Integrating delirium measurement into your research

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Outline

- Overview of delirium measurement in research studies
- Training of delirium assessors
  - Ongoing oversight and quality control
- Non-exhaustive compendium of measures
- Case Studies

Delirium Measurement in Research Studies

- One size does NOT fit all
- Considerations:
  - What 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 Patient-Oriented Research

- Making a research assignment of delirium presence or absence

- Not a clinical diagnosis (in most cases)

- Goals:
  - High validity: agreement with external standard
  - High reliability: agreement with each other

How to do it?

- Standardized delirium assessment
- Extensive training of assessors
- Close oversight and quality control

Standardized Delirium Assessment
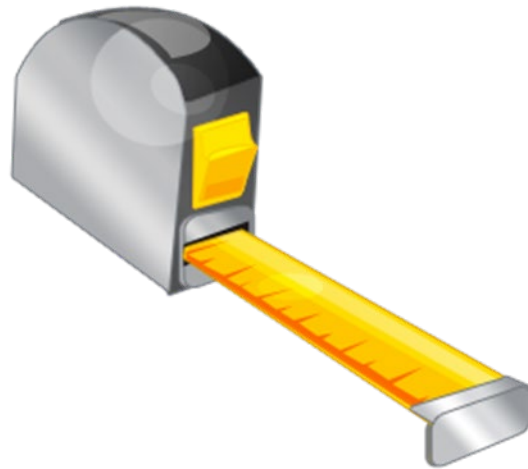
Key Components

- Cognitive testing
  - Including formal testing of attention
- Observations of symptoms
  - Altered level of consciousness
  - Psychomotor agitation/retardation
- Presence/acuity of mental status change
  - Fluctuations during assessment
  - Ask patient, proxies (nurses, family)

Assessor Training

Who to hire?

- Usually bachelor's degree in nursing, psychology or cognitive neuroscience
- Some have Masters degrees
- Prior clinical research experience (ideal)
- Experience in clinical (hospital) setting
- Demonstrated interest and ability to work with older adults

Didactic training

- Basic training in delirium
  - Needed even for clinicians (even moreso)
- Training in mental status evaluation
  - General principles: hearing, vision, comfort, distractions, proxies, etc.
  - Evaluation begins when entering room, ends when leaving the room
- Training in delivering the assessment
  - Practice delivering to each other

Training Videos

- Used at the conclusion of didactic training

- Enables all learners to code assessment

- Review and discuss coding
  - How to integrate cognitive testing and observations during interview
  - Ensures everyone is able to recognize key features of delirium
  - Confusion rating (0-10, not part of CAM scoring) used as a training device

Long CAM, 3D-CAM Videos available at AGS, ADS, DeliriumCentral.org

Field Training

- Observed interviews by senior staff
  - Can start with senior volunteers
  - Move on to real patients
- Review interviews, coding immediately upon completion—provide feedback
- Inter-rater training—do 2 assessors agree?
  - Usually pair learner with seasoned assessor
  - Assess at least 3 delirious patients together

Common Issues in Training

- Focus exclusively on answers to questions, not observations

- Making excuses for patient
  - Very old—what do you expect?
  - Is really sick
  - Just took a pain medication

- Difficulty translating incorrect answers, observations into delirium symptoms

Oversight, Quality Control

Quality Control

- Ongoing inter-rater reliability checks
  - At least 5% of all assessments
  - Pair experienced/less experienced
- Senior review of selected assessments
- Periodic re-training of specific elements
- Cross-check with medical record review

Weekly Team Meetings

- Review:
  - Present interesting Cases
  - Answer specific coding questions
- Cross-check coding of assessments
  - All reviewed before submitted for data entry

Challenge: Multi-site Studies

- How to replicate "local" training?
- Convene all sites for "kick-off" meeting
- Have standardized training followed by "certification" of assessors
- Periodic tele/video conferences
- Centralized quality review
  - Review case report forms
  - Record bedside assessments (permission)

Bedside Delirium Measures

A (Non-exhaustive)
Compendium of Approaches

DSM5

- Requires detailed clinician evaluation
  - Patient assessment, cognitive testing
  - Interviews with family, care providers
  - Medical record review
  - Perhaps laboratory, radiology studies
- Requires clinical expertise, time, cost
- The "gold standard", but rarely used except in validation studies

