Patient Falls in Radiology

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18.1 Introduction

The Agency for Healthcare Research and Quality (AHRQ) estimates 700,000 to 1000,000 people suffer a fall yearly in the United States [1–3].

The Joint Commission (TJC) under Provision of Care, Treatment, and Services (PC) PC.01.02.08 states: "The hospital assesses and manages the patient's risk for falls." Additional statements contained in this section include EP 1: "The hospital assesses the patient's risk for falls based on the patient population and setting" and EP 2: "The hospital implements interventions to reduce falls based on the patient's assessed risk." The National Patient Safety Goal NPSG.09.02.01 states "Reduce the risk of falls," with additional falls emphasis in subsections EP1–EP5 [4]. The Safe Practices of the National Quality Forum states, "Take actions to prevent patient falls and to reduce fall-related injuries by implementing evidence-based intervention practices" [5].

Falls are an upsetting occurrence that can happen when providing medical care. In good circumstances, these events may result in a near miss. In lesser circumstances, these events result in fractures, lacerations, or internal bleeding. Falls impact healthcare and add cost for consumers, families, and providers [6, 7].

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Radiology is a high volume, ever-changing, dynamic workspace filled with many obstacles including Mayo stands and procedure tables, anesthesia equipment, portable ultrasound machines, oxygen tanks, and electrical or other cables that can lend to patient falls. The fact that the patient maybe weak from a nothing by mouth (NPO) status, the present illness, and/or the effect of sedative/anxiety and other medications increases the falls risk. The potential for liquids (contrast or other) on the floor after a procedure and dim lights in radiology areas also make navigating a room hazardous. Multiple personnel may be milling about as they prepare the procedure room and the patient if elderly may possess sensory deficits that can contribute to the risk of falling [8].

Fall prevention involves many facets of the patient's care, including managing a patient's risk factors for falls and the department's physical structure [3, 8]. As hospitals and ambulatory care sites continue to strengthen falls programs while decreasing falls risk, ancillary areas such as radiology offer additional opportunity.

18.2 Background

Most of the research regarding falls has occurred in hospitalized patient populations [9] and in elderly populations located in community or long-term care facilities [10–13]. Data regarding

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falls in a supplemented service, such as radiology-nursing, is limited. A ten-year literature review of review of the *Journal of Radiology Nursing* (www.sciencedirect.com/journal/journal-of-radiology nursing) [14] revealed no articles dedicated to patient falls. The *Core Curriculum for Radiologic and Imaging Nursing, third edition* (https://www.arinursing.org/resources/publications/) [15] does mention a paragraph regarding falls prevention for patients in radiology, so clearly there is a need for more research into this problem in radiology.

18.2.1 Fall Rates

Research studies have found falls occur at a rate of 3–5 per thousand hospital bed days [2]. From 30 percent to 35 percent of these patients sustain an injury as a result of the fall, and approximately 11,000 falls are fatal [2, 3]. Falls injuries result in increasing length of stay 6.3 hospital days with the average cost for a serious fall at $14,056 per patient [3]. The Pennsylvania Safety Authority cites 620 radiological falls in 2009 resulting in 5% serious safety event (SSE) [8].

18.2.2 Etiology and Consequences

Table 18.1 outlines a general issues patient falls map. Death or serious injury resulting from a fall at a healthcare facility is considered a never event [2, 3]. The Centers for Medicare and Medicaid Services (CMS) do not reimburse hospitals for additional costs associated with patient falls [2, 6, 16]. As noted in a 2018 PSNet publication, even "no harm falls" are stressful to patients, family members, and healthcare staff [2]. "A patient fall can start the beginning of a negative cycle that can lead older patients to restrict activities leading to loss of strength and independence" [2].

Table 18.1 General falls issues

Falls Issue
Fall risk assessment issues, e.g., physical surroundings, patient mobility
Handoff communication issues
Toileting issues
Call light issues
Organizational cultural and educational issues
Patient medication issues

Source: Adapted from *Health Research &* Educational Trust [3]

18.3 Fall Risk Assessment

Falls prevention has been the subject of extensive research and articles in the quality literature. Prevention efforts begin with assessing the individual patient's risk of falls [2]. There are many tools for identifying patients at risk for falls, success is dependent on the patients predisposing issue [2]. Most falls occur in elderly patients who are experiencing delirium, are prescribed psychoactive medication, or have baseline difficulties with strength, mobility, or balance [17, 18]. Non-elderly patients who are acutely ill also have a higher falls risk [2, 19]. Table 18.2 presents a current list of commonly used patient screening tools to determine falls risk.

