Beth Israel Deaconess Medical Center

A teaching hospital of Harvard Medical School

Delirium Assessment:
Confusion Assessment Method (CAM)
3D-CAM

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Delirium Measurement in Research Studies

- One size does NOT fit all
- Considerations:
  - What kind of assessment to use?
  - How to determine delirium presence, severity?
  - Who should perform the assessments?
  - How often to perform the assessments?
- Answer may differ from study to study

Bedside assessment in Epi Studies

- Not making a clinical diagnosis
- Making a research assignment of delirium presence or absence
- Goals:
  - High validity: concordance with external standard
  - High reliability: concordance with each other

Standardized Delirium Tests
(selected from >40)

- Confusion Assessment Method (CAM)
- CAM for the Intensive Care Unit (CAM-ICU)
- 3-Minute Diagnostic Interview for CAM delirium (3D-CAM)
- Intensive Care Delirium Screening Checklist (ICDSC)
- Delirium Index (DI)
- Delirium Observation Screening Scale (DOSS)
- Delirium Rating Scale (DRS)-Revised-98
- Delirium Symptom Interview (DSI)
- Memorial Delirium Assessment Scale (MDAS)
- Neelon/Champagne Confusion Scale (NEECHAM)
- Nursing Delirium Screening Scale (NuDESC)
- The 4AT

….and more

Focus on
Confusion Assessment Method (CAM)

- Most widely used method worldwide
- Used in >5000 original studies to date, translated into over 20 languages
- Short CAM (4-item)—diagnostic algorithm only
- Long CAM (10-item):
  - provides more information on phenotypes, severity
  - can serve as reference standard in research studies
- Our training today will focus on the Long CAM
- Also describe the 3D CAM--standardized interview that operationalizes the Short CAM

Confusion Assessment Method

- Developed in 1988, since no validated instrument for delirium existed at that time
- Designed to enable non-psychiatrist clinicians to detect delirium quickly and accurately
- Based on DSM-IIIR criteria (11 criteria)—simplified and operationalized criteria and developed diagnostic algorithm. Extrapolates well to DSM5
- Copyrighted instrument. Free of charge for all nonprofit clinical, educational, academic research purposes with acknowledgement:
  - *"Confusion Assessment Method. © 1988, 2003, Hospital Elder Life Program. All rights reserved. Adapted from: Inouye SK et al. Ann Intern Med. 1990; 113:941-8."*

