Abbreviated Delirium Screening Instruments: Plausible Tool to Improve Delirium Detection in Hospitalized Older Patients

Oberhaus J, Wang W, Mickle AM, et al. Evaluation of the 3-Minute Diagnostic Confusion Assessment Method for identification of postoperative delirium in older patients. JAMA Netw Open. 2021;4(12):e2137267. doi:10.1001/jamanetworkopen.2021.37267

Shenkin SD, Fox C, Godfrey M, et al. Delirium detection in older acute medical inpatients: a multicentre prospective comparative diagnostic test accuracy study of the 4AT and the confusion assessment method. BMC Med. 2019;17(1):138. doi:10.1186/s12916-019-1367-9

Study 1 Overview (Oberhaus et al)

Objective: To compare the 3-Minute Diagnostic Confusion Assessment Method (3D-CAM) to the long-form Confusion Assessment Method (CAM) in detecting postoperative delirium.

Design: Prospective concurrent comparison of 3D-CAM and CAM evaluations in a cohort of postoperative geriatric patients.

Setting and participants: Eligible participants were patients aged 60 years or older undergoing major elective surgery at Barnes Jewish Hospital (St. Louis, Missouri) who were enrolled in ongoing clinical trials (PODCAST, ENGAGES, SATISFY-SOS) between 2015 and 2018. Surgeries were at least 2 hours in length and required general anesthesia, planned extubation, and a minimum 2-day hospital stay. Investigators were extensively trained in administering 3D-CAM and CAM instruments. Participants were evaluated 2 hours after the end of anesthesia care on the day of surgery, then daily until follow-up was completed per clinical trial protocol or until the participant was determined by CAM to be nondelirious for 3 consecutive days. For each evaluation, both 3D-CAM and CAM assessors approached the participant together, but the evaluation was conducted such that the 3D-CAM assessor was masked to the additional questions ascertained by the long-form CAM assessment. The 3D-CAM or CAM assessor independently scored their respective assessments blinded to the results of the other assessor.

Main outcome measures: Participants were concurrently evaluated for postoperative delirium by both 3D-CAM and long-form CAM assessments. Comparisons between 3D-CAM and CAM scores were made using Cohen κ with repeated measures, generalized linear mixed-effects model, and Bland-Altman analysis.

Main results: Sixteen raters performed 471 concurrent 3D-CAM and CAM assessments in 299 participants (mean [SD] age, 69 [6.5] years). Of these participants, 152 (50.8%) were men, 263 (88.0%) were White, and 211 (70.6%) underwent noncardiac surgery. Both instruments showed good intraclass correlation (0.98 for 3D-CAM, 0.84 for CAM) with good overall agreement (Cohen κ = 0.71; 95% CI, 0.58-0.83). The mixed-effects model indicated a significant disagreement between the

3D-CAM and CAM assessments (estimated difference in fixed effect, –0.68; 95% CI, –1.32 to –0.05; $P = .04$). The Bland-Altman analysis showed that the probability of a delirium diagnosis with the 3D-CAM was more than twice that with the CAM (probability ratio, 2.78; 95% CI, 2.44-3.23).

Conclusion: The high degree of agreement between 3D-CAM and long-form CAM assessments suggests that the former may be a pragmatic and easy-to-administer clinical tool to screen for postoperative delirium in vulnerable older surgical patients.

Study 2 Overview (Shenkin et al)

Objective: To assess the accuracy of the 4 'A's Test (4AT) for delirium detection in the medical inpatient setting and to compare the 4AT to the CAM.

Design: Prospective randomized diagnostic test accuracy study.

Setting and participants: This study was conducted in emergency departments and acute medical wards at 3 UK sites (Edinburgh, Bradford, and Sheffield) and enrolled acute medical patients aged 70 years or older without acute life-threatening illnesses and/or coma. Assessors administering the delirium evaluation were nurses or graduate clinical research associates who underwent systematic training in delirium and delirium assessment. Additional training was provided to those administering the CAM but not to those administering the 4AT as the latter is designed to be administered without special training. First, all participants underwent a reference standard delirium assessment using *Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition)* (*DSM-IV*) criteria to derive a final definitive diagnosis of delirium via expert consensus (1 psychiatrist and 2 geriatricians). Then, the participants were randomized to either the 4AT or the comparator CAM group using computer-generated pseudo-random numbers, stratified by study site, with block allocation. All assessments were performed by pairs of independent assessors blinded to the results of the other assessment.

Main outcome measures: All participants were evaluated by the reference standard (*DSM-IV* criteria for delirium) and by either 4AT or CAM instruments for delirium. The accuracy of the 4AT instrument was evaluated by comparing its positive and negative predictive values, sensitivity, and specificity to the reference standard and analyzed via the area under the receiver operating characteristic curve. The diagnostic accuracy of 4AT, compared to the CAM, was evaluated by comparing positive and negative predictive values, sensitivity, and specificity using Fisher's exact test. The overall performance of 4AT and CAM was summarized using Youden's Index and the diagnostic odds ratio of sensitivity to specificity.