18.4 Preventing Patient Falls

As with all successful programs, it is important for patients and their families to feel empowered, educated, and involved in their treatment plan [24]. There are two major considerations when considering a fall prevention program. First, the prevention measures must be individualized to the client [24]. There is no single method to prevent falls. The most impactful programs include a combination of environmental interventions such as bed alarms, slippers, and ensuring patients are within the nurse's line of sight coupled with clinical intervention such as minimizing medications that may predispose patients to falls and implementing a falls tool [25]. The use of a standardized risk assessment tool and cultural interventions are executed as well [25, 26]. Emphasizing falls prevention is a multidisciplinary responsibility [2, 17].

Table 18.2 Falls assessment tools

Scale	Development	Rating system	Principle constructs
Morse fall scale	Developed by Janice Morse in 1985	Elements rated either "yes" or "no," and assigned a point value. Score used to determine risk	• History of falling • Use of ambulatory aid • Intravenous therapy • Gait • Mental status
STRATIFY scale	Developed in 1997 by D. Oliver	Score used to determine risk	• Falls history • Patient agitation • Frequent toileting • Transfer and mobility (number score of how much aid patient requires)
Hendrich II fall risk model	Developed by Ann Hendrich in 2003	Score used to determine risk	• Confusion, disorientation, impulsivity • Symptomatic depression • Altered elimination • Vertigo • Male patients • Administration of antiepileptics (or dosage changes) • Benzodiazepine administration • Poor performance in rising from a seated position test
Johns Hopkins fall risk assessment tool	Developed by Johns Hopkins Medicine in 2005	Score used to determine risk	• Patient age • Fall history • Elimination • Medications • Use of patient care equipment • Mobility • Cognition
STEADI (stopping elderly accidents, deaths and injuries)	Developed in 2013 by the CDC	Score used to determine risk	• Toolkit contains educational materials geared toward patients and their families

Source: Adapted from Wong C, Recktenwald A, Jones M, Waterman B, Bollini M, Dunagen W [20].; Centers for Disease Control and Prevention, [21]; Poe SS, Dawson Patricia B, Cvach M, Burnett M, Kumble S, Lewis M, et al. [22]; Han J, Xu L, Zhou C, Wang J, Li J, Hao X, et al. [23]

18.4.1 Multifactorial Approach to Fall Reduction

Literature has suggested that focusing interventions on specific components of falls and fall risks has been unsuccessful in reducing falls [3]. Patient falls can result from many factors. Prevention programs that utilize synchronized strategies such as improving the fall risk assessment process, using visual cues or systems to alert staff to patients at risk, improving communication among staff regarding fall risk status, ensuring safe patient transfers while toileting [25, 27], using equipment such as low beds with mats, and improving staff and patient education are instrumental in successfully reducing patient falls [3, 25, 27].

18.4.2 Successful Fall Prevention Interventions

Innovative falls programs must confront a common fallacy held by many healthcare providers; falls are inevitable, not necessarily preventable [2]. Measures to improve overall safety in a unit may be helpful. A 2018 PSNet perspective discusses the specific components used in successful fall prevention intervention [2]. Table 18.3 summarizes these interventions as reported in

Table 18.3 Successful components in fall prevention strategy

Hospital	Interventions	Results	Lessons learned
Bassett Medical Center, Cooperstown, New York	• Call don't fall campaign targeted at patient toileting issues • Post-fall huddles to identify contributing factors and root causes	• 43% falls reduction	• Staff concerned with patients' privacy to assist with toileting • Reluctance of patients to ask for help
Baylor Scott & White Medical Center—Garland, Texas	• Revised patient educational materials • Revised patient workflows for toileting and falls risk communication	• Unspecified falls reduction	• Post-fall assessments to identify contributing factors and root causes
Kaiser Permanente Zion Medical Center, San Diego, California	• Educating patients and families about the danger of falls • Staff work with resistant patients to determine the cause and address their concerns • Continual assessment of each patient's risk level based on medical condition, medications and ambulation	• Unspecified falls reduction	• Interdisciplinary falls committee created • Unit huddles at the beginning of each shift and 2 h later reviewing patient changes and observations
Memorial Hermann Memorial City Hospital, Houston, Texas	• Current falls allowed for increased subjectivity, inconsistent ratings and assessment • Post fall huddle started • Bed alarms not standardized or functional	• Falls in cardiology decreased 50.5% in the study and falls with injuries decreased 49.2% • Success credited to robust process improvement, safety culture and leadership commitment	• Video of best practices produced including a checklist of critical steps to ensure patient safety • Preventing falls with injury is a continuous effort due to patients and family member variability
Wake Forest Baptist Medical Center, Winston-Salem, North Carolina	• Impaired mobility and impaired cognitive function confirmed as key risk factors for falls • Diuretics administered close to bedtime identified as risk factor	• Unspecified falls impact	• Unit-based huddles pass on critical information to staff • Falls added to daily system check-in, for quality and safety issues

