Exploring the Utility of Ultra-Brief Delirium Assessments in a Nonintensive Care Geriatric Population: The GEM Study

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Objective: To determine how an ultra-brief structured tool that would require usually less than a minute for delirium assessment compares with a clinical assessment based on Diagnostic and Statistical Manual-IV (DSM-IV) in a geriatric postacute care (PAC) rehabilitation unit. Design: Prospective observational cohort study. Setting: Postacute geriatric hospital ward of a Veteran’s Affairs hospital. Participants: Consecutively admitted patients between 50 and 100 years old for inpatient postacute medical care. Measurements: Two teams, blinded to one another’s evaluations, performed daily delirium assessments using either the Confusion Assessment Method for the intensive care unit (CAM-ICU) or clinical assessment based on DSM-IV. Results: There were 61 patients enrolled (median 73 years old, range: 52–94), who underwent 521 paired observations. Delirium was detected in 18 patients (29.5%) by one of the two screening methods over the course of the study, most of whom (14 patients, 23%) were delirious on the first day of enrollment. Delirium was identified by the CAM-ICU on 12.6% of the observations and by the clinical assessment on 6% of the observations (κ = 0.25, 95% confidence interval [CI]: 0.09, 0.40). Examination of disagreement between the 2 evaluations revealed that patients with dementia (κ = 0.11, 95% CI: −0.14, 0.27) had 10.7 times higher odds (95% CI: [3.1, 36.8], p value < .001) of having discordance than patients without dementia. Conclusions: Different delirium assessments may disagree depending on the study population. Dementia patients are especially challenging to evaluate for delirium.

Key Words: Dementia, Clinical practice, Delirium.
Delirium is a neurobehavioral condition, which the Diagnostic and Statistical Manual-IV (DSM-IV) defines as a disturbance in consciousness accompanied by a change in cognition or a perceptual disturbance that is not better accounted for by dementia (American Psychiatric Association, 2000). The DSM-IV also specifies that the disturbance in consciousness develops over a short period and tends to fluctuate in course and that the diagnosis hinges on the presence of inattention (the hallmark of delirium) and not the presence of hallucinations or delusions.

Delirium is a common occurrence among hospitalized individuals, with rates ranging from 15% to 50% (Francis, Martin, & Kapoor, 1990; Inouye et al., 1999; Levkoff et al., 1992; Peterson et al., 2006) or as high as 60% to 80% in intensive care units (ICUs). Delirium is a particular concern among hospitalized elders, given the increased risk of delirium conferred by advanced age (Ely et al., 2004; Levkoff et al., 1992; Peterson et al., 2006) and its association with increased morbidity and mortality (Belletti et al., 2007; Elie et al., 2009; Fong et al., 2012; Inouye, Rushing, Foreman, Palmer, & Pompei, 1998; Rockwood et al., 1999). Recent research suggests that individuals who experience delirium while in ICU may also experience long-term cognitive deficits (Fong et al., 2009; Girard et al., 2010; Leslie, Marcantonio, Zhang, Leo-Summers, & Inouye, 2008; O’Keefe and Lavan, 1997) with significant medical and public health costs (Marcantonio, Bergmann, Liely, Orav, & Jones, 2010; Milbrandt et al., 2004). There have been reports from postacute care (PAC) rehabilitation settings in nursing homes that 16% of patients are admitted with delirium and that 12% demonstrate delirium at 1 week when evaluated by research staff with the Confusion Assessment Method (CAM; Ely et al., 2001). Although brief screening instruments have been shown to detect delirium, there has been little research into the methods of diagnosing delirium in the setting of postacute geriatric inpatient units.

The CAM-ICU is a brief structured delirium assessment instrument. It has previously been validated among ventilated patients in the ICU (Ely et al., 2004) and has been modified for use in settings that require very brief methods to screen such as the emergency department (Han et al., 2009). Although the CAM-ICU has been demonstrated to have good sensitivity and specificity in multiple studies for detecting delirium in ICU populations (Gusmão-Flores, Salluh, Chalhub, & Quarantini, 2012), it has not been widely used with patients with dementia or in postacute settings. This study sought to determine how frequently delirium was detected by the CAM-ICU in a Veteran’s Affairs (VA) postacute setting as compared with standard-of-care treatment team’s clinical assessment based on DSM-IV criteria.

Methods

Participants

The study population consisted of consecutive individuals (61 of 67 patients enrolled in the study) aged between 50 and 100 years, admitted to the acute Geriatric Evaluation and Management (GEM unit), a postacute geriatric rehabilitation unit at the Nashville campus of the Tennessee Valley Health System. Participants were enrolled either between January and May 2010 or between May and July 2011. The goal of the GEM unit is to prepare patients for discharge from the hospital and to bring them to their optimal functional level. The GEM unit comprises 10 beds and admits approximately 12 patients per month. Individuals admitted to the GEM unit undergo multidisciplinary evaluation and rehabilitation therapy during their inpatient stay.

