American Journal of Emergency Medicine 34 (2016) 1031–1036

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Original Contribution

A quick and easy delirium assessment for nonphysician research personnel☆

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ARTICLE INFO

Article history:
Received 21 December 2015
Received in revised form 28 January 2016
Accepted 25 February 2016

ABSTRACT

Objectives: Delirium in the emergency department (ED) is an emerging field of research. Most ED research infrastructures utilize lay personnel to collect data, but delirium assessments that can be reliably performed by nonphysicians are lacking. We evaluated the diagnostic performance of the modified Brief Confusion Assessment Method (modified bCAM) for this purpose.

Methods: This was a secondary analysis of a prospective observational study that enrolled ED patients 65 years or older. The original bCAM was a brief (<2 minutes) delirium assessment that assessed for inattention by asking the patient to recite the months backward from December to July. It was modified by adding the Vigilance A ("squeeze my hand when you hear the letter 'A'") to the inattention assessment. The elements of the modified bCAM were performed by a research assistant (RA) and emergency physician. The reference standard for delirium was a psychiatrist assessment performed within 3 hours using *Diagnostic and Statistical Manual of Mental Disorder, Fourth Edition, Text Revision* criteria. All assessors were blinded to each other. Sensitivities and specificities with their 95% confidence intervals (CIs) were calculated for the RA and emergency physician.

Results: Of the 406 patients enrolled, 50 (12%) were delirious. The modified bCAM was 82.0% (95% CI, 71.4%-92.6%) sensitive and 96.1% (95% CI, 94.0%-98.1%) specific when performed by the RA. The emergency physician's modified bCAM exhibited similar diagnostic performance.

Conclusions: The modified bCAM may be a feasible and accurate method for nonphysicians to assess for delirium. Future studies are needed to confirm these findings.

1. Introduction

Delirium is an acute loss of cognition characterized by the presence of inattention, altered level of consciousness, and disorganized thinking [1]. This form of acute brain failure occurs in 8% to 10% of older emergency department (ED) patients, affecting approximately 1.9 million older ED patients each year in the United States alone [2–5]. This number exceeds the annual number of patients with acute coronary syndromes in the United States in all ages, which is a disease with comparable mortality and morbidity [6,7]. In the hospital setting, the deleterious consequences of delirium are well documented. It is associated with higher long-term mortality [8–10], accelerated functional and cognitive decline [10–15], prolonged hospital length of stays [16], and increased health care costs [17].

☆ Source of funding: Dr Han and this study were funded by the Emergency Medicine Foundation Career Development Award and the National Institutes of Health (K23AG032355). This study was also supported by the National Center for Research Resources (grant UL1 RR024975-01) and is now at the National Center for Advancing Translational Sciences (grant 2 UL1 TR000445-06). Dr Ely was supported in part by the National Institutes of Health R01AG027472 and R01AG035117, and a Veteran Affairs MERIT award and Geriatric Research, Education, and Clinical Center. Dr Schnelle is also supported by the Veteran Affairs Geriatric Research, Education, and Clinical Center.

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http://dx.doi.org/10.1016/j.ajem.2016.02.069
0735-6757/

However, the epidemiology of delirium in the ED is unclear. Compared with the hundreds of in-hospital studies published over the past two decades, the number of studies conducted in the ED is sparse. Hospital-based studies have limited generalizability to the ED patient population because it excluded those who are discharged from the ED. In addition, many of these studies enrolled patients 24 to 48 hours after admission, and the patient's delirium status at the time of enrollment may not reflect his or her delirium status in the ED. Because the ED is the nexus of the health system and the gateway for a significant proportion of hospital admissions, improving our understanding of delirium in the ED is crucial to improving the quality of care delivered to the geriatric patient [18]. As a result, there has been an increased push to perform more delirium investigations in the ED by funding agencies [19–21].

One significant barrier to conducting such investigations is the lack of feasible delirium assessments available for the dynamic ED environment. Many delirium assessments can take up to 30 minutes to complete [22,23]. Prolonged assessments are not feasible to perform in the ED because a large number of eligible patients can present at one time and interruptions frequently occur. In addition, many ED research infrastructures utilize nonphysicians for data collection. Because most delirium assessments are subjective, their diagnostic accuracy may be reduced in nonphysicians [24,25]. Hence, brief (<2 minutes) delirium assessments that maximize efficiency, minimize burden to the patient, and can be reliably performed by nonphysicians are needed. The Brief Confusion Assessment Method (bCAM) is a delirium assessment that possesses these desirable characteristics and takes less than 2 minutes to perform [26]. Although highly specific in older ED patients, its sensitivity was 78% when performed by research assistants (RAs). We sought to modify the bCAM and to improve its sensitivity for RAs while minimally affecting specificity [26]. The objective of this study was to evaluate the diagnostic accuracy and reliability of the modified bCAM.

