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Research Article

Awareness and Use of Clinical Decision Rules, The Canadian C-Spine Rule (CCR), and Nexus In Patients With Suspected Neck Injuries Among Swedish Physicians at the Linköping University Hospitals Emergency Department

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Abstract

Objectives: To explore the awareness and use of the Canadian C-spine rule (CCR) and NEXUS among physicians disposing of patients with a possible clinically significant neck injury at the emergency department of Linköping University Hospital.

Keywords: *Clinical Guidelines; Clinical Rule; Canadian C-spine rule; Nexus*

Introduction

The prior year 2015, Linköping University Hospital's emergency department was initially staffed by rotating physicians from different departments and receives about 50 000 patients yearly. About 300 (<1%) are patients with a suspected neck injury. A previous study showed that the prevalence of clinically significant neck injury following blunt trauma was relatively low (<3%); however, missed or delayed diagnosis could give a disastrous permanent outcome [1]. Due to concern about possible consequences, many physicians tend to obtain imaging even in patients with benign clinical presentations. This could be inefficient as 96 percent or more of this imaging will not show any clinically significant injury [2].

There are two validated clinical decision rules available to assess the need for imaging in a patient with a suspected neck injury following blunt trauma, the Canadian C-spine rule (CCR) [3] and the National Emergency X-radiography Utilization Study (NEXUS) [2]. This study aimed to explore the awareness and use of CCR and NEXUS among physicians disposing of patients with a possible clinically significant neck injury at the emergency department of Linköping University Hospital.

Methods

In 2013, a single-center cross-sectional survey study using web-based questionnaires was sent to all physicians expectedly disposing of patients with a possible clinically significant non-penetrating neck injury at the emergency department of Linköping University Hospital. The questionnaires were sent to physicians via working e-mail, consisting of 39 emergency physicians, 31 orthopedics, 34 surgeons, and 36 training physicians.

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Study design and population

This is a single-center, web-based study. A self-administered e-mail with the web-based questionnaires was sent to all physicians potentially disposing of patients with neck injuries at the Linköping Hospital emergency department. Some

of the questions used were similar to those used in the study by Eagles et al [4], translated into Swedish. The questionnaires were sent by e-mail addresses to respective department group e-mail addresses.

Information for approval of the study was sent to the respective head of the departments before the study started. Approval by the Regional Ethical Committee was unnecessary as no patients were included. No reward was offered for answering.

Survey Content and Administration

The web-based questionnaires were sent to all physicians who were assumed to be potentially disposing of a patient with a neck injury through their department's group e-mail address. In the first question, they were asked if they were aware of CCR before receiving the e-mail, followed by how often they practiced CCR in their clinical management of patients with suspected neck injuries. They were also asked to grade their agreement on several statements, such as CCR's usefulness in their clinical work, its benefit for patients, and whether CCR improved the effective use of health care resources. The questionnaires regarding NEXUS were similar to the CCR.

Analysis of data

Respondent's answers 'sometimes,' 'often,' and 'always' were considered as a user, and the answer 'never' as a non-user. Respondents' agreement on the statement above was graded as positive for an answer 'partially agree' or 'strongly agree.' Respondents' agreement was graded as negative for responses 'partially disagree and 'strongly disagree.'

Results

The response rate was 76 of 127 (60 %). Seventy-two percent answered that they were aware of CCR, while 63 % were aware of and used CCR. Eighty-one percent were not aware of NEXUS. Eighteen percent were aware of but preferred CCR, while 1 percent selected NEXUS instead of CCR.

The questionnaires were sent to emergency physicians (n= 39), orthopedics (n= 31), surgeons (n= 34), and physicians on training/ houseman (n= 36). Unfortunately, the e-mail addresses included non-physicians in the respective department who were irrelevant to the study and did not respond to the survey. The questionnaire was sent with two reminders a month apart.

According to the list of e-mail addresses, 140 people would have received the questionnaires. Twelve physicians were excluded based on absence/vacation/parental leave. One responded by stating that they were not a physician. The response rate was 76 of 127 (60 %). However, the response rate was possibly higher because there were not only physicians among the 128 addresses. As the study was conducted locally, the answers analyzed were not based on the degree of experience of each physician in the respective group, as this had not guaranteed anonymity.

Seventy-six physicians replied to the questionnaires (Fig 1): 22 training physicians (housemen), of which 3 had not yet worked at the emergency department, 24 emergency physicians, 8 surgeons, and 9 orthopedics. Thirteen did not specify which specialty they belonged to. Eight stated they were specialists, while 5 were consultants.

