OVERUTILIZATION OF CT SCANS OF THE BRAIN

IN NURSING HOME PATIENTS POST FALL

by

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Abstract

The use of head computed tomography (CT) scans are being overutilized in the nursing home setting following patient falls. The decision to perform head CT scans on post-fall patients is being made without using current best practice protocols. The primary focus of this quality improvement project was to determine the effect of implementing the Canadian CT Head Rule (CCHR) during assessment of nursing home patients post fall compared to the current practice of obtaining a CT of the head on all patients. The plan, do, study, act (PDSA) model was utilized to make this practice change. Patients who fell were assessed according to the nursing home’s current policy in addition to use of the CCHR. Pre and post surveys were also administered to the nursing staff to determine their knowledge, attitudes, and beliefs of their current practice and use of the CCHR. Of the total number of patients sustaining a fall, there was a 100% correlation with the CCHR on the need for a CT scan post fall and 100% had negative findings on their head CT scans. Overall, nurses felt incorporating the CCHR into their current policy would eliminate unnecessary transfers, improve patient management post-fall, and decrease their overall workload. This quality improvement project reveals that changes in practice may be considered when determining the need for head CT scans on patients post fall in the nursing home.

Key words: computerized tomography, imaging, mild head injuries, CCHR, CT overutilization
Overutilization of CT Scans of the Brain in Nursing Home Patients Post Fall

Nursing home patients that have fallen, with and without neurological changes post fall, are being sent to the emergency room (ER) for a CT scan of the brain to determine the need for further intervention. Elders in nursing homes are generally frailer than older adults living in the community. They have more chronic conditions and have gait and balance deficits due to their advanced age and age related cognitive changes. “Several aspects of aging may contribute to fall risk, including imbalance, frailty, joint disorders, chronic medical conditions, and medication interactions” (Dams-O’Connor et al, 2013, p. 2001). All of these factors are linked to an increased incidence of falls. In 2013, the direct medical costs of older adult falls, adjusted for inflation, were $34 billion (Stevens, Corso, Finkelstein, & Miller, 2006). With the population aging, both the number of falls and the costs to treat fall injuries are likely to increase.

Health care professionals are constantly asked to provide care in a more cost-effective way. In the nursing home, residents are frequently sent to the ER for CT scans of the head post fall regardless of their neurological status. Some nursing homes have made this a policy and a standard of practice. Studies report that up to one-third of imaging examinations ordered are not justified when the clinical presentation of a patient is reviewed. Clinicians have stated that a 93% rate of inappropriate imaging is a problem in the delivery of healthcare (Bairstow, Persaud, Mendelson, & Nguyen, 2010, p. 194).

Problem Description

The gap in practice identified in this project is the need to assess patients post fall in the nursing home to determine the need for head CT scans. Studies have shown a strong correlation between negative findings on CT scans with falls associated with no neurological changes. A recent study on patients 70 and older found that CT scans should not be used as a substitute to a
neurological examination. The findings noted that the presence of new neurological deficits on exam were associated with a significantly higher rate of positive brain CT scans (Hirano, Bogardus, Saluja, Leo-Summers, & Inouye, 2006).

The question this paper intends to answer is the following: In the nursing home population would the use of a staff multifaceted improvement policy reduce the number of head CT scans post fall compared to current practice? The identified problem was the current practice of ordering CT scans post fall and the proposed solution was to introduce a multifaceted quality improvement project to train the nursing staff to use an evidenced based assessment tool to provide consistent assessment of patients post-fall and increase the nurse’s confidence level of managing patients post fall in the nursing home.

Available Knowledge

The literature supports the practice of using established protocols to determine the need for a head CT scan rather than using an imaging test as a screening tool. Emergency departments treat approximately 2.5 million nonfatal fall injuries among older adults each year (Bergen, Stevens, & Burns, 2016). Brain CT scans done on patients with MHI with no neurological deficits contributed to increased costs and decreased patient safety (Parma et al., 2014). The literature demonstrates that the incidence of intracranial complications after MHI does not warrant CT scans. Patients between 65 and 79 years old (without risk factors) can be managed like younger patients since the rate of complications detected by CT scans is very low (Riccardi et al., 2013).

