

## Supplemental material 1: tests used for delirium assessment

### CAM: CONFUSION ASSESSMENT METHOD

The Confusion Assessment Method (CAM) was created in 1990 by Dr. Sharon Inouye, and it was intended to be a bedside assessment tool usable by non-psychiatrists to assess for delirium [1]. Delirium is defined in terms of four diagnostic features and is deemed positive when Feature 1 and Feature 2 and either Feature 3 or 4 are present.

<b>CAM</b> Confusion Assessment Method	The diagnosis of delirium by CAM requires the presence of <b>BOTH</b> features <b>A</b> and <b>B</b>	
	<b>A = acute onset and fluctuating course</b>	<p>Is there evidence of an acute change in mental status from patient baseline?</p> <p>Does the abnormal behavior:</p> <ul style="list-style-type: none"> <li>➤ come and go?</li> <li>➤ fluctuate during the day?</li> <li>➤ increase/decrease in severity?</li> </ul>
	<b>B = Inattention</b>	<p>Does the patient:</p> <ul style="list-style-type: none"> <li>➤ have difficulty focusing attention?</li> <li>➤ become easily distracted?</li> <li>➤ have difficulty keeping track of what is said?</li> </ul>
	<b>AND</b> the presence of <b>EITHER</b> feature <b>C</b> or <b>D</b>	
	<b>C = Disorganized thinking</b>	<p>Is the patient's thinking</p> <ul style="list-style-type: none"> <li>➤ disorganized</li> <li>➤ incoherent</li> </ul> <p>For example, does the patient have</p> <ul style="list-style-type: none"> <li>➤ rambling speech/irrelevant conversation?</li> <li>➤ unpredictable switching of subjects?</li> <li>➤ unclear or illogical flow of ideas?</li> </ul>
	<b>D = Altered level of consciousness</b>	<p>Overall, what is the patient's level of consciousness:</p> <ul style="list-style-type: none"> <li>➤ alert (normal)</li> <li>➤ vigilant (hyper-alert)</li> <li>➤ lethargic (drowsy but easily roused)</li> <li>➤ stuporous (difficult to rouse)</li> <li>➤ comatose (unrousable)</li> </ul>

## MINI COG TEST

In order to rate the CAM, for each evaluation a formal cognitive testing using the Mini-Cog test will be performed. It is a 3-minute instrument that can increase detection of cognitive impairment in older adults. It consists of two components, a 3-item recall test for memory and a simply scored clock drawing test [2].

### Step 1: Three Word Registration

Look directly at person and say, "Please listen carefully. I am going to say three words that I want you to repeat back to me now and try to remember. The words are [select a list of words from the versions below]. Please say them for me now." If the person is unable to repeat the words after three attempts, move on to Step 2 (clock drawing).

Version 1	Version 2	Version 3	Version 4	Version 5	Version 6
Banana	Leader	Village	River	Captain	Daughter
Sunrise	Season	Kitchen	Nation	Garden	Heaven
Chair	Table	Baby	Finger	Picture	Mountain

### Step 2: Clock Drawing

Say: "Next, I want you to draw a clock for me. First, put in all of the numbers where they go." When that is completed, say: "Now, set the hands to 10 past 11."

Use preprinted circle (see next page) for this exercise. Repeat instructions as needed as this is not a memory test. Move to Step 3 if the clock is not complete within three minutes.

### Step 3: Three Word Recall

Ask the person to recall the three words you stated in Step 1. Say: "What were the three words I asked you to remember?" Record the word list version number and the person's answers below.

#### Scoring:

Word Recall: ____ (0-3 points)	1 point for each word spontaneously recalled without cueing.
Clock Draw: ____ (0 or 2 points)	Normal clock = 2 points. A normal clock has all numbers placed in the correct sequence and approximately correct position (e.g., 12, 3, 6 and 9 are in anchor positions) with no missing or duplicate numbers. Hands are pointing to the 11 and 2 (11:10). Hand length is not scored. Inability or refusal to draw a clock (abnormal) = 0 points.
Total Score: ____ (0-5 points)	Total score = Word Recall score + Clock Draw score. A cut point of <3 on the Mini-Cog <sup>TM</sup> has been validated for dementia screening, but many individuals with clinically meaningful cognitive impairment will score higher. When greater sensitivity is desired, a cut point of <4 is recommended as it may indicate a need for further evaluation of cognitive status.

## CAM-ICU : CONFUSION ASSESSMENT METHOD IN INTENSIVE CARE UNIT

The CAM-ICU is an adaptation of the CAM tool for use in ICU patients (e.g., critically ill patients on or off the ventilator) using nonverbal, objective tests derived through a comprehensive literature review and consultation with numerous delirium experts [3]. The CAM-ICU underwent extensive validation in the ICU setting and is, therefore, one of the delirium scores recommended by international guidelines [4].