Procedures

On weekdays, potential participants were approached soon after admission and consented with procedures approved by the VA Institutional Review Board (IRB). The IRB issued a waiver of informed consent due to minimal risk associated with monitoring of delirium and the acceptance of delirium assessment as a component of usual care. Daily weekday evaluations of delirium were performed during the enrolled patients’ length of stay by physicians and nurses working on the unit using DSM-IV criteria. The CAM-ICU and Richmond Agitation-Sedation Scale (RASS) evaluations of consciousness were independently performed by either a psychologist or an internist (S. Gordon and T. Doering) trained in the use of the CAM-ICU (Ely et al., 2001; Girard et al., 2010; Sessler, Gosnell, & Grap, 2002). All of the cognitive assessments were performed independently in a blinded fashion between 8 a.m. and 12 p.m. on weekdays. The Functional Assessment Staging (FAST) for dementia (Reisberg, 1988) was used to assess dementia severity for appropriate participants. Only completed paired observations were entered into the database. Data from participants who were unavailable, refused observation for that day, or were too somnolent for evaluation (RASS-3) were not included.
Measures

**CAM-ICU evaluation of delirium.**—The CAM-ICU is a 2-minute standardized assessment (Ely et al., 2001; Girard et al., 2010) derived from the longer CAM, which allows for either nonverbal or verbal patient responses to detect delirium (Inouye et al., 1990). The CAM-ICU measures delirium based on four features: (a) acute onset of changes or fluctuations in the course of mental status, (b) inattention, (c) disorganized thinking, and (d) altered level of consciousness. An individual is assessed as delirious if he/she demonstrates features (a) and (b), as well as either features (c) or (d). The CAM-ICU has demonstrated excellent validity and reliability among ventilated and nonventilated patients in the ICU. It has also demonstrated good feasibility when used by nonpsychiatric health care professionals. They determined if there was an acute change (feature a) when they first evaluated the patient by interviewing the treatment nurse. On repeat measurements, these raters evaluated change based on their experience with the patient and accompanying RASS scores documented in the patient’s chart. The type of delirium was also classified daily as hyperactive (increased motoric activity with agitated behavior and increased level of arousal) or hypoactive (reduced motor behavior and lethargy) based on the structured CAM-ICU and RASS assessments.

**Treatment team clinical assessment based on DSM-IV criteria.**—Evaluations of delirium were performed for more than 4 hours apart from the CAM-ICU study team’s evaluations. The clinical treatment team doing the clinical evaluation was composed of the attending physician, clinical pharmacist, social worker, and geriatric nurse practitioner, who were involved in the daily care of the patient. The team evaluated the patient during their normal rounds and with that knowledge they would designate the patient’s delirium status. There were four different attending physicians, including the principal investigator (PI) during the course of the study, all skilled in DSM-IV criteria. The remainder of the treatment team was the same throughout the study, and the PI communicated daily with the team, recording the final classification of the evaluated 24-hour period (as delirium present or absent).

**Statistical Analysis**

Continuous variables were compared between demented and nondemented cohorts using nonparametric Wilcoxon rank–sum tests, and categorical variables were compared using Pearson chi squares. A kappa statistic was calculated to determine interobserver reliability between the two delirium assessment methods. For kappa, confidence intervals (CIs) were constructed using bootstrap method with 1000 bootstrap samples with replacement to account for correlation among repeated measures (Efron, 1979). To analyze if discordance between CAM-ICU and clinical assessment using DSM-IV criteria was associated with dementia, we used logistic regression for the generalized estimating equation modeling with discordance as an outcome and dementia as a covariate and logit link function, exchangeable correlation structure, and patient ID as a cluster.

**Results**

Sixty-one of 67 admissions consented for enrollment during the period of the study. The average age was 73 years (range: 52–94). All but 2 of the 61 participants were men. Diagnoses included 14 (23%) medically complex as indicated by multiple comorbid diagnoses, 9 (15%) cancer as a principle diagnosis, 6 (10%) post-coronary artery bypass grafting, 17 (28%) post-other surgical procedure, 8 (13%) stroke, and 7 (11%) dementia patients. The seven participants with a dementia diagnosis were determined to be moderately-to-severely demented (Level 6–7) by the FAST score. The average length of stay of the enrolled participants was 20.3 days.

Table 1 illustrates these results reported per observation for the total population. There were 61 patients enrolled (median: 73 years old, range: 52–94), who underwent 521 paired observations. Delirium was detected in 18 patients (29.5%) by one of the two screening methods over the course of the study, most of whom (14 patients, 23%) were delirious on the first day of enrollment. Delirium was identified by the CAM-ICU on 12.6% of the observations and by the clinical assessment on 6% of the observations (κ = 0.25, 95% CI: 0.09, 0.40). Most delirium was detected on the first day of the assessment (14 of 18 participants). There was no difference in the duration of delirium between demented and nondemented participants (mean days [SD] demented; nondemented: clinical assessment 2.8 (3.5); 4.5 (2.4) and CAM-ICU 3.2 (3.1); 6.7 (6.8)]).