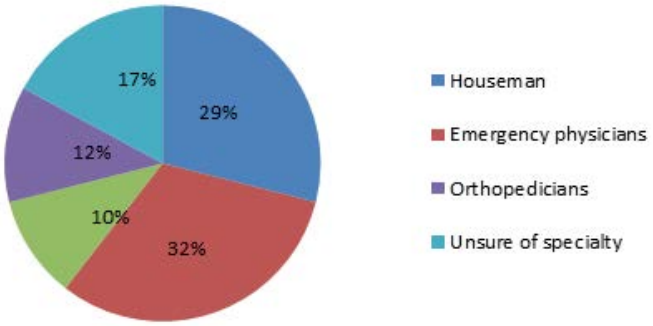

Figure 1: Answers for different groups of physicians

Seventy-two percent answered that they were aware of CCR, and 87 percent (or 63 percent of all respondents) were aware of and practiced CCR (Fig 2). Five percent were aware of CCR but did not use it, while 4 percent did not respond whether they practiced CCR. Of all those who answered, 18 percent said they used different screening strategies in their clinical work. Some did not use any clinical decisions-rules at all.

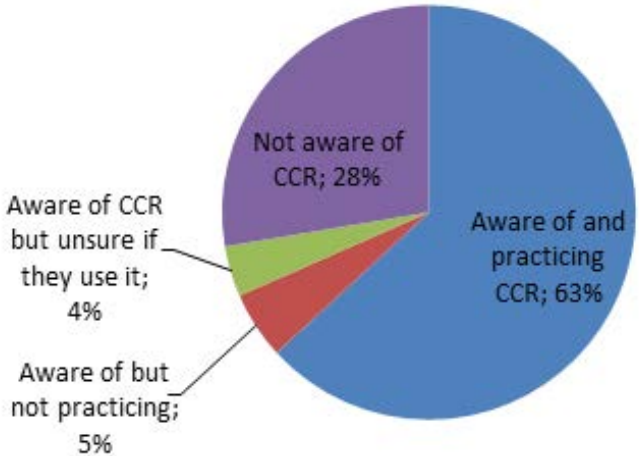

Figure 2: Awareness and practice of CCR

A majority of the respondents agreed that CCR was helpful in their work, that patients benefited from the use of CCR, and that CCR improved the effective use of health resources (Fig 3).

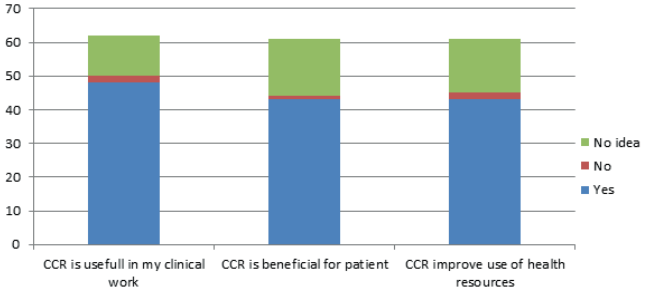

Figure 3: Opinions on how useful CCR and Nexus are in clinical practice, patient benefit, and impact on other health resources.

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Eighty-one percent of all who responded were unaware of NEXUS (Fig 4). Eighteen percent were aware of NEXUS but preferred to use CCR, while only 1 percent preferred NEXUS instead of CCR.

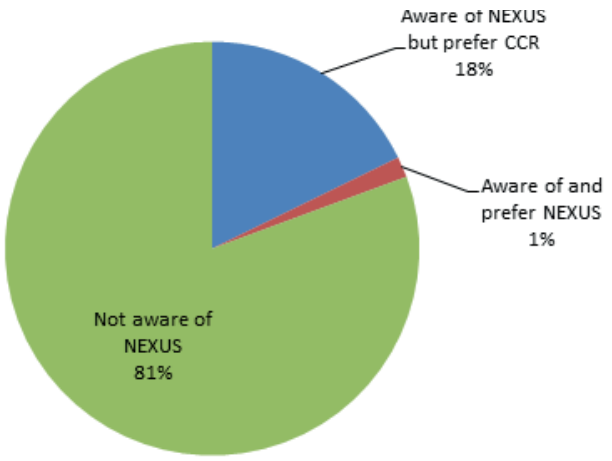

Figure 4: Knowledge of and use of NEXUS

Discussion

CCR and NEXUS have been developed, validated, and used as clinical decision rules in managing patients with possible neck injuries. The use of these clinical decision rules has been shown to reduce the number of unnecessary imaging done on patients with a suspected neck injury, shorter the time of stay in the emergency room, reduce unpleasant consequences as a result of immobilization, and reduce workload for emergency department staff [4]. The majority of respondents in this study agreed with this statement. Even though NEXUS and CCR have been around for over a decade, unnecessary cervical spine imaging is often done [5]. The inappropriate use of imaging cannot be justified with the availability of these clinical decision rules in disposing of patients with suspected neck injuries [6]. With a specificity ranging between 1% to 77%, CCR would still allow imaging done on patients without significant clinical neck injuries; however, this is fewer than NEXUS [7]. CCR implementations study by Stiell et al. showed a reduction of performed radiographic examinations in patients with suspected neck injuries [8]. According to Coffey et al., CCR would have reduced radiographic examination by 17.4 percent [5]. For patients who slipped imaging using CCR, the stay in the emergency room was reduced by approximately 2 hours [4].