Features and Descriptions	Absent	Present
<p><b>I. Acute onset or fluctuating course</b></p> <p>A. Is there evidence of an acute change in mental status from baseline?</p> <p>B. Or, did the (abnormal) behavior fluctuate during the past 24 hours, that is, tend to come and go or increase and decrease in severity as evidence by fluctuations on the Richmond Agitation Sedation Scale (RASS) or the Coam Glasgow Scale?</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>II. Inattention</b></p> <p>Did the patient have difficulty focusing attention as evidenced by a score of less than 8 correct answers on either the visual or auditory components of the Attention Screening Examination (ASE)</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>III. Disorganized thinking</b></p> <p>Is there evidence of disorganized or incoherent thinking as evidenced by incorrect answers to 3 or more of the 4 questions and inability to follow the commands?</p> <p>Questions</p> <ol style="list-style-type: none"> <li>1. Will a stone float on water?</li> <li>2. Are there fish in the sea?</li> <li>3. Does 1-pound weigh more than 2 pounds</li> <li>4. Can you use a hammer to pound a nail?</li> </ol> <p>Commands</p> <ol style="list-style-type: none"> <li>1. Are you having unclear thinking?</li> <li>2. Hold up these many fingers (examiner holds 2 fingers in front of the patient)</li> <li>3. Now do the same thing with the other hand (without holding the 2 fingers in front of the patient)</li> </ol> <p>(If the patient is already extubated from the ventilator, determine whether the patient's thinking is disorganized or incoherent, such a rambling or irrelevant conversation, unclear or illogical flow or ideas, or unpredictable switching from subject to subject)</p>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>IV. Altered level of consciousness</b></p> <p>Is the patient level of consciousness anything other than alert, such as being vigilant or lethargic or in a stupor, or coma?</p> <p>Alert: spontaneously fully aware of environment and interacts appropriately</p> <p>Vigilant: hyperalert</p> <p>Lethargic drowsy but easily aroused, unaware of some elements in the environment or not spontaneously interacting with the interviewer; becomes fully aware and appropriately interactive when prodded minimally</p>	<input type="checkbox"/>	<input type="checkbox"/>

<p>Stupor: difficult to arouse, unaware of some or all elements, in the environment or not spontaneously interacting with the interviewer; becomes incompletely aware when prodded strongly; can be aroused only by vigorous and repeated stimuli and as soon as the stimulus ceases, stupor subject lapse back into unresponsive state</p> <p>Coma: unarousable, unaware of all elements in the environment with no spontaneous interaction or awareness of the interviewer so that the interview is impossible even with maximal prodding</p>		
Overall CAM-ICU Assessment (Features I and II and either feature III or IV): YES <input type="checkbox"/> NO <input type="checkbox"/>		

### RASS = RICHMOND AGITATION-SEDATION SCALE

The Richmond Agitation Sedation Scale (RASS) is a component of the CAM-ICU (Feature 4: Altered Level of Consciousness). The RASS has been shown to be both reliable and valid in critically ill adults with and without mechanical ventilation and sedating medications [5].

RASS is a 10-point scale, with four levels of anxiety or agitation (+1 to +4 [combative]), one level to denote a calm and alert state (0), and 5 levels of sedation (-1 to -5) culminating in unarousable (-5). The values and definitions for each level of agitation and sedation are displayed below:

The Richmond Agitation-Sedation Scale (RASS)		
Score	Term	Description
+4	Combative	Overtly combative, violent, immediate danger to staff
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive
+2	Agitated	Frequent non-purpose full movement, fights ventilator
+1	Restless	Anxious but movements not aggressive or vigorous
0	Alert and calm	
-1	Drowsy	Not fully alert, but has sustained awakening (eye opening/eye contact) to voice (>10 seconds)
-2	Light sedation	Briefly awakens with eye contact to voice (< 10 seconds)
-3	Moderate sedation	Movement or eye opening to voice (but not eye contact)
-4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation
-5	Unarousable	No response to voice or physical stimulation

Procedure for RASS assessment	
1. Observe patient	Score 0 to +4
<ul style="list-style-type: none"> <li>• Patient is alert, restless, or agitated</li> </ul>	
2. If not alert, state patient's name and say to open eyes and look at speaker	Score -1
<ul style="list-style-type: none"> <li>• Patient awakens with sustained eye opening and eye contact</li> </ul>	Score -2
<ul style="list-style-type: none"> <li>• Patient awakens with eye opening and eye contact but not sustained</li> </ul>	Score -3
<ul style="list-style-type: none"> <li>• Patient has any movement in response to voice but no eye contact</li> </ul>	
3. When no response to verbal stimulation, physical stimulate patient by shaking shoulder and/or rubbing sternum.	Score -4
<ul style="list-style-type: none"> <li>• Patient has any movement to physical stimulation</li> </ul>	Score -5
<ul style="list-style-type: none"> <li>• Patient has no response to any stimulation</li> </ul>	

## REFERENCES:

- 1 Inouye SK, van Dyck CH, Alessi CA, *et al.* Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med* 1990;**113**:941–8.
- 2 Borson S, Scanlan JM, Chen P, *et al.* The Mini-Cog as a screen for dementia: validation in a population-based sample. *J Am Geriatr Soc* 2003;**51**:1451–4. doi:10.1046/j.1532-5415.2003.51465.x
- 3 Ely EW, Inouye SK, Bernard GR, *et al.* Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). *JAMA* 2001;**286**:2703–10.
- 4 Barr J, Fraser GL, Puntillo K, *et al.* Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the Intensive Care Unit: executive summary. *Am J Health Syst Pharm* 2013;**70**:53–8.
- 5 Sessler CN, Gosnell MS, Grap MJ, *et al.* The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients. *Am J Respir Crit Care Med* 2002;**166**:1338–44. doi:10.1164/rccm.2107138