Results: All 843 individuals enrolled in the study were randomized and 785 were included in the analysis (23 withdrew, 3 lost contact, 32 indeterminate diagnosis, 2 missing outcome). Of the participants analyzed, the mean age was 81.4 [6.4] years, and 12.1% (95/785) had delirium by reference standard assessment, 14.3% (56/392) by 4AT, and 4.7% (18/384) by CAM. The 4AT group had an area under the receiver operating characteristic curve of 0.90 (95% CI, 0.84-0.96), a sensitivity of 76% (95% CI, 61%-87%), and a specificity of 94% (95% CI, 92%-97%). In comparison, the CAM group had a sensitivity of 40% (95% CI, 26%-57%) and a specificity of 100% (95% CI, 98%-100%).

Conclusions: The 4AT is a pragmatic screening test for delirium in a medical space that does not require special training to administer. The use of this instrument may help to improve delirium detection as a part of routine clinical care in hospitalized older adults.

Commentary

Delirium is an acute confusional state marked by fluctuating mental status, inattention, disorganized thinking, and altered level of consciousness. It is exceedingly common in older patients in both surgical and medical settings and is associated with increased morbidity, mortality, hospital length of stay, institutionalization, and health care costs. Delirium is frequently underdiagnosed in the hospitalized setting, perhaps due to a combination of its waxing and waning nature and a lack of pragmatic and easily

implementable screening tools that can be readily administered by clinicians and nonclinicians alike.[1] While the CAM is a well-validated instrument to diagnose delirium, it requires specific training in the rating of each of the cardinal features ascertained through a brief cognitive assessment and takes 5 to 10 minutes to complete. Taken together, given the high patient load for clinicians in the hospital setting, the validation and application of brief delirium screening instruments that can be reliably administered by nonphysicians and nonclinicians may enhance delirium detection in vulnerable patients and consequently improve their outcomes.

In Study 1, Oberhaus et al approach the challenge of underdiagnosing delirium in the postoperative setting by investigating whether the widely accepted long-form CAM and an abbreviated 3-minute version, the 3D-CAM, provide similar delirium detection in older surgical patients. The authors found that both instruments were reliable tests individually (high interrater reliability) and had good overall agreement. However, the 3D-CAM was more likely to yield a positive diagnosis of delirium compared to the long-form CAM, consistent with its purpose as a screening tool with a high sensitivity. It is important to emphasize that the 3D-CAM takes less time to administer, but also requires less extensive training and clinical knowledge than the long-form CAM. Therefore, this instrument meets the prerequisite of a brief screening test that can be rapidly administered by nonclinicians, and if affirmative, followed by a more extensive confirmatory test performed by a clinician. Limitations of this study include a lack of a reference standard structured interview conducted by a physician-rater to better determine the true diagnostic accuracy of both 3D-CAM and CAM assessments, and the use of convenience sampling at a single center, which reduces the generalizability of its findings.

In a similar vein, Shenkin et al in Study 2 attempt to evaluate the utility of the 4AT instrument in diagnosing delirium in older medical inpatients by testing the diagnostic accuracy of the 4AT against a reference standard (ie, *DSM-IV*–based evaluation by physicians) as well as comparing it to CAM. The 4AT takes less time (~2 minutes) and requires less knowledge and training to administer as compared to the CAM. The study showed that the abbreviated 4AT, compared to CAM, had a higher sensitivity (76% vs 40%) and lower specificity (94% vs 100%) in delirium detection. Thus, akin to the application of 3D-CAM in the postoperative setting, 4AT possesses key characteristics of a brief delirium screening test for older patients in the acute medical setting. In contrast to the Oberhaus et al study, a major strength of this study was the utilization of a reference standard that was validated by expert consensus. This allowed the 4AT and CAM assessments to be compared to a more objective standard, thereby directly testing their diagnostic performance in detecting delirium.

Application for Clinical Practice and System Implementation

The findings from both Study 1 and 2 suggest that using an abbreviated delirium instrument in both surgical and acute medical settings may provide a pragmatic and sensitive method to detect delirium in older patients. The brevity of administration of 3D-CAM (~3 minutes) and 4AT (~2 minutes), combined with their higher sensitivity for detecting delirium compared to CAM, make these instruments potentially effective rapid screening tests for delirium in hospitalized older patients. Importantly, the utilization of such instruments might be a feasible way to mitigate the issue of underdiagnosing delirium in the hospital.