The CAM Diagnostic Algorithm

(1) acute onset and fluctuating course

-and-

(2) inattention

-and either-

(3) disorganized thinking

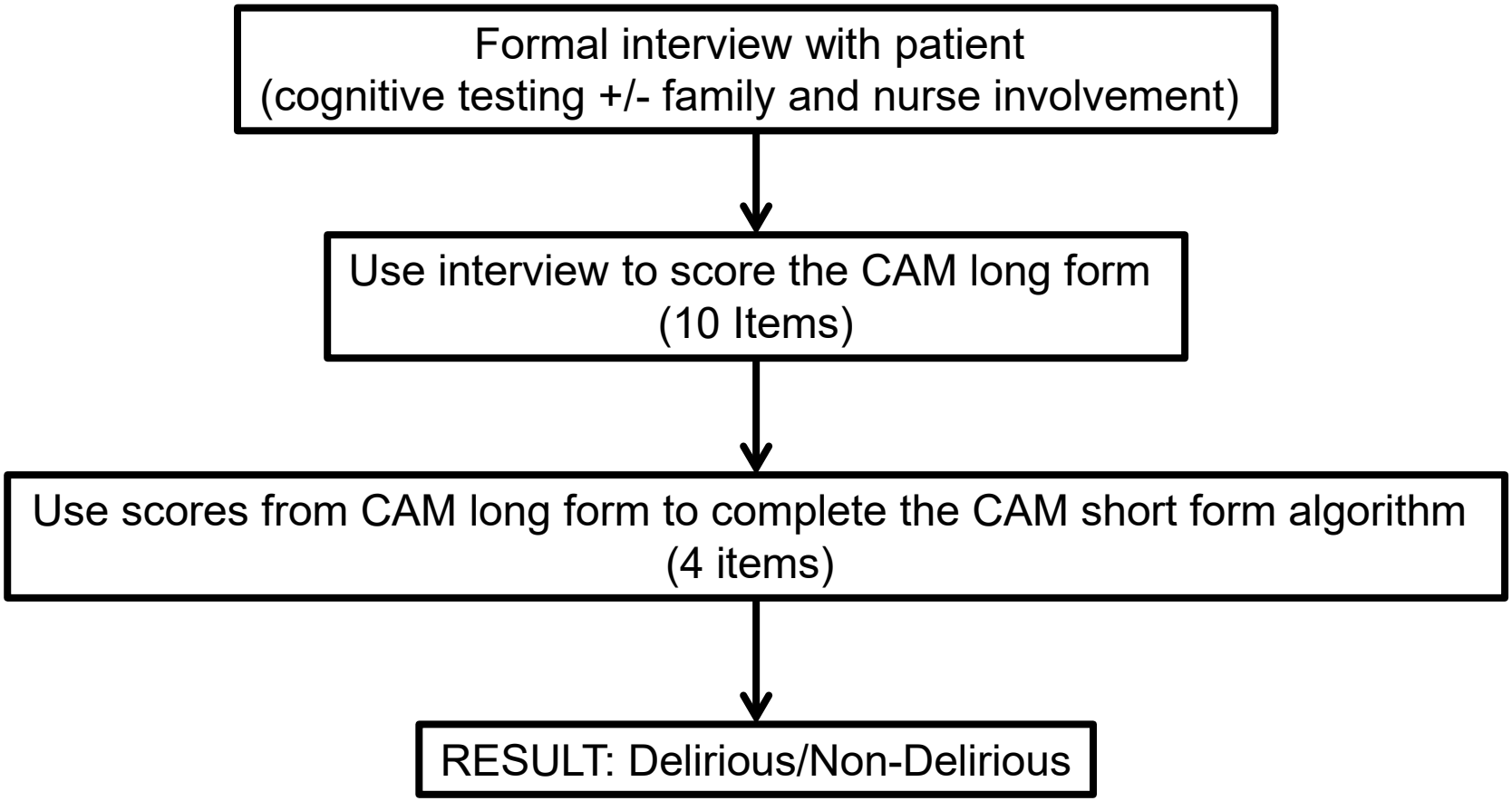
-or-

(4) altered level of consciousness

CAM highly sensitive (94%) and specific (89%) when used by trained individuals.

Inouye SK et al. Ann Intern Med 1990; 113:941. Wei LA et al. JAGS 2008;65:823

The CAM Diagnostic Process



Cognitive testing

- The CAM must be scored based on observations made during an interview including formal cognitive assessment
- The assessment can be brief, but should include: attention, orientation, memory
- Common tests used: SPMSQ, Mini-Cog, digit span, DOWB, MOYB
- Score CAM based not only on cognitive testing results, but also observations during consent, conversation, and other parts of interview

General Interview Guidelines

- Aim to create a quiet, calm environment
- Reduce likelihood of interruption
  - Communicate with nursing
  - Ask family members to leave the room
- Technique
  - Make sure patient can see and hear you
  - Use devices for hearing impaired (Pocket Talker)
  - Do not give verbal praise, or indicate correct or incorrect answers

General Interview Guidelines

(contd.)

- Write notes (need space in RedCAP forms)
- Record patient's exact words if possible
- Do not give your interpretation, but rather describe the exact behavior observed:
  - Instead of "respondent disoriented", write "respondent said she was on a ship in Hawaii".
  - Instead of "respondent seems inattentive", write: "could not make eye contact, attention darted to every noise in room".

Review of CAM Features

CAM Scoring

- Each CAM Feature (besides Feature 1) is rated “not present”, “mild”, or “marked”
- “Mild” rating means:
  - behavior was present or observed
  - did not significantly interfere with the interview
- “Marked” rating means:
  - did significantly interfere with the interview process (e.g., interview difficult, interrupted, or prolonged).

CAM – Acute Change

Is there evidence of an acute change in mental status from the patient's baseline?

- Positive if the patient demonstrates or reports a change in mental status
- Must establish the baseline
- Either new in onset or worsening in intensity, usually over hours to days
- Evidence may come from the interview (patient self-report), medical record, nurse/MD, comments from family or visitors.

CAM - Fluctuation

Did this behavior fluctuate during the interview?

- Key features to observe for fluctuation
  - Inattention
  - Disorganized thinking
  - Altered Level of Consciousness
  - Psychomotor Agitation
  - Psychomotor Retardation
- Scored based on fluctuation during the interview (i.e., symptom comes and goes or increases and decreases in severity)

CAM - Inattention

Did the patient have difficulty focusing attention, for example being easily distractible, or having difficulty keeping track of what was being said?

- Reduced ability to maintain attention to external stimuli and to shift attention to new stimuli.
- Respondent unaware or out-of-touch with environment (e.g., dazed, fixated, or darting attention); no eye contact
- Difficult to establish back and forth conversation
- Errors on attention tests or needs directions repeated

CAM – Disorganized Thinking

Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?

- Patient speaks incoherently, rambles, irrelevant conversation, tangential or circumstantial speech, faulty reasoning
- Off-target or nonsense responses
- Must be able to speak to assess this feature

CAM – Altered level of consciousness

Overall, how would you rate this patient's level of consciousness?

- Alert (Normal)
- Vigilant (Overly sensitive to stimuli, startles easily)
- Lethargic (Drowsy, easily aroused)
- Stupor (Sleeping, Difficult to arouse)
- Coma (Unarousable)

- Hints:
  - May need to wake patient up to start interview – this is a "freebie" even if it's difficult to fully wake them
  - Distinguish from psychomotor agitation or retardation
    - LOC refers to level of arousability or responsiveness
    - Psychomotor agitation/retardation characterizes nature of responses to stimuli (hyperactive vs. delayed, etc)

CAM - Disorientation

Was the patient disoriented at any time during the interview, such as thinking he/she was somewhere other than the hospital, using the wrong bed, or misjudging the time of day?