In the nursing home industry, falls are an unfortunate occurrence among residents. Because of the fear of litigation, the current practice is to send patients to the ER for CT scans of the head post fall, regardless of the resident’s neurological status after the fall. Current use of CT
scans for MHI is increasing and is highly variable and inefficient (Stiell et al., 2005). Determining the need for a head CT scan is no longer based on neurological assessment findings and patient appearance. The decision is driven by concerns of litigation. This has led to an overutilization of CT scans and an increase in medical costs to the health care system by performing unnecessary CT scans. If a patient post fall is not experiencing any new neurological findings, they are considered low risk for intracranial complications (Riccardi et al., 2013).

Clinical management of this group does not include a CT scan. The overall yield of head CT scans in older patients is low; targeting scans toward patients with new focal neurological findings post fall would improve the yield (Gangavati et al., 2009).

The use of established guidelines specific for determining the need for head CT scans is well established. Validation exists of the different head CT guidelines in use and their significant impact on patient outcomes and increased quality of care. (Jones, Morley, Grant, Wojcik, & Paolo, 2014; Parma et al., 2014; Stiell et al., 2005). A variety of participating age groups have been studied and all CT scans performed were done according to the guidelines being reviewed in the individual study. Results were further divided by patient presentation with the criteria being whether there were neurological deficits associated with the MHI. A statistically significant number of patients reviewed with no neurological deficits had unnecessary head CT scans. Speculation was made that the number could have been higher but some patients had underlying medical conditions that affected CT results. Implementation of a clinical decision support tool is associated with a 13.4% relative decrease in head CT utilization, suggesting that evidence-based tools have a role in improving patient outcomes, reducing healthcare costs, and support the need to use evidence-based tools in patient care (Ip et al., 2015).
Several guidelines exist that discuss criteria for CT scans after MHI. The CCHR’s criteria for CT scan after a MHI is a Glasgow Coma Scale (GCS) score of 13 to 15, and at least one of the risk factors stated in the CCHR. This decision tool has been used as a standard of practice in determining the need for CT scans after MHI and has resulted in more selective ordering of CT scans, more rapid discharge, and significant health care savings (Stiell, et al., 2005). Guideline recommendations serve to increase the quality of care, introduce and educate healthcare providers on best evidence based practice, increase the uniformity of care, and reduce cost. Clinical guidelines provide a consistent approach to quality improvement in healthcare settings and are believed to reduce morbidity, mortality, and increase cost-effectiveness (May, Sibley, & Hunt, 2014). Application of this tool when determining the treatment plan for a nursing home patient that has fallen and has no neurological deficits will lead to a more cost effective and safer approach to their care.

When addressing a tool to assist with determining the need for a head CT scan, most studies discussed the use of the CCHR over other tools. (Albers et al., 2013; Elgamal et al., 2006; Smits et al., 2005). These studies also compared and validated the CCHR against other widely used tools and found: there was a lower sensitivity with the CCHR than other tools for neurocranial traumatic or clinically important CT findings; the CCHR identified all cases requiring neurosurgical intervention and has greater potential for reducing the use of CT scans. The CCHR has been found to identify up to 61.8% of unjustified CT scans with optimal understanding on the use of the CCHR by healthcare professionals (Arab et al., 2015). By incorporating the CCHR in the assessment of patients post fall, a validated tool will help determine whether or not to send a patient to the hospital for a CT scan. The tool will improve the nurse’s assessment of their patients and reduce the use of unnecessary head CT scans by
identifying those that should have a head CT scan versus those that can be managed in the nursing home. Incorporating the CCHR will lead to better overall patient management, reduction of unnecessary costs and improve time management for the staff.

Rationale

The PDSA model is the guiding model that was used to help the nursing home staff recognize that current standards and evidence-based practice do not support their current management of patients post fall. The model has been proven to be an effective change management guide. The PDSA can be used for a process change that focuses on making improvements in outcomes by adjusting the system not the individual (Bohnenkamp, Pelton, Rishel, & Kurtin, 2014). By finding a more efficient and effective way to manage nursing home patients post fall, care was rendered through a patient centered approach identifying the best option for management post fall in a timely manner.

