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Applicability of the Canadian CT Head Rule in Minimal Head Injury

To the Editor:

We applaud Davey et al[1] for their study describing their use of the Canadian CT Head Rule with patients with minimal head injury. They generated interesting hypotheses in regard to this subgroup of patients (who do not experience loss of consciousness or transient confusion) compared with patients with minor head injury (who do). Although the authors acknowledged a number of study limitations, some were not taken into consideration, and questions remain.

The issue of spectrum bias is important, whereby the Canadian CT Head Rule might perform differently in a population (patients with minimal head injury) different from that for which it was originally validated (minor head injury); applying the decision instrument to a population at lower risk of clinically significant brain injury could reduce the rule's specificity. In particular, many patients aged 65 years and older who present to emergency departments for falls and potential brain injuries have computed tomography (CT) scans performed solely because of their age (even when they have no loss of consciousness or confusion).

In addition, including only patients who underwent head CT likely resulted in referral bias. Patients at higher risk of clinically significant brain injury were preselected according to clinical judgment or guidelines that are themselves based on the Canadian CT Head Rule. In fact, the American College of Emergency Physicians' (ACEP's) criteria for imaging generally mimic those of the Canadian CT Head Rule, with the exception of one.[2] Assessing the Canadian CT Head Rule's performance retrospectively—and then comparing it with elements that were already influenced by the Canadian CT Head Rule—may have falsely increased its sensitivity. We question why the authors did not include all patients who presented with minimal head injury (regardless of physicians' decision to order head CT) or include a proxy outcome for patients who did not undergo a head CT.

Another concern is that applying the Canadian CT Head Rule to patients with minimal head injury could have various and possibly opposite effects, depending on the context. Canada's rate of CT examinations in 2011 to 2012 was 126 examinations per 1,000 patients, whereas the United States' was 265 per 1,000 patients.[3] The application of the Canadian CT Head Rule to an expanded population could lead to an increase in use rates of head CT where use rates are lower while reducing head CT use where use rates are higher. Considering this, defining location-dependent testing thresholds and acceptable miss rates could provide clinicians and patients clearer data to support Canadian CT Head Rule application and also perhaps reduce doubts in regard to clinical decisions and imaging.[4]

Last, we commend the authors for reporting emergency physicians' self-reports of shared decisionmaking use. Unfortunately, readers are unable to understand what this concept meant for the participants because the definition of shared decisionmaking does not seem to have been provided. Future explorations of the role of

shared decisionmaking are needed for this population because it could help reduce inappropriate use of head CT in patients with either minimal or minor head injury.[5]

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In reply:

We appreciate the letter by Tran et al[1] and essentially agree with their comments. Their first concern is the use of a decision rule validated in one population of subjects but applied to a population with potentially different characteristics. Although a derivation-validation study conducted with a population with minimal head injury would have been ideal, we neither had the resources to perform such a study nor believed such an effort was necessary. Risk factors for consequential head injury have been explored in many patient populations and clinical settings already[2-4] and finding additional factors seemed unlikely. We also believe the medical community does not need another head computed tomography (CT) rule at this juncture, nor would they necessarily want to adopt one.

We agree that referral bias likely existed in our study subjects, such that our inclusion criteria selected for the more severely injured of the minimal head injury group. We doubt (though without any evidence) that there would have been a sufficient number of false-negative results to significantly affect the sensitivity of the Canadian CT Head Rule in our study. Ideally, we would have included all