone, and oxycodone); piperidines (demerol, lomotil, imodium, fentanyl, and sufentan); methadone; benzodiazepines, diazepam; benedryl; chloral hydrate (Lexicomp Online, 2010).

**Neurological impairment:** A change in level of brain function manifests by changes in generalized motor responses. Motor dysfunction may be characterized as alterations in motor tone, movement and complex motor performance and may present as hypertonia (increased muscle tone) or hypotonia (decreased muscle tone). Symptoms may be identified as spasticity, gegenhalten (involuntary resistance to purposeful movement of extremities), dystonia, and/or rigidity, flaccidity, paresis (weakness), paraplegia (weakness of lower extremities), hyperkenesia (excessive movement), or hypokenesia (decreased movement). Alterations in complex motor performance include disorders of posture and disorders of gait (Boss & Wilkerson, 2006).

**Primary diagnosis:** The primary condition or disease listed in the patient’s medical record. The primary diagnosis is the first condition or disease identified by the physician for which the patient was admitted to the hospital.

**Rehabilitation patient:** For the purpose of this study, a patient receiving episodic care in the Rehabilitative Unit at Children’s Hospital Central California, Madera.
Secondary diagnosis: More than one medical diagnosis is listed in the patient’s medical record. The secondary diagnosis is not the primary diagnosis for which the patient is admitted.

Seizures: A review of the medical record has identified a diagnosis of seizure to include; partial seizures (seizures beginning locally), either simple or complex; or generalized seizures (bilaterally symmetric and without local onset), identified as either myoclonic, clonic, tonic, tonic-clonic, atonic or absence type seizures; or unclassified epileptic seizures (Boss & Wilkerson, 2006).

Sensory deficit: Visual or hearing deficit identified in the medical record.

Unanticipated physiological fall: a fall that may be attributed to physiological causes or conditions, such as seizures or fainting, that cannot be predicted before the first fall (Morse, 2009).
CHAPTER 4: METHODOLOGY

The study purpose was to verify whether a high-risk designation on the Children’s Hospital Central California, Madera Humpty Dumpty Fall Risk Screening Tool is associated with a documented fall. A retrospective matched case-control design was used to capture information on 132 inpatient pediatric fall incidents that were reported to the Children’s Hospital Central California Risk Management Department from May 1, 2008 through December 31, 2009. Of the 132 reported falls, three were eliminated as age was identified to be greater than 18 years of age; an additional 17 incidents were a result of repeat falls, resulting in 112 children who fell during hospitalization (cases). The controls, abstracted from an internal database, were sampled from patients admitted during May 1, 2008 – December 31, 2009 who did not fall (control group). The cases and controls were pair-matched for age, gender, and diagnosis.

Research Design

A retrospective pair matched case-control design was used to capture information on inpatient pediatric falls that occurred during May 1, 2008 – December 31, 2009 at Children’s Hospital. An examination of the medical records of 112 hospitalized pediatric patients who had experienced a fall (cases) and 112 hospitalized pediatric patients who did not fall (controls) provided a database of physiological and environmental variables from both groups. Cases (fallers) were identified from reported falls submitted through an occurrence report to Children’s Hospital Central California Risk Management Department. Exclusion criteria were those falls of visitors, employees, or patient falls from the outpatient and neonatal intensive care units. Controls (non-fallers) were abstracted from an internal database by the Research Department at Children’s
Hospital Central California, Madera, and case matched according to age, gender, diagnosis and date of fall occurrence. Data were collected about the fall event (cases), the patient, and fall risk assessment status on an investigator designed research tool. No data were collected directly from patients, family members or staff. A comparison of patients who fell (cases) with controls (non-fallers) was made using the chi-square test. At an alpha of .05, variables identified in which \( p < .05 \) were considered significant.

**Setting**

This retrospective pair matched case-control study was conducted at Children’s Hospital a free-standing pediatric teaching facility. Patient data were abstracted electronically from existing occurrence reports used for risk management/quality improvement purposes and patient medical records who received care in seven in-patient (medical, surgical, medical-surgical, respiratory, oncology, rehabilitation, and pediatric intensive care) units. Infants receiving care in the neonatal intensive care unit were excluded. In addition, falls of visitors, employees, or patient falls from the outpatient setting were excluded.

Physiological, environmental variables and fall risk status were collected for both groups from a retrospective medical record review, and for the fall group, additional information pertaining to the fall event was obtained from the risk management occurrence report. All data were collected by the researcher and recorded on an investigator designed research tool. Coded data were then entered into an Excel© spreadsheet that was password protected.
Participants of the Study

The target population of this study consisted of hospitalized pediatric patients during May 1, 2008 – December 31, 2009 at Children’s Hospital Central California, Madera. All participants were 0-18 years of age. Case participants were comprised of 112 patients who had fallen during hospitalization, 114 of which were reported to the Risk Management Department at Children’s Hospital Central California, Madera. One case, originally identified as a control, was changed to a case when a documented fall was discovered during the medical record review process. Three cases were eliminated as age was identified to be greater than 18 years of age. Participants used as controls were identified from an internal database and pair-matched according to gender, age, and diagnosis. No data were gathered directly from patients, family members or staff. Since data were abstracted from existing occurrence reports used for risk management/quality improvement purposes and patient medical records, resulting in no more than minimal risk participants, expedited review was granted from Children’s Hospital Central California Institutional Review Board (see Appendix A). In addition, written permission to conduct the study was granted by the California State University Department of Nursing in compliance to the California State University Fresno Institutional Review Board policy (see Appendix B).