DSM5-TR, Am Psych Assoc., 2022

Long CAM

- All 10 Features in the original CAM
- Each feature: not present, mild, marked
- Flexible cognitive testing—MMSE, MoCA, SPMSQ, SBT, etc.
- Can operationalize:
  - Delirium diagnosis: CAM diagnostic algorithm
  - Delirium severity: CAM-S long form (0-19)

Inouye et. al, Ann Int Med, 1990
Inouye et. al, Ann Int Med, 2014

Short CAM

- 4 Features in CAM diagnostic algorithm
- Each feature: not present, mild, marked
- Flexible cognitive testing—MMSE, MoCA, SPMSQ, SBT, etc.
- Can operationalize:
  - Delirium diagnosis: CAM diagnostic algorithm
  - Delirium severity: CAM-S short form (0-7)

Inouye et. al, Ann Int Med, 1990
Inouye et. al, Ann Int Med, 2014

3D-CAM

- 4 Features in CAM diagnostic algorithm
- Fixed cognitive testing, observations
- Each feature: present/absent based on answers to questions
- Can operationalize:
  - Delirium diagnosis: CAM diagnostic algorithm
  - Delirium severity: 3D-CAM-S (0-20) via the "raw" method (JAGS, 2020)
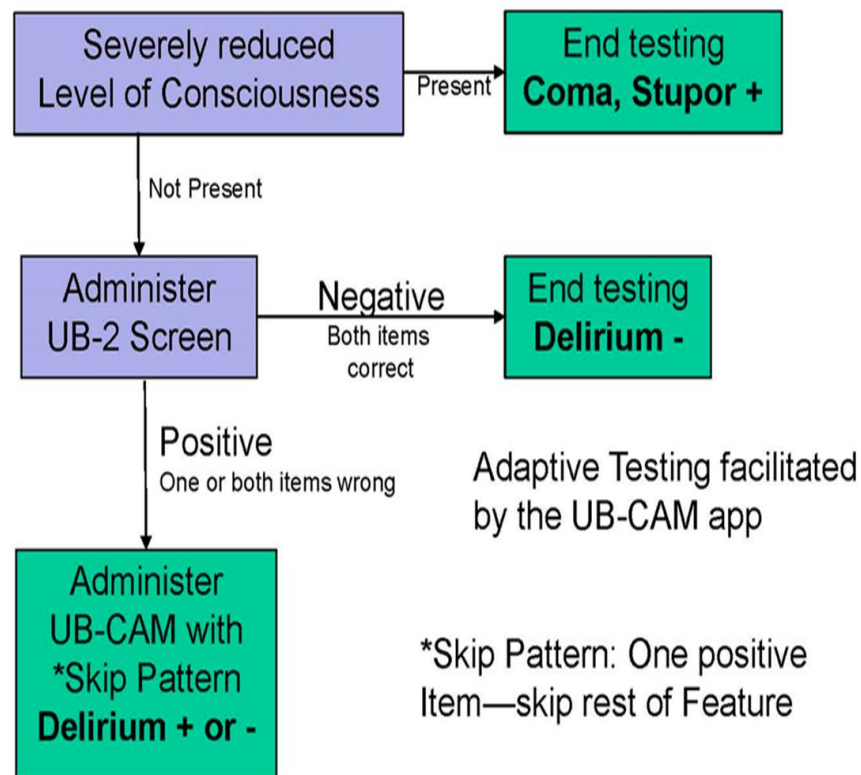
Marcantonio et. al., Ann Int Med, 2014
Vasunilashorn et. al., JAGS, 2020

UB-CAM

- Brief, adaptive version of the 3D-CAM

- Starts with UB-2 screen
  - If negative—end assessment, delirium negative
  - If positive, admin 3D-CAM with skip pattern

- Designed primarily for clinical screening

- Does not measure severity

UB-CAM Delirium Identification Protocol

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Severely reduced          Present    End testing
Level of Consciousness    ────────►  Coma, Stupor +