As this study was carried out in a teaching hospital, we assumed that the awareness of these clinical decisions-rules should be at least as good as in the United Kingdom and Australasia, as estimated by Eagles et al. According to Eagles et al., 89 percent respective, 94 percent of the respondents in the United Kingdom and Australasia were aware of and practiced CCR in their clinical activities [9]. In Canada, it was 97 percent, while in the United States, 65 percent, which was understandable, given that CCR developed in Canada and NEXUS in the United States.

However, the awareness and use of CCR and NEXUS by physicians disposing of patients with suspected neck injuries at Linkoping University Hospital were lower. Seventy-two percent of all respondents indicated that they were aware of CCR, but only 63 percent used CCR. In our study, respondents' answers 'sometimes', 'often', and 'always' were grouped as users, while in Eagles et al., the answer 'sometimes' was grouped as non-users. When the answer was analyzed, as done by Eagles et al. [9], only 46 percent of the respondents in our study were aware of and used CCR. Surprisingly, only 19 percent of all the respondents were aware of NEXUS.

According to Eagles et al. [9], the knowledge of clinical guideline rules was higher in younger doctors, those working full-time, and those working at university hospitals. Our study showed a different result. No explanation of these clinical rules' low awareness and use can be provided as our study was not designed to answer this. There was a clear need for further training and space for improvement among physicians disposing of patients with a suspected neck injuries at this center.

This study was done in a single center before the organization changed locally, and the result could only be used for conclusion within this center. The web questionnaires were sent to the group e-mail of employees in respective departments, some were not physicians, and some physicians might not be staffing the emergency department. To obtain an optimal study, it would be desirable to have a response rate of over 80 percent. Previous studies, however, revealed that the average response rate for medical questionnaires was expected to be between 52 and 54 percent [10]. The response rate for this study was 60 percent, which was somehow acceptable. However, there was a low response rate among the surgeons and orthopedics, as only 30 percent of each specialty answered the questionnaires.

Conclusion

In this particular center, in 2013, there needed to be higher awareness and use of CCR and NEXUS among physicians disposing of patients with possible clinically significant neck injuries, despite its teaching hospital status and time-lapse from the development and validation of both rules.

This study showed that, in 2013, there was a great need for information and training on these clinical guide rules among medical students and all physicians who were disposing of patients with suspected neck injuries at the emergency services at the Linköping University Hospital in Sweden. The low awareness and use of clinical decision rules might have led to many patients being imaged unnecessarily and to ineffective healthcare resources.

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References

1. Davis, J.W., et al (1993) The etiology of missed cervical spine injuries. *J Trauma*. 34: 342-346. [Crossref]
2. Hoffman, J.R., et al (2000) Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. National Emergency X-Radiography Utilization Study Group. *N Engl J Med*. 343: 94-99. [Crossref]
3. Stiell, I.G., et al (2001) The Canadian C-spine rule for radiography in alert and stable trauma patients. *Jama*. 286: 1841-1848. [Crossref]
4. Stiell, I.G., et al (2003) The Canadian C-spine rule versus the NEXUS low-risk criteria in patients with trauma. *N Engl J Med*. 349: 25-108. [Crossref]
5. Coffey, F., et al (2011) Validation of the Canadian c-spine rule in the UK emergency department setting. *Emerg Med J*. 28: 873-876. [Crossref]
6. Stiell, I.G., et al (1995) Use of radiography in acute knee injuries: need for clinical decision rules. A*cad Emerg Med*. 2: 966- 973. [Crossref]
7. Michaleff, Z.A., et al (2012) Accuracy of the Canadian C-spine rule and NEXUS to screen for clinically important cervical spine injury in patients following blunt trauma: a systematic review. *Cmaj*. 184: 867- 876. [Crossref]
8. Stiell, I.G., et al (2009) Implementation of the Canadian C-Spine Rule: prospective 12 centre cluster randomised trial. *Bmj*. 339: 41-46. [Crossref]
9. Eagles, D., et al. (2008) International survey of emergency physicians' awareness and use of the Canadian Cervical-Spine Rule and the Canadian Computed Tomography Head Rule. *Acad Emerg Med*. 15: 1256-1261. [Crossref]
10. Asch, D.A., M.K. Jedrziewski and N.A. Christakis (1997) Response rates to mail surveys published in medical journals. *J Clin Epidemiol*. 50: 1129-1136. [Crossref]