RETROSPECTIVE CHART REVIEW OF HEAD CT SCANS ORDERED IN THE EMERGENCY DEPARTMENT AT SELKIRK REGIONAL HEALTH CENTER

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Interlake-Eastern Regional Health Authority

The Interlake-Eastern Regional Health Authority (IERHA) covers an area of 61,000 km^2 and has a population of 129,000 residents.[1] As of February 2019, there are 3,100 staff working across 10 hospitals, 16 personal care homes, 17 community health offices, 19 EMS stations, one quick-care clinic and 6 dialysis sites.[1] The Selkirk Regional Health Centre opened June 25, 2017, following its relocation from the Selkirk District General Hospital.[1] The Selkirk Regional Health Centre is the largest hospital in the Interlake-Eastern Regional Health Authority and is home to the only MRI and only CT scanner in the region.[1]

Choosing Wisely Canada Background

The Choosing Wisely campaign began in the United States in 2012, and in Canada in 2014.[2] The goal of Choosing Wisely is to reduce unnecessary tests, treatments and procedures in healthcare by outlining several recommendations for testing within each medical specialty.[2] Ordering unnecessary tests, treatments and procedures can have negative consequences including additional stress and follow up testing for patients as well as the risks associated with false positive results. Furthermore, unnecessary testing can result in longer wait times and increased costs for both the patient and the healthcare system.

In the 2017 study by the Canadian Institute for Health Information looking at eight Choosing Wisely Canada recommendations, up to 30% of patients had tests, treatments and procedures that were potentially unnecessary.[3] There are many reasons why providers still might feel the need to order these tests, treatments and procedures, including failing to recognize the potential harm, poor knowledge of evidence, and patient and family requests or expectations. In addition, students, residents and new graduates may be driven by lack of confidence and experience and may not want to miss a particular finding or diagnosis.

Benefits and Challenges of Choosing Wisely Recommendations

Some Choosing Wisely Recommendations are very clear and follow a specific algorithm or set of rules, such as Emergency Medicine Recommendation #1 which recommends using the Canadian CT head rule for adults and either the CATCH or PECARN rule for children who present to an emergency department with a minor head injury.[2] Other recommendations, however, are more vague, such as the Family Medicine Recommendation #8: "Don't do annual physical exams on asymptomatic adults with no significant risk factors."[2] Because significant risk factors are not defined, each physician may have differing definitions as to what constitutes a significant risk factor. The advantage to the vagueness of the recommendation is that it allows each physician to apply it to their own specific clinical situations. Thus, physicians may feel more apt to follow the recommendation, knowing that they can apply it how they best see fit for their practice. However, it also leaves the possibility that some physicians may under or over use the nonspecific recommendations.

Introduction

Choosing Wisely Canada Emergency Medicine Recommendation #1: "Don't order CT head scans in adults and children who have suffered minor head injuries (unless positive for a validated head injury clinical decision rule").[2]

The purpose of this chart review is to analyze whether the emergency medicine Choosing Wisely recommendation #1 is being used to determine whether adult patients presenting to the Selkirk Emergency Department with a minor head injury require a CT head scan. Specifically, this Choosing Wisely guideline recommends the Canadian CT head rule (CCHR) to determine whether patients presenting to the Emergency Department with a minor head injury require a CT head scan.[2] This recommendation is in place to avoid unnecessary CT head scans, which can cause patients to be exposed to unnecessary ionizing radiation and increase their length of stay in hospital.[2] The information from this chart review can allow us to better tailor educational information for emergency physicians and staff, and ensure guidelines are being met and the best possible care provided.

Canadian CT Head Rule (CCHR)

The CCHR study for patients with minor head injury was published in 2001.[4] Prior to this study, there was conflicting evidence for the use of CT imaging in cases of minor head injury and there were no strong studies to determine guidelines. The CCHR was created by analyzing different factors from patient's history and physical exams and how those factors were related to the need for neurological intervention or a clinically important brain injury[4]. The CCHR for patients with a minor head injury is used to help determine whether patients suffering from a minor head injury require CT head imaging.