2. Methods

2.1. Study design and setting

This was a secondary analysis of prospective observational study that investigated the validity of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), bCAM, and the Delirium Triage Screen in older ED patients [26,27]. The results of this particular analysis have not been previously published. This study was conducted at a tertiary care, academic ED with an annual census of approximately 57 000 visits.

2.2. Study population

A convenience sample of patients was enrolled from July 2009 to February 2012, Monday through Friday between 8:00 AM and 4:00 PM. The enrollment window was based on the delirium reference rater's (consultation-liaison psychiatrists) availability. Because of the extensiveness of their evaluations, patient enrollment was limited to one per day. The local institutional review board reviewed and approved this study. Informed consent was obtained from the patient or an authorized surrogate whenever possible. The institutional review board granted a waiver of consent for patients who were both unable provide consent and without an authorized surrogate available in the ED or by phone. This waiver was provided because they determined this study to have minimal risk to the patient and that potential benefits of participating in our study far outweighed the risks.

Patients were included if they were 65 years and older, were in the ED for less than 12 hours at the time of enrollment, and were not in a hallway bed. The 12-hour cutoff was arbitrarily set to help include patients who presented in the evening and early morning hours, yet minimized extraneous factors that would artificially cause new-onset delirium from prolonged exposure to known delirium precipitants (eg, opioid or benzodiazepines). Patients in the hallway beds were not included because there was a high level of ambient noise. Performing a lengthy psychiatric evaluation in the hallway would have been difficult. Patients were excluded if they refused consent, were non-English speaking, were previously enrolled, were deaf or blind, were comatose, were nonverbal or unable to follow simple commands before their acute illness, or did not complete all the study assessments. Comatose patients were excluded because a patient must be arousable to verbal stimuli to assess for delirium [28]. Patients who were non-verbal or unable to follow simple commands before their acute illness were considered to have end-stage dementia, and this was determined by surrogate interview or medical record review. They were excluded because diagnosing delirium in patients with end-stage dementia can be challenging even for a psychiatrist. Patients who did not complete the study were those who refused the psychiatrist assessment or were discharged from the ED before the data collection could be completed.

2.3. Measurements

The bCAM was originally adapted from the CAM-ICU [29], both of which were based on the CAM algorithm developed by Inouye et al [1]. The bCAM consisted of four features: (1) altered mental status or fluctuating course, (2) inattention, (3) altered level of consciousness, and (4) disorganized thinking. A patient was considered to be bCAM positive if altered mental status or fluctuating course (feature 1) and inattention (feature 2), and either altered level of consciousness (feature 3) or disorganized thinking (feature 4) were present. Altered mental status and altered level of consciousness represent two different, yet interrelated constructs. Altered mental status refers to an acute change in the patient's global mentation, whereas altered level of consciousness reflects a specific change in the patient's level of arousal or wakefulness.

We modified the bCAM to further improve its sensitivity while maintaining its specificity before the analysis using expert opinion. The original bCAM assessed feature 2 (inattention) by asking the patient to recite the months backward from December to July; the task was stopped if the patient paused at specific month for 15 seconds. The modification added the Vigilance "A" test from the CAM-ICU; for this task, the patient had to squeeze the rater's hand every time he or she heard the letter "A" [30]. A series of 10 letters ("SAVEAHAART") were given every 3 seconds. If the patient made more than 1 error on either the months of the year backward or the Vigilance A tasks, then the patient was considered to be inattentive or feature 2 positive. This cutoff was also set a priori using expert opinion. If they were unable or refused to perform these tasks, then they were considered to be positive for inattention.

Like the bCAM, feature 1 was considered positive if the patient had altered mental status or a fluctuating course. This feature was primarily determined by interviewing a family member or caregiver in the ED or by phone. If the patient was from a skilled nursing facility, then the skilled nursing facility was contacted. If the patient lived alone at home and no collateral history was available, then the medical record was reviewed to help determine the patient's mental status baseline. If there was no information about the patient's baseline mental status and the patient was feature 2 (inattention) positive and either feature 3 (altered level of consciousness) or 4 (disorganized thinking) positive, then it was assumed that the patient was feature 1 positive. Altered level of consciousness (feature 3) was determined by the Richmond Agitation Sedation Scale, which is an arousal scale that ranges from −5 (comatose) to +4 (combative) [31]. If the patient had a Richmond Agitation Sedation Scale other than 0 (alert, normal level of consciousness), then the patient was considered to have altered level of consciousness. Disorganized thinking (feature 4) was assessed for by asking the patient four yes/no questions and a simple command.