Source: Adapted from Health Research and Educational Trust [3]

The Joint Commission Center for Transforming Healthcare Project [3].

18.5 Robust Process Improvement® (RPI)

Preventing patient falls is a complex issue that requires analysis to determine contributory factors and analyze the data trends. As part of The Joint Commission Center for Transforming Healthcare: Preventing Falls with Injury project, seven U.S. hospitals used Robust Process Improvement®, which integrates tools from Lean Six Sigma and change management procedures, to decrease falls with injury on targeted units. The seven participants followed the Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) framework to discover the causative factors and root causes for falls and falls with injury in the test areas [3, 24]. The seven study sites identified 30 root causes and developed 21 specific solutions to address those root causes [3, 24].

The study participants set an initial collective goal to reduce the rate of falls with injury by 50% and to decrease the overall falls rate by 25%. The participating institutions began with a collective baseline falls with injury rate of 1.31 (falls with injury per 1000 patient days) and a combined baseline falls rate of 4.00 (falls per 1000 patient days) [3, 24].

18.5.1 Targeted Solutions Tool

Recognizing that every organization has its own unique combination of contributing factors, the Center for Transforming Healthcare developed an online application called the Targeted Solutions Tool® (TST®) to guide organizations through a method for fall prevention. Embedded within the software application is a data collection tool that helps an organization in measuring and analyzing the contributory factors for falls. When the data is entered in the TST®, the software tool provides analysis and listing of the organization's falls and falls with injury deficiencies. After reviewing the provided analysis, the TST® provides solutions targeting the top contributing factors for falls and falls with injury in the unit examined [3]. The Preventing Falls TST® is available to all Joint Commission-accredited organizations. Further information on TST® is available at: (https://www.centerfortransforminghealthcare.org/what-we-offer/targeted-solutions-tool).

18.5.2 Success

Examination of the project outcomes had surprising results. Leadership support was critical to the project success, confirming that those involved had the time to perform data collection for measurement with subsequent analysis and providing institutional knowledge for project navigation. This leadership support was vital during the solution implementation phase [3].

The first key for falls prevention success was to effectively measure and analyze the contributory factors. A misperception discovered among the participants was the belief that specific contributing factors had already been addressed at their organization. Examples included tasks such as having a fall risk assessment consistently used or proactive toileting and educating patients. The healthcare organizations that measured and analyzed their specific contributing factors were able to identify the most impactful factors for their areas and focus their time and resources on solution implementations targeting their needs [3].

Sustainable success was achieved by the careful measurement and analysis of the specific causative factors at each participating institution. For example, an organization may employ a fall risk assessment but through data-driven analysis the organization was able to discover whether or not staff consistently scored the fall risk assessment (interrater reliability), whether or not the assessment captured those patients at the greatest risk for falls, and whether or not the patients' falls assessment was updated with changes in medical condition. This process led to learning and several "aha" moments for the teams involved [3].

The second key for a successful fall prevention initiative was to address culture change. It is imperative to have project support from leadership and staff, including senior management, medical staff, and patient advisory council. Having this support will help ensure a robust fall prevention culture and will help raise expectations for fall prevention. The healthcare organizations with the most success were those that developed a philosophy of "zero falls" among all staff, from the chief executive officer to the maintenance crews. Successful falls prevention organizations developed a culture of pride and ownership over "zero falls." Preventing falls became a mission that reverberated throughout the entire hospital. Successful cultures effectively used change management tools and approaches to support the culture changes. In addition, they engaged and partnered with patients and families to adopt an organization-wide commitment to improving safety and preventing falls [3, 24].