The Emergency Medicine Choosing Wisely Recommendation #1 indicates to not order CT head scans in adults with minor head injuries unless they have a positive CCHR result.[2] The CCHR applies to minor head injuries, defined as witnessed loss of consciousness, definite amnesia or witnessed disorientation in patients with a GCS of 13-15.[2] The CCHR does not apply to patients <16 years of age, patients on warfarin, patients with bleeding disorders or patients who had a seizure after their head injury.[5] The injury must have occurred in the last 24 hours for the rule to apply.[5] For people with minor head injuries as defined, there is evidence to suggest that CT head imaging should not be performed unless there are either high risk factors (for neurological intervention) or medium risk factors (for brain injury on CT).[5] The high risk factors include a GCS score <15 at 2hrs after injury, suspected open or depressed skull fracture, any sign of basal skull fracture (hemotympanum, 'racoon' eyes, CSF otorrhea/rhinorrhea, Battle's sign), two or more episodes of vomiting or age 65 years or older.[5] Medium risk factors are amnesia before the impact of 30 minutes or more, or a dangerous mechanism (pedestrian struck by vehicle, occupant ejected from motor vehicle, fall from elevation of 3 ft or 5 stairs or greater).[5]

Methods

This study reviewed charts of patients aged 16 and older who presented to the Selkirk Regional Health Center Emergency Department between July 1, 2018 and March 29, 2019 with the diagnosis of head injury, concussion or head trauma. We first determined if the patient had a head injury within the last 24 hours and then analyzed whether they met any of the CCHR exclusion criteria (patients under the age of 16, on warfarin, have a bleeding disorder or patients who had a seizure after their head injury). We then analyzed the chart of each patient who had a head injury to determine whether they were considered a minor head injury, defined as patients with a Glasgow Coma Scale (GCS) of 13-15 and at least one of the following: witnessed loss of consciousness, definite amnesia, or witnessed disorientation. If the patient fell into the minor

head injury category, we then applied the CCHR to determine whether the patient had no risk factors, medium risk factors, or high-risk factors to determine whether a CT head scan was indicated.

Results

This retrospective chart review analyzed the charts of 105 patients who presented to the Selkirk Emergency department over a five-month period. Of the 105 analyzed charts 32 were pediatric cases (under the age of 16) and 35 did not meet the definition of a head injury or had other exclusion criteria. Thus 67 charts total did not meet the requirements for us to apply the CCHR and were excluded from the results. 38 charts met the requirements of a head injury and out of the 38, 21 (55%) met the requirements of a minor head injuries. Of those 21 who met the requirements for a minor head injury, 14 (67%) had no risk factors for neurosurgical intervention or brain injury and 4 (29%) had head CT scans. 7(33%) patients had medium or high-risk factors and 6 (86%) of those 7 patients had head CT scans done (Figure 1).

As a secondary outcome, there were 14 charts who had a head injury but did not meet the criteria of a minor head injury (did not have witnessed loss of consciousness, amnesia or witnessed disorientation). Of these 14, 4 (26%) received a head CT scan and 13 (74%) did not receive a head CT scan.

