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-III-R 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:
### 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.

The CAM Diagnostic Process

Formal interview with patient
(cognitive testing +/- family and nurse involvement)

Use interview to score the CAM long form
(10 Items)

Use scores from CAM long form to complete the CAM short form algorithm
(4 items)

RESULT: Delirious/Non-Delirious
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
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

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?