

10 Clinical Decision Rules You Should Know Before your Emergency Medicine Rotation

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Abstract

A survey was sent to Dalhousie North Nova Family Medicine Residents and the Emergency Department physicians of the Colchester East Hants Health Centre to determine the 10 most used clinical decision rules in the Emergency Department. Based on these results a podcast designed to inform medical students about the 10 most used clinical decision rules was created. This podcast provides a brief summary and history of the 10 most common decision rules and how to use them, providing students a concise resource and introduction into a key aspect of Emergency Medicine.

Keywords: decision rule, decision making, medical education

Introduction

Clinical decision rules are tools that use 3 or more variables, composed of findings in history and physical to help physicians make decisions.¹ These clinical decision rules can be implemented into clinical spaces, often emergency departments, to help standardize care as well as improve care and system control in other ways, such as reducing unnecessary imaging and the costs and risks associated. They are a fundamental expression of evidence-based medicine, based on their formation in original research. The formation of clinical decision rule goes through three stages, derivation validation and

implementation: with each stage being founded in research.² Despite the significance of evidence-based medicine in medical education there has been little research on the role of clinical decision rules in medical education.¹ Poor understanding and teaching around medical education can even be seen as a barrier to effective implementation of clinical decision rules as lack of student/resident knowledge is considered a barrier to their effective implementation.²

Giving medical students and learners exposure to clinical decision rules on in their training can help allow them to a baseline of knowledge and to grow past it, learning to apply the rules in a practical sense, and to challenge and understand rules while still being under appropriate supervision. The importance of this is perhaps best described by Woods et al. by stating “clinical decision rules should be viewed as a starting place for resident education, not a destination”.¹

Despite the importance of clinical decision rules in medicine and medical education, information about these rules is not easily accessible to learners. In a time when students are bombarded with knowledge, to learn clinical decision rules is something that often only happens in the context of active clinical encounters, and often directly subsequent to the use of a particular rule based on a particular patient encounter. The ability to learn about numerous clinical decision rules in one concise place would allow medical learners to quickly acquire fundamental knowledge of these scores prior to being exposed to them in a patient care setting. Recent studies have emphasized the use of podcasts in medical education as an efficient way of learning as they allow students to combine education with other routine chores and activities.³ Studies have also shown that medical learners prefer

podcasts with a duration of 30 minutes or less.³ To our knowledge there have been no studies showing the most used clinical decision rules in the emergency department, and no podcasts targeted at medical students that serve as an introduction to numerous clinical decision rules. Our goal is to answer this question and to develop a podcast to share with medical students/learners.

Relevance to Family Medicine:

A tool such as this is relevant to the practice of family medicine, primarily by the way that family medicine and emergency medicine are intertwined within both our province and country. Family physicians provide emergency care across a large number of centers in Canada, and as a result emergency medicine is considered a core domain of family medicine. Additionally, tools aimed at efficiently giving emergency medicine knowledge may be particularly applicable to family medicine-based learners, who often get less dedicated emergency medicine education than their emergency medicine specific counterparts. This tool would serve to help make learners both medical experts and scholar, two core tenants in the CANMEDS framework, and certainly aims towards helping learners become skilled clinicians, considered one of the 4 core principles of family medicine per the CFPC.

Research Question

Can an educational podcast be constructed for medical students that explains the most frequently used clinical decision rules in the emergency department.

Background

The clinical decision rules that we will touch on in the podcast are as follows, listed in the order they are presented in the podcast. The evidence surrounding each of these rules is considered to be strong as each has undergone derivation, validation and implementation into current medical teachings and guidelines.

Ottawa Ankle Rules

The Ottawa Ankle rules were first derived from a paper titled “A study to develop clinical decision rules for the use of radiography in acute ankle injuries”, written by Dr. Ian Steill and colleagues.⁴ The goal of this study was to create a clinical decision rule to be used in the emergency department that was 100% sensitive for ankle and mid foot fractures.⁴ The same group then published a refinement article that created and validated the rules we use today.⁵ A set of rules for each of the ankle and midfoot exist to determine if patients need x-ray evaluation.