Instrumentation

Data for the statistical analysis were gathered by using an investigator designed research tool consisting of both physiological, environmental variables and fall risk status from cases and controls. The variables on the research tool were identified as potential attributes associated with fallers through three mechanisms: 1) an extensive literature review, 2) focus groups comprised of pediatric clinical experts, and 3) collaboration among nurse researchers associated
with Child Health Corporation America (see Appendix C). Conceptual and operational definitions were developed both independently by the researcher and in collaboration with nurse researchers associated with Child Health Corporation of America (see Appendix D). The CHCA granted permission to include the CHCA Pediatric Falls data collection form in this thesis (see Appendix E).

**Procedures for Data Collection**

Written approval to conduct the study was obtained from the California State University Department of Nursing according to the California State University Fresno Institutional Review Board policy and Children’s Hospital Central California Institutional Review Board. Data were collected from individual occurrence reports submitted to the Children’s Hospital Central California Risk Management Department and through an electronic retrospective medical record review. Fallers (cases) were identified through occurrence reports submitted by the clinical registered nurse who had been signed responsibility for providing care to the patient. Each case (faller) was matched to similar patients (controls), who were hospitalized for more than 24 hours and within 30 days on the same date as the fall event. Cases were also matched to the following criteria: gender; age; and medical diagnosis. Each case (faller) and control (non-faller) was assigned a study identification number to protect confidentiality of the patient. Only data obtained from secondary sources were utilized. No data were collected directly from patients, family members or staff. Physiological, environmental and fall risk data were abstracted from the electronic medical record and entered into the investigator designed research tool. Coded data were then entered into a password protected Excel© spreadsheet.
**Ethical Considerations**

This study posed no more than minimal risk to participants. Data were collected retrospectively from electronic medical records accessed at Children’s Hospital. All data were collected by the principal investigator and secured to protect patient confidentiality. A waiver of consent was requested as the research presented no more than minimal risk of harm to subjects and involved no procedures for which written consent is normally required outside of the research context.

The study required abstraction of information from secondary sources. Only data from the occurrence reports and retrospective medical record review were utilized. Controls (non-fallers) were identified through an internal database at Children’s Hospital. Each case (faller) and control (non-faller) was assigned a study identification number to protect confidentiality of the patient. The information from the study data collection sheets was maintained within a locked file cabinet within a secured office at Children’s Hospital where only the primary investigator had access. De-identified data were entered, using the coded number only, in a secured password protected database. Only aggregate sample data have been reported. All data collection sheets containing protected health information (PHI) will be destroyed per Children’s Hospital Central California policy # 1.1709 Confidential Waste Disposal, within three years. All medical records reviewed were reported to Children’s Hospital Central California Health Information Management department for proper disclosure according to policy.

There were no costs incurred by the participant/family for this research study. There was also no compensation to participants/family for this research study.
There were no potential benefits to participants, although identifying current risk factors associated with hospitalized children who have fallen at Children’s Hospital provided new information to support refinement of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool currently used by registered nurses. A validated fall-risk screening tool will more accurately identify children at high risk for falling. The ability to accurately identify children at risk for falling will enhance the effectiveness of the fall prevention program and improve patient safety in the future.

**Data Analysis**

Data were entered into a statistical program (SPSS ©) and frequencies and descriptive statistics were obtained to examine event characteristics. Crosstabs and chi-square test of independence ($\chi^2$) functions were used to determine significant differences between particular variables among cases (fallers) and controls (non-fallers). At an alpha of .05, variables in which $p<.05$ were considered to be significant. Calculations of the sensitivity and specificity of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool were used to determine the predictive ability of the tool to accurately identify patients at risk for falling.
CHAPTER 5: RESULTS

Statistical analysis was performed on a convenience sample of (212) pediatric participants identified in the Children’s Hospital database as having received care during May 1, 2008 and December 31, 2009. Participants consisted of 106 identified fallers (cases) and 106 identified non-fallers (see Table 1). Descriptive statistics were used to evaluate for significant differences between fallers (cases) and non-fallers (controls). When comparing fallers (cases) to non-fallers (controls) no significant differences were detected in gender, age, ethnicity and diagnosis. Fifty one percent were males and 49% were females. The majority of the sample was identified as Hispanic (53.8 %), followed by Caucasian (34.9 %), African American (4.7%) and Asian (3.8 %).

Table 1. Gender of Cases and Controls (N=212)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Cases (n)</th>
<th>Controls (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fallers</td>
<td>Non-fallers</td>
</tr>
<tr>
<td>Male</td>
<td>53</td>
<td>55</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>51</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
<td>106</td>
</tr>
</tbody>
</table>

There were no significant differences detected in age between fallers and non-fallers, with an average age of 6 years 6 months. The highest incidence of falls occurred in children less than four years of age (45%) followed by adolescents 11-18 years of age (24%). School-aged children between the ages of 7 to 10 years (16%) fell slightly more frequently than pre-school children between the ages of 4 to 6 years (15%) (see Table 2).
When comparing fallers to non-fallers there was no significant difference identified for diagnosis. The most frequently occurring primary diagnosis was hematology/oncology (28%), of which adolescents 11-18 years of age had the highest incidence of falls. The second most frequently occurring primary diagnosis was infectious disease (23.6%), with falls occurring most frequently among the 2-3 year olds. There were 13 children identified to have a neurological/developmental disability (12.3%) as a primary diagnosis who had fallen (see Table 3).