The most typical motoric subtype of delirium was hypoactive (87.5% first observation delirium by either method classed as RASS score −3 to
0) with only 2 of 16 observations determined to be hyperactive. All dementia patients exhibited delirium by at least one assessment method, and delirium was identified by both methods in three patients (12 paired observations), by CAM-ICU alone in three patients (28 paired observations), and by DSM-IV criteria alone in one patient (six paired observations). All episodes were of the hypoactive motorific subtype. Examination of disagreement between the two evaluations revealed that dementia patients (11% patients, 14% paired observations) produced a disproportionate number of discordant observations. Patients with dementia ($\kappa = 0.11, 95\% CI: -0.14, 0.27$) had 10.7 times higher odds (95% CI: [3.1, 36.8], $p$ value < .001) of having discordance than patients without dementia, Table 2.

### Challenges and Limitations

Strengths of our study include detailed clinical assessment of all participants by an experienced treatment team and a large number of paired observations. Our population, however, included 11% dementia patients, who may comprise the most difficult population to evaluate for delirium. Lack of a structured DSM-IV assessment tool makes it necessary to rely on clinical judgment of physicians who know the patient well when assessing for delirium. Despite the fact that we utilized a high clinical standard of care for delirium assessment, we did not document specific elements of delirium on the global assessment. The CAM-ICU identified more patients, suggesting that the CAM-ICU might be more sensitive or less specific for delirium detection in postacute settings with demented patients.

### Discussion

Delirium was frequently present in the VA patients who participated in this study with most delirium detected by either method on first observation (23% of all patients), which indicates that nearly one in four patients was admitted to the rehabilitation unit with delirium. This is a slightly higher rate of delirium reported on or near admission than studies conducted in PAC facilities in non-VA settings, which report a 12%–15% rate of delirium on admission (Marcantonio et al., 2010). This high rate suggests a particularly at-risk population for delirium in either the hospital or during the transition between the hospital and the rehabilitation unit. These data support the need for routine delirium screening in both settings.

We found that there was poor agreement between the CAM-ICU and treatment team clinical assessment using DSM-IV criteria, with delirium more often suggested by the CAM-ICU, especially for demented patients. Three demented patients demonstrated delirium identified by both methods. Our results suggest that the efficacy of different delirium assessments may vary by population, comorbidity, and severity of illness. In our experience, fluctuating attention, especially a change from baseline, may have impacted assessments, although each paired observation was performed within a 4-hour time frame. Treatment team members also spent more time observing patients. Neufeld and colleagues (2011) also found that the CAM-ICU and the Intensive Care Delirium Screening Checklist (ICDSC; Bergeron, Dubois, Dumont, Dial, & Skrobik, 2001) were both less sensitive than a comprehensive DSM-IV reference rater neuropsychiatric evaluation in detecting delirium in noncritically ill hospitalized patients. However, in one other study comparing the CAM-ICU with an unstructured evaluation approach in ICU patients, Guenther and colleagues (2012) found the CAM-ICU identified more delirium in surgical patients compared with subjective assessment by bedside nurses.

### Table 1. Agreement of Confusion Assessment Method-Intensive Care Unit (CAM-ICU) and Clinical Assessment (N = 61 Patients, 521 Paired Observations)

<table>
<thead>
<tr>
<th></th>
<th>Clinical assessment positive</th>
<th>Clinical assessment negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAM-ICU positive</td>
<td>15</td>
<td>51</td>
</tr>
<tr>
<td>CAM-ICU negative</td>
<td>18</td>
<td>437</td>
</tr>
</tbody>
</table>

### Table 2. Discordance Between Assessment Methods By Dementia

<table>
<thead>
<tr>
<th></th>
<th>Without dementia</th>
<th>With dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discordant</td>
<td>414</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$\kappa$</th>
<th>Percent agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>0.25 (0.09, 0.4)</td>
<td>86.76 (77.91, 93.88)</td>
</tr>
<tr>
<td>Dementia present</td>
<td>0.11 (−0.14, 0.27)</td>
<td>52.78 (31.75, 75.64)</td>
</tr>
<tr>
<td>Dementia absent</td>
<td>0.15 (0.01, 0.45)</td>
<td>92.2 (84.78, 98.41)</td>
</tr>
</tbody>
</table>

Note: Patients with dementia have 10.7 times higher odds (95% CI: [3.1, 36.8], $p$ value < .001) of having discordance than patients without dementia.
Conclusions and Future Directions

There was poor agreement between the CAM-ICU and clinical assessment based on DSM-IV criteria in identifying delirium in acute geriatric rehabilitation patients. This was especially true for dementia patients. Both approaches should be compared with a more thorough structured evaluation of delirium to determine their accuracy in detecting delirium. It is possible that demented patients in this setting may require more thorough and complete diagnostic evaluations than were done in this article such as full structured DSM or CAM evaluations.

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