        │ Not Present
        ▼
Administer          Negative      End testing
UB-2 Screen      ──────────────►  Delirium -
                 Both items
        │        correct
        │ Positive
        │ One or both items wrong
        ▼
Administer              Adaptive Testing facilitated
UB-CAM with             by the UB-CAM app
*Skip Pattern
Delirium + or -         *Skip Pattern: One positive
                        Item—skip rest of Feature
```

Marcantonio et. al., Ann Int Med, 2022

CAM-ICU and variants

- 4 Features in CAM diagnostic algorithm
- Fixed cognitive testing, designed for non-verbal (intubated) patients
- Each feature: present/absent based on answers to questions
- Can operationalize:
  - Delirium diagnosis: CAM diagnostic algorithm
  - Delirium severity: CAM-ICU-7
- B-CAM: adaptation for verbal patients

Ely et. al., JAMA. 2004; Khan et. al., Crit Care Med. 2017; Han et. al, Ann Emerg Med, 2013

4AT

- Not CAM-based
- Fixed cognitive testing, observations
- Points based on answers, observations
- Add up points:
  - Delirium diagnosis: cutoff score
  - Delirium severity: sum of points

Bellelli et. al, Age Ageing. 2014

NEECHAM, NuDESC, DOS, etc.

- Not CAM-based
- Observation items based on routine care
  - Usually performed by nurses
- Add up points:
  - Delirium diagnosis: cutoff score
  - Delirium severity: sum of points
- Limited sensitivity/specificity
- Clinical implementation > research

Champagne et. al., The Gerontologist. 1987
Schuurmans et. al., Res Theory Nursing Pract. 2003

Delirium Severity

[Not previously covered]

DRS-98

- Rates 14 features of delirium
- Each feature: mild, moderate, severe
- Add up scores for each feature to get total severity score
- Usually performed after fairly detailed cognitive testing and patient interview
- Designed for clinicians—ratings require some sophistication

Trzepacz et. al., J Neuropsych Clin Neurosci. 2001

MDAS

- Rates 10 features of delirium
- Each feature: mild, moderate, severe
- Add up scores for each feature to get total severity score
- Usually performed after cognitive testing
  - Works particularly well with the MMSE
  - Severity scoring based on performance on testing, making it easier for non-clinicians than the DRS-98

Breitbart et. al., J Pain Symptom Management. 1997

DEL-S

- New instrument—published 2022

- Patient interview:
  - 14 Cognitive Items (Attention, Orientation)
  - 6 Patient Symptom Probes

- Observer Ratings: 10 items
  - Scored 0-25, (Mild 2-4, Mod 5-6, Severe 7+)
  - Also has a short form version, scored 0-13

- Demonstrated to predict clinical outcomes

Vasunilashorn et. al., JAMA Netw Open. 2022

Most severity measures

- Should <u>not</u> be used to diagnose delirium using a cutoff score
- Tend to "overweight" hyperactive sxs
  - Thus, interventions that convert delirium from hyperactive to hypoactive could be seen as reducing severity
  - DEL-S less so than others
- Treatment trials: important to examine other clinically relevant outcomes

Other Approaches

FAM-CAM

- Family members, not patients
- 4 Features in CAM diagnostic algorithm
- Each feature assessed by questions to family members observing the patient
- Can operationalize:
  - Delirium diagnosis: CAM diagnostic algorithm
  - No severity scale currently

Steis et. al., J Am Geriatr Soc. 2012

Chart Review Method

- Review: ALL notes from ALL disciplines
- ANY text relevant to MS change extracted
- Reviewed by at least 2 experts
- Delirium coded as:
  - unlikely, possible, probable, likely, definite
- Delirium: at least 2 "probable" or higher
- Disagreements: adjudication, 3rd reviewer
- Cannot score severity
- Combine with interviews to ↑ sensitivity
  - esp. picks up middle of the night cases

Inouye et. al., J Am Geriatr Soc. 2005

Administrative Data

- ICD-9, 10
  - Delirium has numerous codes, use all
  - Poor sensitivity,
  - Likely high specificity
  - Useful in situations where prevalence is low, high specificity is most important

Kim et. al., Pharmacoepidemiol Drug Safety. 2017

Case Studies

What measure(s) would you use?

Study 1

Phase I trial of a new toxic treatment for hyperactive delirium

2 Measures:

      Eligibility for trial

      Outcome measure for trial

Study 2

Post-marketing surveillance of a drug in over 10 million hospital medical records for possible association with delirium

Study 3

Randomized trial of 2 types of anesthesia approaches for hip fracture in 2000 patients over 50 sites, Delirium is one of several outcomes

Study 4

Mechanistic study of 100 participants at 2 sites incorporating MRI imaging, CSF, and plasma collection for biomarker studies

Study 5

Retrospective study in 300 patients to derive and validate a clinical prediction rule for delirium in patients admitted with CHF

Summary/Conclusions

- Delirium Measurement:
  - Choice of approach: depends on study
  - Different type of staff needed depending on what method will be used

- Key Elements:
  - Standardized assessment
  - Extensive training of assessors
  - Close oversight and quality control

Questions?