Children who fell were identified to have a more severe systemic illness with secondary co-morbid conditions identified (58.5%). Infectious disease (14%) and neurological/developmental delay (9.4%) were most frequently identified as a secondary diagnosis. Hematological disorders were identified as a secondary diagnosis in nine children (8.5%) who had fallen.

Falls occurred most frequently during the first four days of hospitalization (59%); during week-end shifts (e.g., Friday, Saturday, & Sunday) (49%) and between the hours of 1100 and 2300 (55.6%). The highest incidence of falls occurred in the patient’s room (42.7%), the bathroom (33.0%) and the

Table 2. Age Group of Cases and Controls (N=212)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Cases (n)</th>
<th>Controls (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-24 months of age</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>2 to 3 years of age</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>4 to 6 years of age</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>7 to 10 years of age</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>11 to 18 years of age</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>106</strong></td>
<td><strong>106</strong></td>
</tr>
</tbody>
</table>
Table 3. Primary Diagnosis of Cases and Controls (N=212)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Cases (n)</th>
<th>Controls (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fallers</td>
<td>Non-Fallers</td>
</tr>
<tr>
<td>Hematology/Oncology</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Neurological/Developmental Delay</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Respiratory</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Metabolic/Endocrine</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Renal</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cardiac</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Ears/Nose Throat (ENT)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>106</strong></td>
<td><strong>106</strong></td>
</tr>
</tbody>
</table>

Hallway (11.3%). Falling or rolling off an object (35.8%), either the bed (12.3%) or crib (5.7%), occurred most frequently. Most falls occurred when children were supervised (52.8%), often witnessed by the parent (50.9%). Twenty-three percent of supervised falls occurred while children were ambulating, 15% while playing, and 11% while toileting.

The majority of falls resulted in either no injury (57%) or minor injury (42%). Fourteen patients with injury received additional medical treatment, bandaging or pain medication as a result of the fall. There were five patients who received additional diagnostic procedures as a result of the fall.

Ensuring proper identification of fall risk is an essential part of identifying appropriate interventions to prevent falls and falls with injury. Ninety six percent
of the 212 medical records reviewed had a fall risk indicated. Patients who fell were more frequently identified to be at risk for falling \((p = .023)\). Statistically significant differences of the identified level of risk as high, moderate or low were identified between fallers and non-fallers \((p = .000)\). Sixty two (58.5\%) of the fallers were identified as high risk; 38 (35.8\%) as moderate risk; and 5 (4.7\%) as low risk. Interestingly, 24 (23\%) of the non-fallers were identified as high risk; 82 (77\%) as moderate risk and none were identified as low risk for falling.

A statistical evaluation of the fall risk variables identified on the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool revealed two variables to be statistically significant between fallers and non-fallers: continuous narcotic analgesic infusion \((p = .013)\) and patients receiving either physical therapy or rehabilitation services \((p = .012)\). Interestingly, the presence of an intravenous apparatus was not found to be significant among the fallers.

Although not found to be statistically significant, patients who fell were identified to be more likely to have seizures (26.4\%), impaired mobility with use of an assistive device (18.9\%), and history of a previous fall (7.5\%). An individual case review of patients with a history of falling identified that those patients fell more than once during their hospitalization. Interestingly, there was an increased number of patients who did not fall who had received narcotics (22.6\%) or sedation/hypnotic medications (19.8\%), compared to fallers, (14.1 \% and 16\%, respectively).

Statistical analysis of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool identified a sensitivity rate of 64\%, a specificity rate of 53\%, and a false positive rate of 59\%, implying that the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool is just slightly better
than chance at identifying true fallers, and may potentially classify non-fallers as high risk resulting in an increased surveillance of children with minimal risks.
CHAPTER 6: DISCUSSION

The objective of this study was to identify the predictive ability of Children’s Hospital Central California’s Humpty Dumpty Fall Risk Screening Tool to identify hospitalized children at risk for falling. The Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool was evaluated using a case-control methodology to identify significant risk factors between hospitalized pediatric patients who fell (n=106) and non-fallers (n=106) matched according to age, gender and diagnosis. Patients who had fallen more than once during their hospitalization were counted as one fall case, with data synthesized, to decrease bias associated with either overestimating or underestimating the importance of some risk factors. There were no significant differences identified between the fallers (cases) or non-fallers (controls) related to gender, age or ethnicity, indicating close matching of pairs.

The study revealed that children less than four years of age, and adolescents 11-18 years of age fell most frequently. Children who fell frequently had more severe illness with secondary co-morbid conditions. Oncologic and hematologic diagnoses occurred most frequently. Children fell most often during the first four days of hospitalization and during week-end shifts. The most common site of falls was in the patient room, in the presence of adult supervision, most often by a parent. Injury associated with falls was minor. Patients who fell once during this hospital stay had an increased risk of falling again during hospitalization.

An evaluation of the current Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool identified a sensitivity rate of 64%, a specificity rate of 53%, and a false positive rate of 59%. Two high risk variables; continuous
narcotic infusion and physical therapy/ rehabilitative services, were identified as significant.

**Limitations of the Study**

This study was a relatively small study conducted in one children’s facility, limiting the ability to generalize findings. There is a potential for coding bias as data collection was retrospective limiting the completeness and accuracy of the data. Poor documentation of risk factors was noted. Although risk factors assessed were based on a literature review, and clinical expertise it was not all inclusive. There may be additional fall risk factors not acknowledged. In addition, detailed descriptions of fall events were frequently missing from documentation. The study design did not include follow-up to assess for unidentified factors or missed injuries.