The Joint Commission Center for Transforming Healthcare: Preventing Falls with Injury project was successful. Participating organizations tallied a 62 percent reduction in the falls with injury rate and a 35 percent reduction

in the falls rate. A 200-bed hospital utilizing this approach to reduce patient falls with injury could see 72 fewer injuries and net $1 million in costs avoidance. A 400-bed hospital would experience 134 fewer injuries and realize a $1.9 million savings in costs [3].

18.6 Radiology

Radiology is not immune from the risks outlined. In a 2011 American Journal of Radiology article, a fall rate of 0.46 per 10,000 imaging examinations performed in the radiology department was identified [28]. The ratio of falls among outpatients and inpatients was proportionate to the volume of imaging examinations performed in similar categories [28]. A 2016 Chinese study by Lee et al. listed falls as a concern in the radiology department as well [29]. This elevates falls in radiology to a level of global concern.

The rate of falls is one piece of information all radiology nurse managers needs to know. Fall rates and prevention practices should be tracked as an element of your unit's quality improvement program [9]. With tracking, you can determine if care is improving, staying the same, or worsening in response to efforts to change. Monitoring allows you to track your progress and identify areas for further interventions. It allows you to compare falls rates with like units such as in NDNQI benchmarks. It also allows a tangible means to celebrate successes with staff and build sustainable success.

There are several crucial strategies for the implementation of a fall reduction program. They include first, assessing and reassessing patient risk factors for falls with medical and/or environmental causes in the department. Second, identifying patients at risk of falling should be done. Third, communicating patient's fall risk status to staff is important. Fourth, educating patients, families, and staff about how to prevent falls, and finally conducting analysis when a fall occurs should be done. The analysis can be conducted by using a root cause analysis (RCA) [30], conducting a structured, systematic technique for failure analysis to identify risks and hazards such as a radiology failure mode and effect analysis (RFMEA) [31], or maintaining improvements and revisiting the subject with programs such as the Deming cycle of Plan-Do-Check-Act (Adjust) (P-D-C-A) [32]. Implementing some of those strategies has succeeded in reducing the number of falls among hospitalized patients and may be applicable to radiology areas [9, 33, 34].

The research literature in preventing falls has shown intercessions to be effective in reducing the rate and risk of falling [35]. Due to the unique patient population in ambulatory care including radiology, modifications in the methods used to identify those at risk of falling may be required. The Joint Commission recommends in radiological settings, consideration of gait, balance, cognition, and environmental factors that may contribute to falls. These patient attributes maybe more important for considerations than the patient's medication use [36].

The environment of care should be evaluated for safety issues that could predicate a fall. Periodic assessments of individual patients and the service environment play an important role in preventing falls and limiting the harm they cause. Ward et al. [37] developed a fall reduction program for their transitional care unit at an acute care facility that resulted in a 57% reduction in fall rates after 1.5 years of implementation. They emphasized the use of a unit-specific program to identify patients at high risk and to design interventions to protect at-risk patients who may differ in different units of care.

To develop a fall reduction program in a radiology department, specific aspects may need to be considered. Patient education in the prevention of hospital falls is an important facet of falls reduction. Simple interventions such as consistent assistance by staff, avoidance of walking in socks, careful observation of surroundings, slow and steady mobilization, use of eyeglasses, and use of extra caution if taking certain medications should be a part of the educational program [2, 9].

Even with the best intentions, a fall can occur. If an unfortunate fall does occur, it is important to report the event and follow institutional policies and procedures when caring for the injured patient or staff. Filling out the appropriate paperwork for your quality committee or risk management department allows for a review of the case

and implementation of safety practices if indicated. This may help prevent others from suffering a similar fate.

18.7 Conclusion

It is not just patients but also the radiology staff who are at risk for falls in the department, so all environmental hazards need to be taken seriously. Preventing falls is a complicated process made more complicated by the diverse patient population, rapid patient turnover, and technological nature of radiology. While the solutions appear logical on the surface and many are thought already to be in practice, organizations have found that common practices were not implemented consistently. By targeting solutions to their own specific circumstances, radiology departments can be confident that they are addressing the right problems within all the imaging modalities and using scarce time and resources for the greatest impact in the department and organization. Taking a close examination of issues within each individual modality gives radiology departments the opportunity to implement targeted solutions that lead to impactful, sustained reduction in falls and falls injuries.

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