Canadian C-Spine Rule

The Canadian C-Spine rule is another clinical decision rule created by Dr. Ian Steil, first introduced in a paper titled “The Canadian C-Spine Rule for Radiography in Alert and Stable Trauma Patients”.⁶ The goal of this paper was to create a clinical decision rule that was 100% sensitive for clinically important C-spine injuries.⁶ After analysis of 20 variables, a 3-step decision rule was created, to allow for C-Spine injuries to be clinically ruled out without the necessity for imaging.⁶ This saw a significant decrease in the amount of C-Spine imaging that was ordered. This rule was subsequently validated in larger studies.⁷

Canadian CT Head Rule

The Canadian Ct-Head rule is yet another clinical decision rule created by Dr. Ian Steill and colleagues, in a paper titled “The Canadian CT Head Rule for patients with minor head injury”.⁸ The goal of this study was to create a decision rule that was 100% sensitive for brain injuries requiring neurosurgical intervention in the setting of minor head injuries.⁸ The Canadian Ct Head rule was then created following assessment of numerous variables. It was subsequently externally validated and compared to other rules such as the New Orleans criteria where it performed well, being sensitive while being much more specific, reducing the rate of unnecessary scans.⁹

PECARN Pediatric Head Injury Rule

The PECARN Pediatric Head Injury Rule is a rule that exists to determine the necessity for head CTs in children (under age 18), and was derived and validated in a paper titled “Identification of Children at very low risk of clinically important brain injuries after head trauma: a prospective cohort study” by Kupperman et al.¹⁰ This group created two separate rules, one for children under age 2 and one for children above age 2. These rules help to standardize imaging decisions and to decrease the amount of brain imaging done in a particularly vulnerable population (risk of fatal malignancy from cranial CT is thought to be between 1 in 1000 to 1 in 5000) while maintaining sensitivity necessary to detect clinically important brain injury.¹⁰

Centor Score

The Centor score is a score used to stratify a patient's risk of group A beta streptococcus infection (strep throat) when presenting with a sore throat. This score was first developed by Centor et al. in a paper titled "The Diagnosis of Strep Throat in Adults in the Emergency Department", where they analyzed a number of variables to determine which were most closely associated with strep infection.¹¹ This allowed for the development of a 4-component score that predicted group A strep infection.¹¹ This 4-component score was subsequently validated prospectively by the same group.¹² Years later the score would be modified by McIsaac et al, adding an age modifier to the score, becoming the score that is used in clinical decision making today.¹³ This score helps to advise patients whether throat culture, empiric antibiotic treatment, or neither is necessary for patients with sore throat.

CURB-65 Score

The CURB-65 score is an acronym-based score to predict a patient's 30-day risk of mortality in the setting of community acquired pneumonia. The score was derived and validated by Lin et al. in the paper "Defining community acquired pneumonia severity on presentation to hospital".¹⁴ This score has 5 components and the cumulative score corresponds with increasing 30 day mortality, it is used to suggest inpatient vs outpatient management of community acquired pneumonia patient.¹⁴

CHA₂DS₂-VASc Score

The CHA₂DS₂-VASc score is a score used to predict the risk of stroke in patients with atrial fibrillation. The score was first derived in a paper titled "Refining Clinical Risk Stratification

for Predicting Stroke and Thromboembolism in Atrial Fibrillation Using a Novel Risk Factor Based Approach “ authored by Lip et al.¹⁵ This was an expansion of the original CHADS₂ score, also used to predict stroke risk.¹⁶ This score is used to help clinicians determine the stroke risk for patients based on risk factors and help to aide the decision with patients regarding anti-coagulation.¹⁵

Wells’ Score for DVT

The Wells’ DVT score was a score derived by Wells et al. in a study titled “Value of assessment of pre-test probability of deep-vein thrombosis in clinical management”.¹⁷ This score was designed as a way of determining a patient’s pre-test probability for DVT based on a number of risk factors and physical exam findings. Originally this score was used to guide imaging decisions and necessary follow up.¹⁷ However, a subsequent prospective validation study (also published by Wells) established the role of the score when combined with a d-dimer in excluding DVT in a subset of patients, decreasing imaging.¹⁸

Wells’ Score for PE

The Wells’ score for PE, much like the DVT score is a score used to determine a patients pre-test probability for pulmonary embolism based on a combination of risk factors and exam findings. The original score was derived in a paper titled “Derivation of a simple clinical model to categorize patients’ probability of pulmonary embolism”.¹⁹ The score was subsequently validated, showing the negative predictive value for PE of a negative d-dimer when used in patients stratified as low-risk or to be unlikely to have a PE based on the Wells’ score.²⁰ This score has been shown to successfully reduce imaging for ruling out PE.

PERC Rule

The PERC rule, short for pulmonary embolism rule out criteria, is a clinical decision rule derived by Kline et al. in a study titled “Derivation of a clinical decision rule to rule out pulmonary embolism”.²¹ This rule was designed to be applied to patients thought to have a low-risk for pulmonary embolism based on clinical gestalt and could be applied to exclude the diagnosis of pulmonary embolism without the need for d-dimer or imaging.²¹ This score was then validated when applied to patient thought to have a pre-test probability for PE less than 15%.²² This score is successfully used to decrease the amount of d-dimers ordered in PE work-up, and subsequently the amount of patients that require imaging based on the false positive rates of d-dimers.