Although nursing staff were diligent in documenting the child’s fall risk status as high, moderate, or low in the interdisciplinary plan of care, it was noted during data abstraction that frequently only one variable was listed. During the study the majority of children who had fallen (67.9%), actually had two to four additional variables not documented by the nurses. Identifying those children with more than one risk factor as high risk may further enhance the sensitivity and specificity of the tool.

An important issue regarding validity testing of fall risk screening tools is the impact of confounding variables, those variables affecting the outcome of the study, although difficult to control. Myers (2003) identifies “a potential for bias occurs as fall risk assessment tools are used to predict a later event, a fall. Interventions are usually implemented to prevent falls, thereby compromising the predictive value of the risk assessment tools” (p. 229). In pediatric organizations,
fall prevention interventions are considered routine practice as all patients are considered to be at some risk for falling during hospitalization due to multiple intrinsic and extrinsic factors. It would be unethical to ask nurses not to implement fall prevention measures. In addition, there has been ongoing education to enhance patient safety since implementation of the Children’s Hospital Central California Humpty Dumpty Risk Screening Tool in April 2006, resulting in increased staff awareness of the importance in protecting patients from harm.

Findings from this study are contrary to the research conducted by Graf (2005) who identified that being in the hospital for general surgery, having an infectious disease, and having parents present at the bedside were protective against falling. Having an intravenous line was the only protective factor found in this study, which may be an indication that clinical judgment is utilized to identify appropriate interventions. A prospective study is warranted.

Recommendations for Future Research

Based on this study a revision of the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool is indicated. To simplify the fall risk screening tool the most significant risk factors should be retained in the final tool. To increase the specificity of the tool, a discriminate analysis consisting of significant variables will be used to identify weights for each significant factor. Once variables are weighted, prospective validity testing of the tool will be performed.

Future prospective studies to account for confounding variables by collecting information on fall risk factors and nursing interventions not found in the medical record would further strengthen the reliability and validity of the
Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool. Additionally two variables, obesity and anemia, although not accounted for during data abstraction were frequently identified during the medical record review. Recent research has identified that obese children (BMI>95th percentile) have an increased risk of injury from falls, as well as prolonged recovery and increased morbidity (Pomerantz, Timm, & Gittleman, 2010). Obese children tire more easily and have impairments in posture, balance and motor skills, increasing the probability for falling (Sayegh, Bradley, & Vaca, 2010). Several patients were identified to have anemia as a secondary diagnosis with a documented hemoglobin level below 9 g/dL. Children with acute anemia may have dizziness, become weak and tire more easily. Major causes of anemia in children are iron deficiency, hemolysis, hemoglobinopathies and bone marrow suppression (Bomgaars, Mahoney, Lorin, & Hoppin, 2010). Additional research in children with oncologic or hematologic diagnoses is warranted.

Although neurological deficits were not found to be statistically significant in this study, other researchers found altered mental status and impaired gait to be significant factors associated with falls (Razmus et al., 2006). Research conducted at Miami Children’s Hospital also identified a higher incidence of neurological conditions in patients who fell, specifically seizures (Hill-Rodriquez et al., 2009). Further evaluation of the impact of neurological deficits as a variable is indicated.

This study identified that parents were frequently in attendance during the time of the fall. Conducting additional research to analyze family dynamics and the impact of key factors such as socioeconomic status, educational level of parents, language barriers, cultural influences, and family structures is also recommended.
Generalization of findings is difficult due to the limited size of the study and single study site. Further evaluation of case mix index to determine the level of severity of illness compared to other pediatric facilities is needed. Replication of this study with a larger sample size and at multiple children’s hospitals is recommended.

**Implications for Nursing Practice**

The prevalence rate of inpatient falls in this study was 1.44 falls/1000 patient days, which is a higher rate than that found in other pediatric facilities. Identifying children at risk for falling is complex due to multiple contributing factors. Although it is difficult to prevent children from falling, decreasing injuries associated with falls can be achieved.

Protecting children from injury requires a multifaceted approach. The findings of this study identified children fell most frequently during the first few days of hospitalization. For newly hospitalized children, the hospital is a strange environment with multiple distractions, placing the child at a greater risk for falling. Parents may identify the hospital as a safe place and may not be aware of safety hazards. Tired parents who may be anxious and stressed are likely to be less vigilant. Orientation to the environment and development of an educational program focused on teaching parents age-appropriate fall prevention strategies would decrease the rate of falls.

The injuries associated with a pediatric fall are not as severe as that of adults, although there are potential risks. Children have a proportionately larger head, increasing the potential for craniofacial injuries. Lacerations frequently occur with accidental falls (slipping or tripping) (Chang & Tsai, 2007). Head injuries are frequently identified as the most common cause of death in children
who fall. The potential for traumatic brain injury is higher among infants and toddlers 0 to 3 years of age (Love, Tepas, Wludyka, & Masnita-Iusan, 2009). In this study infants fell most often from cribs or the parent couch. The cribs used in the hospital setting are different from cribs used at home. Although hospital cribs have safety latches, the rails can be taken below the level of mattress, allowing infants to easily roll off the mattress. Demonstrating crib safety and reinforcing the importance of not leaving the infant unattended, even for a short period of time, would decrease the rate of falls. Should an infant fall from a crib, skull radiographs, a physical examination and 24 hours of in-hospital monitoring is recommended (Monson, Henry, Lambert, Schmutz, & Christenson, 2008).