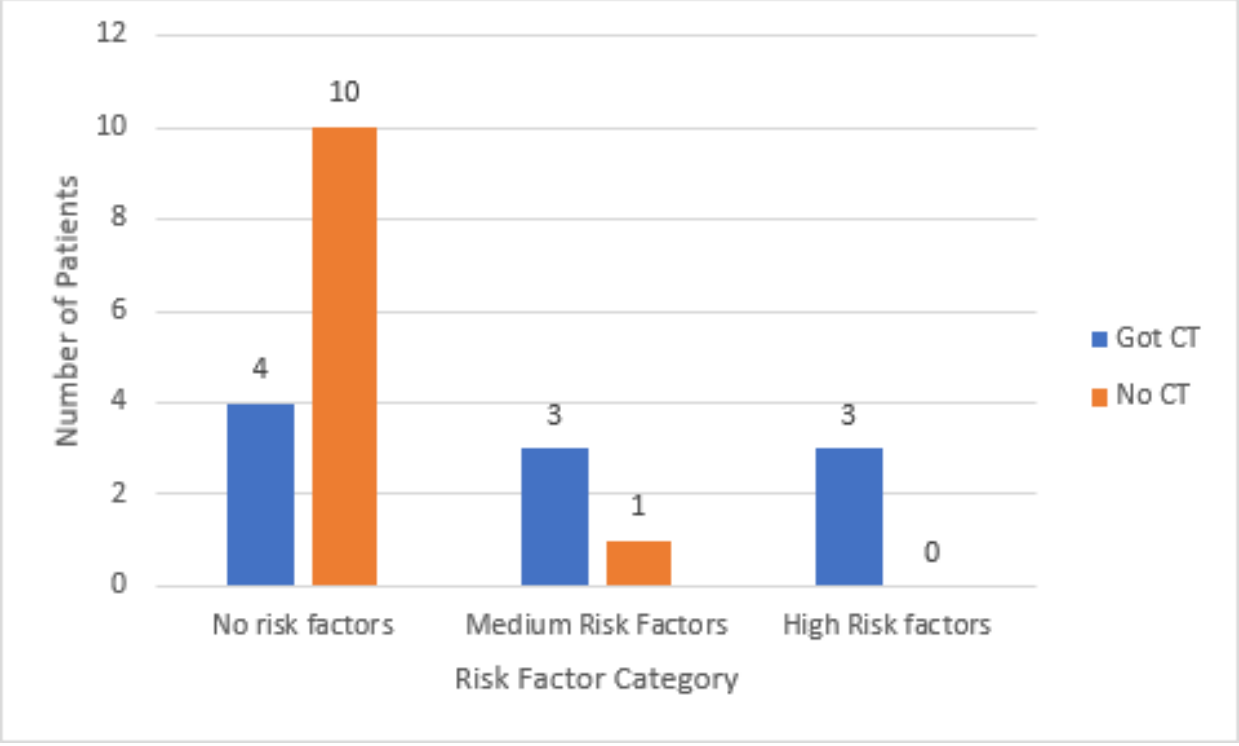

Figure 1. Number of Patients who received a head CT scan and who did not receive a head CT scan divided into each risk factor category.

Discussion

The majority of patients presenting to the Selkirk Regional Health Center Emergency Department between January and May 2019 with a minor head injury were appropriately

assessed for needing a head CT scan or not, as recommended by Choosing Wisely Canada. In total, 76% of the cases appropriately followed the CCHR while 24% did not receive the standard of care as outlined by the CT head guidelines (Figure 2).

There was only one patient who had medium risk factors that did not receive a head CT although it was indicated by the guidelines (Figure 1). All other patients with medium or high-risk factors received head CTs scans (Figure 1). There was more variability in the group of patients presenting with a minor head injury and no risk factors. According to the CCHR, this group is not indicated for a head CT scan, however, 29% of patients in this group received one (Figure 1). These results could suggest that there is increased hesitancy in not ordering a head CT when it comes to patients with a minor head injury even when they have no risk factors. It is possible that although the patients did not have risk factors lined out by the CCHR, the physicians made a clinical judgement that the patient should receive a CT head scan.