The PDSA model in conjunction with the CCHR assisted in incorporating current evidence-based practice to the care of nursing home patients post fall through a systematic assessment of: planning how to incorporate the CCHR into the assessment of a patient post fall, doing the proper education and surveying the nurses to determine their understanding of the new process, studying the results of the correlation between the CCHRs determination for the need for a head CT scan, and the nurses pre and post survey responses, and finally assessing the readiness of the nursing home to implement and process the change.

Specific Aims

The aim of this project was to determine if a staff multifaceted improvement policy would reduce the number of head CT scans post fall. When assessing the patients post fall, no evidence based tool was used to determine if a head CT scan was warranted. Incorporating the
CCHR tool into the assessment of a patient post fall allows for evidence-based decision making when determining the need for a CT scan.

This project included training the nursing staff on the use of the CCHR criteria for CT scans and incorporating this tool into the nursing home's protocol for assessing a patient post fall. This decision rule has been used as a standard of practice in determining the need for CT scans after MHI and has resulted in more selective ordering of CT scans, more rapid discharge, and significant health care savings (Stiell, et al., 2005). By addressing the lack of an assessment tool and protocol for ordering head CT scans, the project can reduce healthcare costs, reduce the potential risks to patients, and improve patient satisfaction.

**Methods**

**Intervention**

Following a literature review, the DNP student presented evidence to the team. The multipronged approach to improving the practice of ordering CT scans post fall on nursing home patients consisted of several steps. First, a meeting with the nursing home's leadership was held to develop a standardized protocol based on the CCHR assessment. Information was provided on the validity of the CCHR. The improved process involved incorporating the CCHR tool in the assessment of patients that fell along with the nursing home’s current process. Second, the nursing staff was trained on the use of the CCHR through several inservice meetings with a focus on assessing patients to determine when a CT scan is appropriate post fall. Time was allotted to answer questions and ensure understanding of the use of the CCHR. Third, a meeting with the Director of Nursing was held to review attendance at the training to ensure 100% participation by all nursing staff.
Measures

Before and after surveys of the nurses’ knowledge, attitudes, and beliefs of the CCHR were used to evaluate how the use of the CCHR may have changed the nurse’s confidence level of managing patients post fall. The outcomes that were measured were the number of head CT scans performed post fall as determined by the nurse’s assessment utilizing the CCHR. Secondary outcomes included the feedback received from the nursing staff’s survey on attitudes toward use of the CCHR. Data from the surveys were compared to see if knowledge, attitudes, and beliefs of the use of the CCHR had changed over the course of the quality improvement project. The team reviewed all findings, discussed modifications that may be needed to implement, and discussed plans to move forward with changing the nursing homes policy on assessing patients post fall.

Analysis

The primary measureable variables were the correlation with the CCHR results and the patient’s CT scan results and correlation between acute neurological changes on assessment with positive and negative results. Pearson correlation coefficients were used to assist in examining the relationship between those with positive versus negative CT reports.

Ethical Considerations

All potential ethical issues were considered and none were identified. Approval for this project was obtained from Capella University’s Institutional Review Board committee.

Results

A total of 17 patients sustained a fall during the four week period of the quality improvement project. Two patients were on anticoagulants and two were > 65 years old which are automatic criteria for head CT scans post fall on the CCHR. Of the remaining 15 patients,
there was a 100% correlation with the CCHR on the need for a CT scan post fall. Based on the CCHR, all 15 patients did not require a head CT scan post fall. All 15 were sent to the hospital for a CT scan per the nursing home’s policy and 100% had negative findings on their head CT scans.

Twenty four nurses participated in the training on the use of the CCHR and how to incorporate its use with the nursing home’s current policy for assessing patients post fall. Fourteen nurses had patients that sustained a fall and applied the CCHR to their assessment. The other 10 nurses did not have any patient falls during the four week period. The pre-training survey results showed that all of the nurses felt that the nursing home’s current policy of sending all patient post fall to the ER for a CT scan was an appropriate intervention. Twenty percent felt that using a tool would be helpful as part of their assessment of patients post fall and would help in determining if a patient needed a head CT scan. None of the nurses were aware of an evidence based tool for assessing the need for a CT scan.