Children’s Hospital provides care in a family -centered environment, with many parents staying overnight to provide care. Quigley et al. (2008) identified that family members are not always dependable in assisting in patient care. Accidental asphyxia is associated with co-sleeping, lending support to the prevention of co-sleeping in the hospital. A visual check on any infant who is known to be in the arms of a parent during evening hours should occur frequently, ideally every 30 minutes.

Children at risk for seizures should be closely monitored. Use of helmets during ambulation and play activities would help prevent accidental head injuries that may occur during a seizure resulting in a fall. Activities that increase the likelihood of falls should be limited until the child becomes accustomed to the effects of anti-seizure medications.

Patients and families should be instructed to call for assistance when getting out of bed or going to the bathroom, especially after receiving pain medications. Acquiring beds with bed alarms would help to alert the nurse when the child is attempting to get out of bed without assistance. Becoming proactive
by implementing comfort care and safety rounds, toileting prior to pain administration, and moving the patient close to the nurse’s station would further decrease the rate of falls.

In conclusion, preventing falls among hospitalized children is challenging due to multiple factors such as the child’s growth and development, play activities, modesty and parental inattentiveness. Use of a pediatric fall risk screening tool appears to enhance staff awareness of the potential risk for injury. Revising the Children’s Hospital Central California Humpty Dumpty Fall Risk Screening Tool to accurately identify those children at greatest risk for injury would promote a safer environment for hospitalized children.
REFERENCES


Children’s Hospital Central California. (n.d.). *About us.* Retrieved from Children’s Hospital Central California website: http://www.childrenscentralcal.org/services/Pages/default.aspx


APPENDIX A: CHILDREN’S HOSPITAL CENTRAL CALIFORNIA INSTITUTIONAL REVIEW BOARD APPROVAL
December 17, 2010

Carole Cooper, RN
Children’s Hospital Central California
9300 Valley Children’s Place
Madera, CA 93636

RE: HSC Study #922 – Retrospective case matched study to identify variables associated with hospitalized children at risk for falling at Children’s Hospital Central California

Dear Carole:

The Human Subjects Committee, serving as the Institutional Review Board for Children’s Hospital Central California, has reviewed and approved the protocol amendment that will add Sue Mahaffey, RN, MSN to the research personnel.

The Human Subjects Committee is authorized to periodically assess the adequacy of the consent and research process. All problems having to do with subject safety must be reported to the Human Subjects Committee. Serious adverse events must be reported within 48 hours all others must be reported within ten working days on an Amendment/Deviation/Adverse Event Form. Please maintain proper data control and confidentiality.

If you have any questions, please call 353-5171.

Sincerely,

Rhonda Pisk
Human Subjects Committee
APPENDIX B: CALIFORNIA STATE UNIVERSITY
DEPARTMENT OF NURSING HUMAN
SUBJECTS APPROVAL
DEPARTMENTAL (UNIT) REVIEW FORM
COMMITTEE ON THE PROTECTION OF HUMAN SUBJECTS
CALIFORNIA STATE UNIVERSITY, FRESNO

Please type

PRINCIPAL INVESTIGATOR

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If student or collaborative research

Carole L. Cooper

Name

Affiliation

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TITLE OF STUDY
A retrospective case matched study to identify variables associated with hospitalized children at risk for falling at Children’s Hospital Central California

If funding is sought, from what agency?

How did the Principal Investigator designate the research? Minimal risk X At risk □

REVIEWER 1

Name Robert Fire, R.N., PsyD, FNP-C

At risk □ Minimal Risk X

COMMENTS:

REVIEWER 2

Name Dr. Michael Russler

At risk □ Minimal Risk X

COMMENTS:

REVIEWER 3

Name Dorothy Fraser

At risk □ Minimal Risk □

COMMENTS:

The department may wish to route this form to the 3 reviewers or send each reviewer a form. If the review is done on three separate forms, the Chair ought to give each reviewer the comments of the other reviewers as well as the Principal Investigator. If all three reviewers judge
Children’s Hospital Central California Pediatric Inpatient Falls Study

Data Collection Form ID: ____________

Page 1 of 9
Description of Fall Event
1. Number of Data Collection Month  1  2  3  4  5  6  7  8  9  10  11  12

2. Day of Week
   Sunday
   Monday
   Tuesday
   Wednesday
   Thursday
   Friday
   Saturday

3. Time of Day (military time) ________

4. Hospital Day (length of stay) ______

5. Location
   Cafeteria
   Hallway
   Other patient care area
   Other Public area, inside hospital
   Outside of hospital
   Patient bathroom
   Patient room, intensive care
   Patient room, non-intensive care
   Playroom
   Public bathroom
   Stairs
   Unknown

6. Witnessed
   No
   Yes
   Unknown

7. If witnessed, who witnessed? (Check all that apply)
   Health care provider/employee
   Other visitor
   Parent/family member
   Student
8. Adult supervision at time of fall
   - No
   - Yes
   - Unknown

9. Fall Type
   - Dropped
   - Fell/rolled off object
   - Loss of Consciousness
   - Lost balance
   - Pushed
   - Seizure
   - Slipped/slid
   - Tripped
   - Other
   - Unknown

10. Activity at Time of Fall
    - Ambulating
    - Bathing/showering
    - Being held
    - Climbing
    - Fighting
    - Kneeling/bending
    - Lying down/sleeping
    - Playing/recreation
    - Running
    - Sitting/high chair window seat
    - Standing
    - Toileting
    - Transitioning in/out of bed
    - Other
    - Unknown