- Inability to locate oneself in the environment with reference to time, place, person
- Thinks she is at home, or that it is night-time during the day
- Errors on orientation questions

CAM – Memory Impairment

Did the patient demonstrate any memory problems during the interview, such as inability to remember events in the hospital or difficulty remembering instructions?

- Inability to learn new material or to remember past or recent events.
- Cannot recall why or how long in the hospital, or why you are interviewing
- Errors on recall tasks

CAM – Perceptual Disturbances

Did the patient have any evidence of perceptual disturbances, for example, hallucinations, misinterpretations, or illusions?

- Interviewer must either witness this feature during the interview or patient reports it within past 24 hours
- Present if patient describes visual, auditory, tactile, olfactory hallucinations or perceptual disturbances, or appears to be responding to such stimuli
- Definitions:
  - Hallucination: perception in the absence of stimulus
  - Misinterpretation: stimulus is present, but misinterpreted
  - Illusion: stimulus present, interpreted correctly, but distorted, such as larger, smaller, or moving

CAM – Psychomotor Agitation

Did the patient have an unusually increased level of motor activity, such as restlessness, picking at bedclothes, tapping fingers, or making frequent sudden changes or position?

- Greatly increased activity compared with norm
- Indicate restlessness or agitation
- Fidgeting, tapping, excessive shifting of position, pacing
- Increased speed of response (motor or verbal)
- Repetitive movements (grasping, picking behaviors)
- May be voluntary or involuntary

CAM – Psychomotor Retardation

Did the patient have an unusually decreased level of motor activity, such as sluggishness, staring into space, staying in one position for a long time, or moving very slowly?

- Reduced activity compared to the norm
- Sluggishness, slowing
- Decreased activity/movement, decreased speed of movements or speech, delayed motor or verbal responses
- May be voluntary or involuntary

CAM – Sleep-wake cycle disturbance

Did the patient have evidence of disturbance of the sleep-wake cycle, such as excessive daytime sleepiness with insomnia at night?

- Interviewer must either witness this feature during the interview or patient reports it within past 24 hours
- Any deviation from the patient's normal sleep-wake cycle.
  - Self-reports of sleeping difficulties (e.g., insomnia or hypersomnolence)
  - Reversal of cycle (e.g., frequent napping during day and insomnia at night)

CAM-S Severity Scoring

- Each CAM Feature (except Feature 1) scored: 0—not present, 1—mild, 2—marked
  - Short CAM (4-item), scores range from 0-7.
  - Long CAM (10-item), scores range 0-19.
- CAM-S score strongly associated with poor clinical outcomes (LOS, costs, placement, functional/cognitive decline, death)
- Useful in tracking course over time, response to treatment, pathophysiological studies

Inouye SK et al. Ann Intern Med. 2014; 160: 526-533

3D-CAM

What is 3D-CAM?

- Stands for: 3 Minute Diagnostic Interview for CAM-defined Delirium
- Short, structured assessment that operationalizes the CAM diagnostic algorithm

How was 3D-CAM created?

- Started with over 160 items
  - Mapped to 4 CAM diagnostic features
- Used Item Response Theory (IRT) to identify most informative items
- Used model selection methods to further reduce items

Yang et. al., BMC Res Meth, 2013

Final Instrument

- Patient Questions: 3 Orientation Items, 4 Attention Items, 3 Symptom Probes
- Observational Items: Altered LOC, Fluctuation, Inattention, Disorganized Thinking
- Any 1 “Positive” Item triggers the Feature
- CAM algorithm: determines the presence or absence of delirium
- Available at: www.hospitalelderlifeprogram.org

Validation Study

- Performed in 201 Gen Med Patients, avg. age 84, 28% with dementia
- All patients received:
  - Reference Standard Assessment
  - 3D-CAM blinded to ref standard
- Results: 95% sensitivity, 94% specificity
  - Retains excellent performance in patients with dementia

Marcantonio et. al., Ann Int Med, 2014

3D-CAM-S

- Method of scoring delirium severity using the 3D-CAM items
  - Replicates the CAM-S severity score (short form)
  - Requires no additional questions
  - Uses results from objective testing within the 3D-CAM to rate each CAM feature: 0, 1, 2

Vasunilashorn et. al., JAGS, 2016

Delirium Screeners

- In populations where 3 minutes is too long, ultra-brief screeners may be useful:
  - Best single item (MOYB): detects >80%
  - Best two items (DOW, MOYB): detects >90%
  - Specificity: 60-70% range
- Screeners followed by 3D-CAM may be efficient, effective (READI study)

Fick et. al., J Hosp Med, 2015

Remember: CAM Ratings

- Start when you enter the room
- End when you leave the room
- Integrate:
  - Performance on formal cognitive testing
  - Observations of LOC, focus, quality of speech, fluctuations, etc.

Is CAM delirium present?

I’ve seen a dying eye
Run round and round a room
In search of something, as it seemed,
Then cloudier become;
And then, obscure with fog,
And then be soldered down,
Without disclosing what it be,
T’were blessed to have seen.

Emily Dickinson

Questions?