Methods

To determine which clinical decision rules were most commonly used in the emergency department, a survey was sent to the 2025-2026 North Nova Family Medicine Resident cohort as well as the staff physicians in the Emergency Department of the Colchester East Hants Health Centre, a regional hospital located in Truro, NS. This survey asked physicians to select the clinical decision rules and scores they used most frequently in the Emergency Department, up to a total of 10 scores. This survey offered 20 initial selections, based on the experience of the author and project supervisor, respondents also had the ability to freely enter other scores that were not included on the initial list (figure 1).

Following the determination of the 10 most commonly used clinical decision rules, a review of the literature surrounding these rules was conducted. Each of these studies was assessed from their initial derivation and prospective validation. These studies and their corresponding rules were then summarized and simplified to their clinical usages, which was then used to draft a script for the educational podcast. The podcast was subsequently recorded and edited by the author using the Riverside software.

Results

The results for the survey were used to determine which clinical decision rules were most used. The 10 most used, listed in order of popularity were “Wells’ Score for PE”, “CHADS-VASc”, “Canadian CT Head Rule”, “Wells’ Score for DVT”, “Canadian C-Spine Rule”, “PERC Rule”, “Ottawa Ankle Rules”, “Centor Score”, “PECARN Pediatric Head Injury Rule” and “CURB-65 Score”. There were 10 additional clinical decision rules/scores initially placed on the survey. Of note, three additional scores were entered into the “other option”, each with only one respondent entering them into the form, they were: “San Francisco Syncope Rule”, “NIH Stroke Scale”, and “GCS Score”. Exact breakdown for each clinical decision rule is shown (Figure 2).

An audio-only podcast discussing these 10 scores was developed. No objective testing was completed to examine uptake or utility of the tool due to time constraints. However, the podcast does provide a relatively concise means of exposing listeners to the fundamentals of each of these rules and how to apply them.

Discussion

When creating tools for medical education, particularly those that are supplementary to core learning expectations, there are several considerations that must be made, including relevance, user interest, cost, and efficiency. A podcast was selected as the media for the teaching tool for this project as it is an effective means of addressing these concerns.

Given the audio file nature of podcasts, they incur no additional costs for distribution, unlike physical media. They are also a time-efficient way for students to learn information, particularly supplementary information in learners who already have a great deal of mandatory information they must know, because studies show podcast are often listened to while doing other tasks such as chores or driving.³ Podcast prevalence in medical teaching is also increasing, suggesting students find it an entertaining means of being educated.³ Exposing medical students to medical education podcasts early in their learning journeys may also serve as a “gateway” to the podcast learning format, which can be beneficial given the rapid uptake of podcast in the medical education realm.

The goal of this project was to develop a relatively brief teaching tool to inform patients about the most used clinical decision rules in the emergency department and how to apply them. Following a survey of local residents and ED staff we were able to do so. The rules described in the tool are each based on solid scientific studies, and the origins of these rules, as well as their development since, are discussed in the tool. While the effectiveness of this particular tool has not been studied, podcasts as a media are considered to be effective ways of medical teaching.³ Next steps for this tool would primarily include being distributed to medical learners, particularly to local learners (Dalhousie University or those

in the CEHHC specifically, where the majority of study respondents work as ED physicians). More widespread distribution would also allow for the collection of data from learners regarding the effectiveness of the tool, including information retained/knowledge gained, and understanding or familiarity with clinical decision rules before and after listening to the podcast.

Strength and Weaknesses

Strengths of this project include making information in an accessible format for students to learn from, particularly in a busy schedule, when podcasts maybe more accessible than a long article or paper. Having this information about numerous different rules collated into one resource also condenses information into one clear resource.

Weaknesses of this project include the small sample size to determine the most used clinical scores. Because the survey was primarily composed of physicians working in a single emergency department, and entirely by those in the Northern or Eastern zone of Nova Scotia, it is also possible that the sample reflects the practices encouraged by the CEHHC, rather than of emergency medicine as a whole.

Conclusion

An educational podcast aimed at teaching medical students what the most frequently used clinical decision rules and how to use them was developed. This podcast/educational tool can provide students who are already burdened with broad, high volume learning an efficient means of introduction to these rules, the corresponding key points to assessing

for a variety of clinical presentations in the emergency department, and an introduction to research in medicine and its utility.

Next Steps

Potential next steps include assessing for feedback from medical regarding effectiveness of learning from the podcast comparing understanding of clinical decision rules before and after listening to the podcast. Further podcasts could also be developed to educate learners about other clinical decision rules that were not amongst the 10 presented in this podcast.