11. If patient fell/rolled off, what object did patient fall from? (Object fell from)
    - N/A
    - Bed
    - Chair/high chair/car seat
    - Crib
    - Exam table
    - Stretcher
    - Other
12. If patient fell from crib, indicate which of the following apply: (Crib rail positioning)
   N/A
   No side rails up
   Only 1 side rail midway up
   1 only side rail up
   1 side rail up & 1 side rail midway up
   2 side rails midway up
   2 side rails up
   Unknown

13. What was the environmental surface on which the patient fell?
   (Environmental surface)
   Carpet
   Concrete/asphalt
   Grass/dirt
   Gravel
   Linoleum
   Tile (porcelain/marble)
   Wood/laminate
   Other
   Unknown

14. If patient did not fall from an object, what were the surface conditions at the time of
   fall?
   (Surface conditions)
   N/A
   Clean/dry
   Wet/slippery
   Icy
   Cracked/other defect
   Unknown

15. Was fall the result of defective equipment?
   (Defective equipment)
   No
   Yes
   Unknown
16. What type of footwear was the patient wearing? (Footwear in use)
   - Athletic shoes
   - Backless shoes
   - Bare feet
   - Flip flops
   - Sandals
   - Slip resistant socks
   - Socks only
   - Other
   - Unknown

17. If mobile or carried, was pathway obstructed? (Pathway obstruction)
   - No
   - Yes
   - Unknown

18. Was the fall related to the patient’s physical/psychological status at time of fall?
   - No
   - Yes
   - Unsure

19. Was the fall related to the physical/psychological status of someone else at the time of the fall?
   - No
   - Yes
   - Unsure

20. Were diagnostic procedures ordered as a result of the injury? (x-ray, CT scan, etc.)
   - No
   - Yes
   - Unknown

21. Did fall result in injury?
   - No
   - Yes
   - Unknown

22. Did injury require medical/surgical treatment? (suture, closed reduction, splint, cast, etc.)
   - No
   - Yes
   - Unknown
Description of Patient

23. Age: (yy OR mm) _____ yr _____ mo  < 1 mo

24. Wt (kg):

25. Gender:
   Male
   Female

26. Developmental Status:
   Appropriate for Age
   Delayed/Mental Retardation
   Unknown

27. Race (maternal race):
   American Indian/Alaska Native
   Asian
   Black or African American
   Native Hawaiian or Other Pacific Islander
   White
   Hispanic/Latino

28. Primary Diagnosis
   Cardiac
   ENT
   Gastrointestinal
   Infectious Disease
   Metabolic/Endocrine
   Neurologic/Developmental Delay
   Renal
   Respiratory
   Hematology/Oncology
   Other

29. Secondary Diagnosis (check all that applies)
   N/A
   Cardiac
   ENT
   Gastrointestinal
   Infectious Disease
   Metabolic/Endocrine
   Neurologic/Developmental Delay
   Renal
   Respiratory
   Hematology/Oncology
   Other
30. ASA Category:
   I - Normal, healthy patient
   II - Mild systemic disease
   III - Severe systemic disease
   IV - Severe, life-threatening systemic disease
   V - Moribund
   VI - Brain-dead
   Unknown/unassigned

31. Level of Consciousness:
   Alert
   Coma
   Lethargic/Drowsy
   Stupor
   Unknown

32. Mental State:
   Oriented
   Disoriented/confused
   Unknown

33. Visual Deficits:
   No
   Yes
   Unknown

34. Mobility:
   Dependent (e.g. body cast, paralysis)
   Independent & unassisted
   Independent with assistive device (e.g. walker, braces)
   Pre-Ambulatory
   Unknown

35. Gait
   Steady
   Unsteady
   Unknown

36. Balance:
   Good
   Fair
   Poor
   Unknown
37. Motor status if non-ambulatory
   Able to roll
   Able to sit with support
   Able to sit without support
   Able to scoot/crawl
   None

38. History of Previous fall:
   No
   Yes
   Unknown

39. History of syncope/dizziness:
   No
   Yes
   Unknown

40. History of Seizure:
   No
   Yes
   Unknown

41. History of neurological impairment?
   No
   Yes
   Unknown

42. History of hyperactivity/ADHD/Impetuousness:
   No
   Yes
   Unknown

43. History of non-compliance to safety standards?
   No
   Yes
   Unknown

44. History of Rehabilitation/PT/OT?
   No
   Yes
   Unknown
45. History of nocturia:
   N/A
   No
   Yes
   Unknown

46. Was patient post surgery/anesthesia?
   No
   Yes

47. If so, how long at time of fall?
   < 4 hrs
   4 – 8 hrs
   9 – 16 hrs
   17 – 24 hrs
   > 24 hrs

48. Had patient received an intermittent sedative/narcotic medication during past 24 hrs?
   No
   Yes

49. If yes, list: ______________________
   N/A

50. If yes, identify frequency
   every ≤ 1 hr
   every ≤ 2 hrs
   every ≤ 3 hrs
   every ≤ 4 hr
   every ≤ 5 hrs
   every ≤ 6 hrs
   every ≤ 8 hrs
   every ≤ 12 hrs
   every ≥ 12 ≤ 24 hrs
   every ≥ 24 hrs
   N/A

51. What was the degree of sedative response?
   N/A
   Minimal-normal response to verbal commands
   Moderate- purposeful response to verbal commands w/without tactile stimulation
   Deep-purposeful response following repeated or painful stimulation
52. Had patient received a Vinca Alkaloid medication within the past 24 hrs?
   No
   Yes