Common statements among the nurses included feeling more competent on how to assess a patient post fall due to the added assessment needed for the CCHR, more comfortable keeping a post-fall patient in the nursing home given that the tool indicated no need for a CT scan, and appreciation for an improved process that would in the long run save them time and avoid unnecessary transfer for their patients to the hospital. Overall, nurses felt incorporating the CCHR into their current policy would eliminate unnecessary transfers, improve patient management post fall, and decrease their overall workload. Although not all nurses had an opportunity to use the CCHR, their responses were still positive to the survey based on the feedback from their co-workers. Based on the results and responses, the CCHR is an effective tool in decreasing the unnecessary use of head CT scans in patients post fall, improves nursing’s
confidence level of managing their patients post fall and should be used as part of the nursing homes policy on managing a patient post fall to improve their care.

**Discussion**

**Summary**

Patient falls are a common occurrence in nursing homes that can lead to serious injuries. The pre-survey of nurses revealed the lack of knowledge in the current use of an assessment tool such as the CCHR. The post-survey results demonstrated that overall the nurses felt use of the CCHR increased their confidence level of managing patients post fall. Additionally, the education made them more aware of the over utilization of CT scans on their patients and made them question their current management of patients post fall. By incorporating clinical indications and neurological assessment findings, nursing homes will provide greater assurance of appropriate use of head CT scans. In an effort to reduce unnecessary healthcare costs and provide patient care that is cost effective, decisions on the need for CT scans of the head in nursing home patients post fall needs to be based on more clinical indicators than the fall itself.

**Interpretation**

This quality improvement project revealed that changes in practice should be considered when determining the need for head CT scans on patients post fall in the nursing home. As previous studies have shown, requiring CT scans of the brain in all nursing home patients post fall, with a neurological assessment that shows no acute changes, is not a cost effective standard of practice to institute. Implications to nursing include opportunities for further education on neurological assessment skills to help determine criteria for needing a head CT scan. Preparing a patient for transfer out of the nursing home requires additional paperwork and staffing
adjustments. Implications to nursing home patients include the risk of renal failure after the use of intravenous contrast, confusion, and possible agitation due to the change in their environment.

If the patient has dementia, sedation may be needed to perform the CT scan which could lead to hospitalization if complications develop. Pain from prolonged positioning on the exam table and the burdens associated with sitting in an ER for extended periods of time are additional implications to the patient. Implications to the healthcare system, if the practice of unnecessary CT scans continues, include rising health costs and development of a practice pattern that is not supported by evidence-based guidelines. Sending patients to the ER for inappropriate studies could result in overcrowding of patients waiting to have tests done in an already busy ER. This could lead to extensive wait times and inefficient use of ER staff needing to monitor an otherwise stable patient that could have the same test done as an outpatient.

Limitations

All of the nurses participated in the training and surveys although only 14 of the 24 nurses had the opportunity to use the CCHR. There were no issues identified with understanding the use of the CCHR or how to incorporate the tool with the nurses’ current process for assessing a patient post fall.

Conclusion

Falls in the nursing home cannot be entirely prevented, but the use of a clinical assessment tool can help improve the assessment and minimize the use of unnecessary diagnostic testing. As Medicare and other government agencies such as Medicaid begin to scrutinize insurance claims and hospital utilization, more data will be available as to the effective use of diagnostic tests. This re-evaluation of medical costs can have a significant impact on improving healthcare provider’s decisions on management of medical conditions. In 2013, the direct
medical costs of older adult falls, adjusted for inflation, were $34 billion (Stevens et al., 2006). With the population aging, both the number of falls and the costs to treat fall injuries are likely to increase.

As Medicare begins to extend its audit of healthcare costs to nursing home utilization and base reimbursement on their results, nursing homes will begin to look at efforts to reduce unnecessary healthcare costs and provide patient care that is cost effective. These findings suggest that changes in nursing home policies need to be re-evaluated and more appropriate protocols using evidence-based tools should be used when determining the need for CT scans of the head in nursing home patients post fall. This will also provide an opportunity to use evidence based guidelines to help in making the decision for or against CT scans.
References


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I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the APA Publication Manual.

Learner name and date  Drina Portman  9/6/2017
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