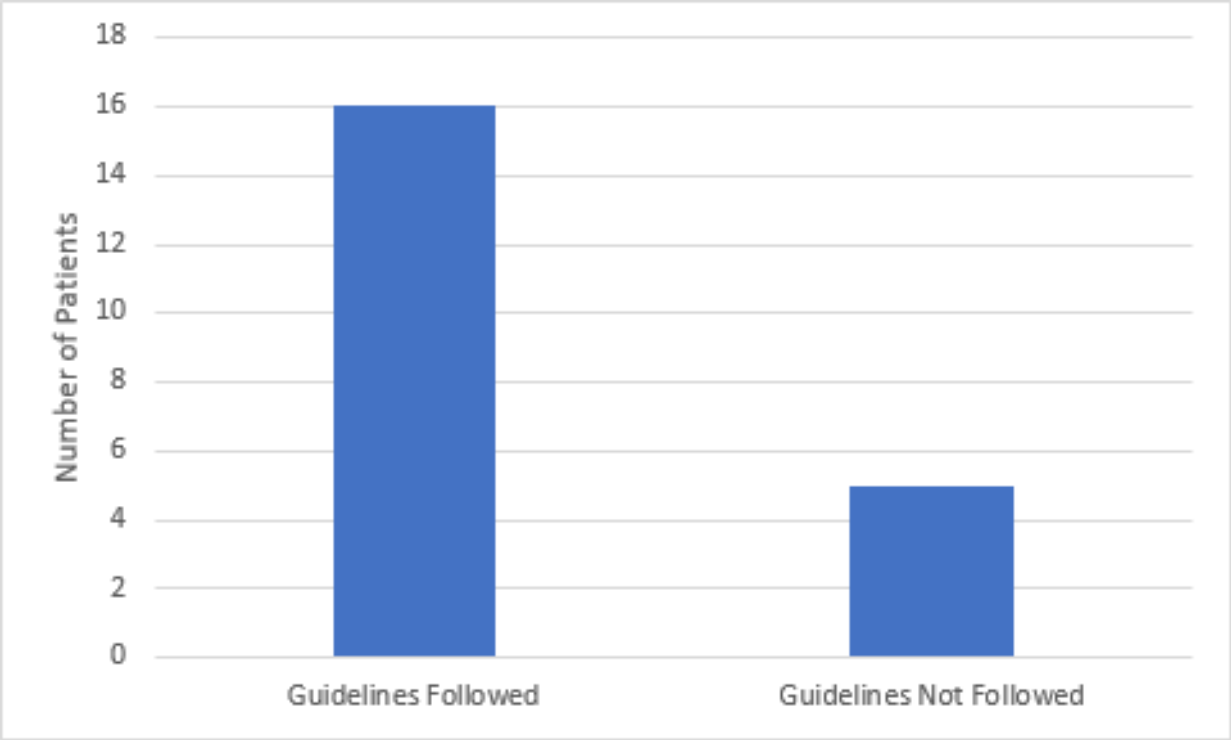

Figure 2. Number of Patients according to whether the Canadian Head CT Guidelines were followed (n=21).

Limitations

One challenge of this analysis was that not all questions specific to the CCHR were answered about a patient's risk level in the note. Some notes were vague in indicating the extent of memory loss that patients experienced, only stating that they had “some memory loss.” Additionally, many of the reviewed charts were head injuries that had happened more than 24 hours prior to presenting to the emergency department, which is an exclusion to the CCHR. Thus, these cases could not be included in the results. It would also be beneficial to have a larger sample size of patients with minor head injuries to get a more accurate picture of how well this Choosing Wisely recommendation is being applied.

Conclusion

Patients presenting to the Selkirk Regional Health Center Emergency Department with minor head injuries and no risk factors are receiving CT scans 29% of the time, however the research is based on a small sample size. When meeting guideline criteria, CT head imaging is not recommended in this group. Furthermore, although 76% of charts analyzed did follow the proper guidelines, this still leaves 24% that received care not in accordance with the CCHR.

The Choosing Wisely Canada campaign has Choosing Wisely Talks that take place on the 1st Thursday of every month from 12pm-1pm ET. These talks are held by webinar where listeners tune in to hear a live guest speaker. The guest speaker is often someone who has made significant gains in implementing the Choosing Wisely recommendations. Interested physicians can tune into these talks, with the added benefit that this time could count towards continuing medical education credits. Emergency department could also post statistics regarding the CCHR as well as the other nine emergency medicine choosing wisely recommendations each month to determine how well they are being implemented. Additionally, using technology could help reinforce these ideas. For example, having a computer-based reminder notification come up or an interactive flow-chart/checklist of the rule when a head injury is initially reported. Finally, further research using a larger sample size would allow a more accurate report of how well this Choosing Wisely recommendation is being applied in the Selkirk Emergency Department. Research could also be directed to see if there are differences between dedicated emergency doctors and family doctors working in emergency, as well as investigations into how well the pediatric head CT recommendations are being followed.

Sources:

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