53. Had the patient received an antihypertensive medication?
   No
   Yes
   If yes list _________________

54. Was a risk tool used to assess risk of fall?
   No
   Yes

55. Was patient identified to be at risk for a fall?
   No
   Yes

56. If yes, risk identified as
   High
   Moderate
   Low

57. Were specific fall prevention interventions incorporated into the plan of care based on at-risk status?
   No
   Yes
   Unknown

58. If yes, check all that apply.
   Non-skid socks
   Supervision while up
   Bedside sitter
   Change in room assignment
   Increased surveillance
   Safety instructions reinforced
   Other

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APPENDIX D: DATA COLLECTION GUIDELINES
Children’s Hospital Central California Pediatric Inpatient Falls Study
Data Collection Definitions

1. Data Collection Month: Arabic number corresponding to month of study involvement.
2. Day of the Week: Validate per calendar
3. Time of Day: Record as military time.
4. Hospital Day: Length of stay in days at time of fall event. Day of hospitalization is identified as 1.
5. Location: Place where child fell defined as:
   - Cafeteria: serving area or dining room
   - Hallway: throughout hospital on inpatient unit or outpatient area
   - Other patient care area: Radiology, Lab, Therapy department, etc
   - Other public area, inside hospital: Elevator, gift shop, lobby, etc.
   - Outside the hospital: parking garage, sidewalk, street, stairs
   - Patient Bathroom: Bathroom located within or adjacent to patient’s room that is dedicated to patient use.
   - Patient room, intensive care.
   - Patient room, non-intensive care:
   - Playroom: Playroom, activity center, playground
   - Public bathroom: Toilet and sink facilities available for public use.
   - Stairs: located inside the hospital
6. Witnessed: Check medical record/incident report to determine if someone saw the fall occur.
7. If witnessed, who witnessed? Identify relationship of person to patient who saw child fall:
   - Health care provider/employee: physician, RN, technician, PT/OT, hospital volunteers.
   - Parent/family member: biological or custodial parent; guardian; natural, half-step-or foster sibling; grandparent; aunt/uncle, etc.
   - Other visitor: Any non-related visitor, i.e. clergy, teacher, school mates, neighbor, etc.
   - Student: Nursing, medical, social work, therapy services, or other health related career.
8. Adult supervision at time of fall: parent (of any age) or individual > 18 years of age.
9. Fall Type: Mechanism by which fall occurred.
   - Dropped: non-purposeful loss of hold on patient
   - Fell/rolled off object: non-purposeful descent to the floor from a recumbent or sitting position
   - Loss of consciousness: Fainting or loss of consciousness for any reason other than seizure
   - Lost balance: non-purposeful fall from a seated, standing or kneeling position
   - Pushed: purposeful, aggressive act
   - Seizure: documented neurological event
   - Slipped/slid: fall caused by loss of contact with surface regardless of condition of surface
10. Activity at Time of Fall:
   - Ambulating: Upright with paced, purposeful movements of lower extremities at time of fall
   - Bathing/Showering: Any activity involving personal hygiene regardless of location.
   - Being held: patient in arms or on lap of any individual
   - Climbing: purposeful attempt to get onto a higher object/location
   - Fighting: Any physically aggressive activity
   - Kneeling/bending: lowering of body from an upright position to one in which patient is bent at the waist, knees or both,
   - Lying down/sleeping: any recumbent position regardless of object on which positioned
   - Playing/recreation: Engagement in any activity for diversion or entertainment
   - Running: Upright with rapid, bodily movement
   - Sitting/high chair/window seat: seated on any object; positioned with HOB up > 30 degrees.
   - Standing: any still, upright position
   - Toileting: purposeful act of or preparing to eliminate of urine/feces
   - Transitioning in/out of bed: a purposeful change in location
   - Other (specify): any other unspecified activity

11. If fell/rolled off, what object did child fall from?
   - Bed: A bed designed for the care of a child or adult hospital inpatient, e.g. standard hospital bed, rotobed, clinitron bed, etc.
   - Chair/high chair/car seat: Any piece of furniture with/without wheels designed to be sat on: high chair, car seat, wheel chair, infant seat, etc
   - Crib: Any bed designed for an infant/toddler, e.g., crib, isolette, over bed warmer
   - Exam table: any flat, fixed surface used to assess patients, e.g. exam table/bed, counter.
   - Stretcher: any device designed for the purpose of transporting a patient in a recumbent position
   - Other (specify):
   - N/A: not applicable

12. If patient fell from crib, indicate which apply. Answer based on report.
13. What was the environmental surface on which the patient fell?
   - Tile: Any fixed, hard surface developed from component parts & joined by grout/cement, e.g. porcelain tiles, bricks
   - Wood/Laminate: Any wood or other grooved, wood-like substance,
   - Carpet: any padded surface, recycled tire floor
   - Linoleum: any fixed, continuous, smooth surface, e.g., linoleum, granite, marble,
   - Concrete/asphalt: fixed, continuous, rough surface
Grass/dirt: any naturally occurring environmental surface
Gravel: Any loose, rough surface
Other: Any other non-specified surface

14. Surface conditions at time of fall?
   Clean/dry: No inherent risk
   Wet/slippery: Any liquid-coated surface
   Icy: any surface coated with frozen water/liquid
   Cracked/other defect: any hard surface that has a visible defect affecting the evenness of the surface
   Unknown: Surface conditions unreported
   Other: any not specified

15. Defective equipment: Check reports/medical record for description of equipment or other safeguard failures.

16. Type of footwear:
   Athletic shoes: e.g., tennis shoes
   Backless shoes: e.g., clogs, sandals
   Bare feet: no socks or shoes
   Flip flops: any backless, open-toed flat rubber-soled shoe; e.g., slipper, thong,
   Sandals: a shoe fastened to the foot by thongs or straps.
   Slip resistant socks: hospital-provided socks
   Socks only: socks from home
   Other: not specified

17. If mobile or carried, was pathway obstructed: IV poles, toys, etc. in pathway.

18. Was fall related to physical/psychological status at time of fall?
   No: no known factors present to cause fall
   Yes: has medical or psychological condition and antecedent known to cause fall
   Unsure: has medical or psychological condition, is on mediation or receiving other treatments that may increase risk of fall, but a clear association cannot be made.