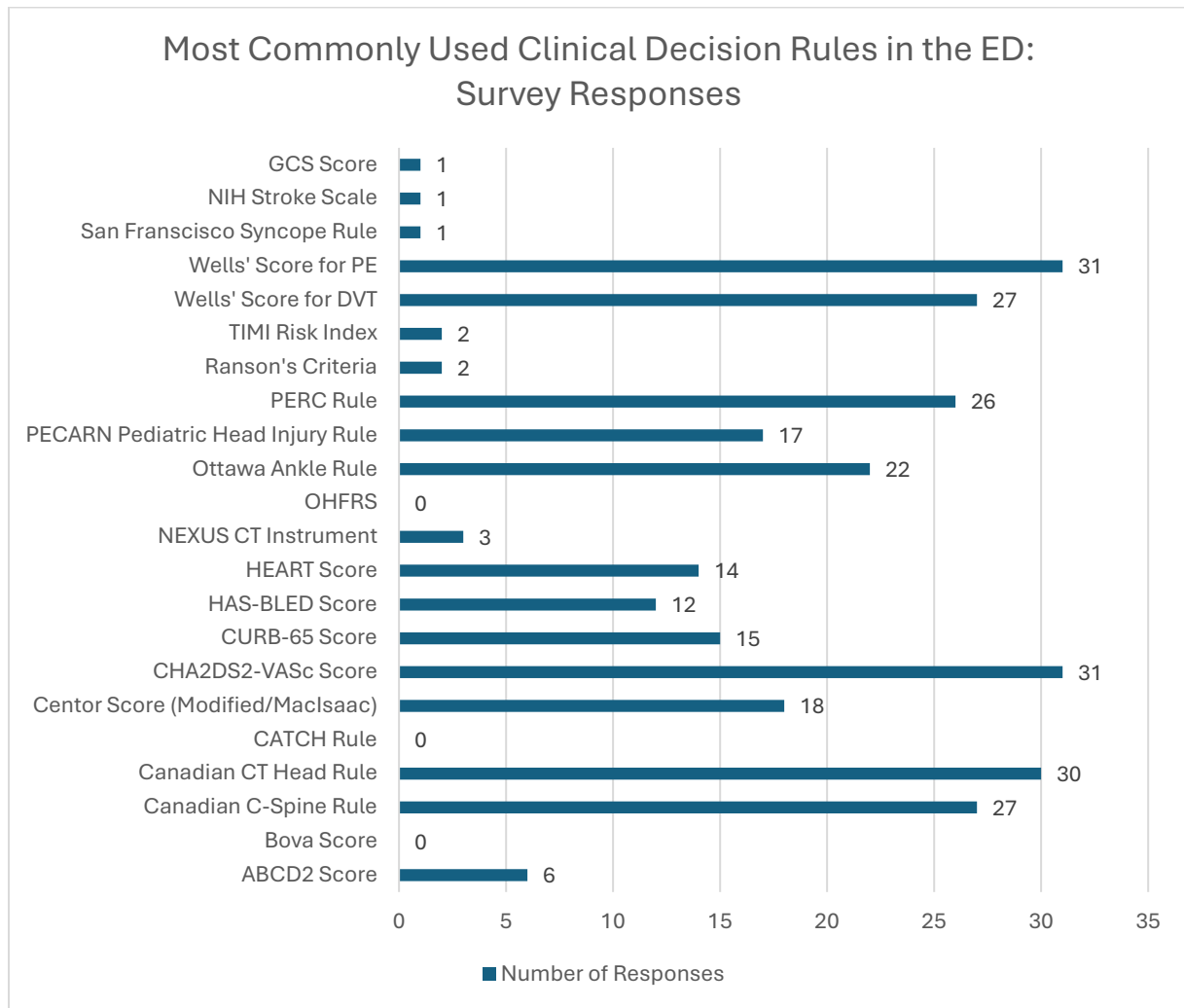
Figure 1: Survey Given to Residents and ED Physicians

Which of the following clinical decision rules/scores do you use most frequently in the emergency department?
(Choose up to 10)

☒ Checkboxes

☐ ABCD2 Score	X
☐ Bova Score	X
☐ Canadian C-Spine Rule	X
☐ Canadian CT Head Rule	X
☐ CATCH Rule	X
☐ Centor Score (Modified/McIsaac)	X
☐ CHA2DS2-VASc Score (or other CHAD variant)	X
☐ CURB-65 Score	X
☐ HAS-BLED Score	X
☐ HEART Score	X
☐ NEXUS CT Instrument	X
☐ OHFRS	X
☐ Ottawa Ankle Rule	X
☐ PECARN Pediatric Head Injury Rule	X
☐ PERC Rule	X
☐ Ranson's Criteria	X
☐ TIMI Risk Index	X
☐ Wells' Score for DVT	X
☐ Wells' Score for PE	X
☐ YEARS Algorithm	X
☐ Other: _____	X
☐ Add option	

Figure 2: Most Commonly Used Clinical Decision Rules in the ED



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