19. Was fall related to someone else’s physical/psychological status at time of fall?
   No: no known factors present to cause fall
   Yes: someone other than patient had a medical or psychological condition that led to fall (e.g. inebriated, medicated, passed out)
   Unsure: has medical or psychological condition, is on mediation or receiving other treatments that may have led to fall, but a clear association cannot be made.

20. Were diagnostic procedures ordered as a result of the injury?
   Yes: At least one of the following were obtained: x-ray, MRI, CT scan, PET, Ultra Sound
   No: no tests were performed

21. Did the fall result in injury?
   Yes: A fall-related injury, regardless of severity, occurred
   No: No fall-related injury occurred

22. Did injury require medical/surgical treatment?
Yes: least one of the following was needed: bandaid, sutures, closed/open reduction, splint, cast
No: no treatment required

Description of the Patient
23. Age: Record in years and months. If number of days is < 15 do not round. If number of days are
   > 15, round to the next month. If less than one month of age, indicate “0.”
24. Weight: Record in kilograms. Use most recent weight.
25. Gender: Per medical record.
26. Developmental status: Check history and physical for documentation.
27. Race: Per medical record. Use mother’s race if biracial.
28. Primary Diagnosis: Reason for admission. Check the appropriate category.
29. Secondary Diagnosis: Check all categories that apply.
30. ASA Category: Check medical record for documentation. If no documentation, use the following as your guide:
   1 = normal, healthy patient; 2 = Mild systemic disease; 3 = Severe systemic disease; 4 = Severe, life-threatening systemic disease; 5 = Moribund; If unable to determine, indicate unknown.
31. Level of Consciousness: Check medical record for documentation. If not documented, indicate unknown.
32. Mental State: Check medical record for documentation. If not documented, indicate unknown.
33. Visual deficits: If wears shield, glasses or contacts, or blind in at least one eye, indicate yes
34. Mobility: Check medical record for documentation. If child < 15 months and not yet walking, indicate “pre-ambulatory.” If > 15 months and not walking, indicate “dependent.” If > 15 months and requires a cane, walker, brace or other orthotic device to ambulate, indicate “independent with assistive device.” If requires no assistive devices and hand holding, I indicate “independent & unassisted.
35. Gait: Check medical record for documentation. If not documented, indicate unknown.
36. Balance: Check medical record for documentation.
37. History of previous fall: Check medical record for documentation of fall before admission to hospital or during hospitalization.
38. History of syncope/dizziness: Check medical record for documentation of syncope/dizziness before admission to hospital or prior to fall event.
39. History of seizure: Check medical record for documentation of seizure activity before admission to hospital or prior to fall event.
40. History of hyperactivity/ADHD/obsessive compulsiveness/impetuosity: Check medical record for documentation of ADHD/obsessive compulsiveness/impetuousness before admission to hospital or prior to the fall event. Includes Torettes syndrome, and movement disorders such as ataxia, cerebral palsy, and postanoxic myoclonus.
41. History of non-compliance to safety standards: Check medical record for history of non-compliance to hospital safety standards prior to the fall event.
42. History of nocturia: Check medical record for documentation of nocturia before admission to hospital. Patient must be at least 2 years of age and toilet-trained. N/A if has
indwelling Catheter; nephrostomy tube; requires intermittent catherization; is ambulatory; parents report diapered at night.

43. History of Rehabilitation/Physical therapy (PT)/Occupational therapy (OT) during hospitalization or prior to fall. Check medical record for history of Rehabilitation/PT/OT.

44. Surgery: Check medical record for record of surgery during hospitalization or within one week of admission.

45. Length of time since surgery: Indicate appropriate time period

46. Sedation: Check medical record for documented administration of a sedative within 4 hours of fall. If yes, indicate sedatives administered.

47. Sedative Response: Check medical record for documentation. If not documented, indicate unknown.

48. Vinca Alkaloid medication: Check medical record for documentation of administration within 24 hours prior to fall.

49. Antihypertensive medications: Check medical record for documentation of administration within 24 hours prior to fall.

50. Fall risk assessment: Check medical record to determine if prior to fall, a fall risk status was identified and documented in the interdisciplinary plan of care.

51. Risk status: Indicate whether patient was deemed to be at low, moderate or high risk.

52. Intervention: Check medical record for documentation of any preventive steps used to decrease the risk of fall. If so, check all that apply.

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APPENDIX E: PERMISSION TO INCLUDE CHCA DATA COLLECTION FORM
REQUEST FOR PERMISSION TO INCLUDE COPYRIGHTED MATERIAL IN MASTER'S THESIS

March 3, 2011

To: Michelle Lunbeck
   Senior Director
   Child Health Corporation of America

From: Carole L. Cooper

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CHCA Pediatric Falls Project (2008)
Data Collection Forms

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Carole Cooper

Type full name as it appears on submission

05/03/2011

Date