Several additional aspects of these abbreviated delirium instruments increase their suitability for clinical application. Specifically, the 3D-CAM and 4AT require less extensive training and clinical knowledge to both administer and interpret the results than the CAM.[2] For instance, a multistage, multiday training for CAM is a key factor in maintaining its diagnostic accuracy.[3,4] In contrast, the 3D-CAM requires only a 1- to 2-hour training session, and the 4AT can be administered by a nonclinician without the need for instrument-specific training. Thus, implementation of these instruments can be particularly pragmatic in clinical settings in which the staff involved in delirium screening cannot undergo the substantial training required to administer CAM. Moreover, these abbreviated tests enable nonphysician care team members to assume the role of delirium screener in the hospital. Taken together, the adoption of these abbreviated instruments may facilitate brief screenings of delirium in older patients by caregivers who see them most often—nurses

and certified nursing assistants—thereby improving early detection and prevention of delirium-related complications in the hospital.

The feasibility of using abbreviated delirium screening instruments in the hospital setting raises a system implementation question—if these instruments are designed to be administered by those with limited to no training, could nonclinicians, such as hospital volunteers, effectively take on delirium screening roles in the hospital? If volunteers are able to take on this role, the integration of hospital volunteers into the clinical team can greatly expand the capacity for delirium screening in the hospital setting. Further research is warranted to validate the diagnostic accuracy of 3D-CAM and 4AT by nonclinician administrators in order to more broadly adopt this approach to delirium screening.

Practice Points

- Abbreviated delirium screening tools such as 3D-CAM and 4AT may be pragmatic instruments to improve delirium detection in surgical and hospitalized older patients, respectively.
- Further studies are warranted to validate the diagnostic accuracy of 3D-CAM and 4AT by nonclinician administrators in order to more broadly adopt this approach to delirium screening.

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Deprescribing in Older Adults in Community and Nursing Home Settings

Bayliss EA, Shetterly SM, Drace ML, et al. Deprescribing education vs usual care for patients with cognitive impairment and primary care clinicians: the OPTIMIZE Pragmatic Cluster Randomized Trial. JAMA Intern Med. 2022;182(5):534-542. doi:10.1001/jamainternmed.2022.0502

Gedde MH, Husebo BS, Mannseth J, et al. Less is more: the impact of deprescribing psychotropic drugs on behavioral and psychological symptoms and daily functioning in nursing home patients. Results from the cluster-randomized controlled COSMOS trial. Am J Geriatr Psychiatry. 2021;29(3):304-315. doi:10.1016/j.jagp.2020.07.004

Study 1 Overview (Bayliss et al)

Objective: To examine the effect of a deprescribing educational intervention on medication use in older adults with cognitive impairment.

Design: This was a pragmatic, cluster randomized trial conducted in 8 primary care clinics that are part of a nonprofit health care system.

Setting and participants: The primary care clinic populations ranged from 170 to 1125 patients per clinic. The primary care clinics were randomly assigned to intervention or control using a uniform distribution in blocks by clinic size. Eligibility criteria for participants at those practices included age 65 years or older; health plan enrollment at least 1 year prior to intervention; diagnosis of Alzheimer

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disease and related dementia (ADRD) or mild cognitive impairment (MCI) by *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision* code or from problem list; 1 or more chronic conditions from those in the Chronic Conditions Warehouse; and 5 or more long-term medications. Those who scheduled a visit at their primary care clinic in advance were eligible for the intervention. Primary care clinicians in intervention clinics were eligible to receive the clinician portion of the intervention. A total of 1433 participants were enrolled in the intervention group, and 1579 participants were enrolled in the control group.

Intervention: The intervention included 2 components: a patient and family component with materials mailed in advance of their primary care visits and a clinician component comprising monthly educational materials on deprescribing and notification in the electronic health record about visits with patient participants. The patient and family component consisted of a brochure titled "Managing Medication" and a questionnaire on attitudes toward deprescribing intended to educate patients and family about deprescribing. Clinicians at intervention clinics received an educational presentation at a monthly clinician meeting as well as tip sheets and a poster on deprescribing topics, and they also were notified of upcoming appointments with patients who received the patient component of the intervention. For the control group, patients and family did not receive any materials, and clinicians did not receive intervention materials or notification of participants enrolled in the trial. Usual care in both intervention and control groups included medication reconciliation and electronic health record alerts for potentially high-risk medications.

Main outcome measures: The primary outcomes of the study were the number of long-term medications per individual and the proportion of patients prescribed 1 or more potentially inappropriate medications. Outcome measurements were extracted from the electronic clinical data, and outcomes were assessed at 6 months, which involved comparing counts of medications at baseline with medications at 6 months. Long-term medications were defined as medications that are prescribed for 28 days or more based on pharmacy dispensing data. Potentially inappropriate medications (PIMs) were defined using the Beers list of medications to avoid in those with cognitive impairment and opioid medications. Analyses were conducted as intention to treat.

Main results: In the intervention group and control group, 56.2% and 54.4% of participants were women, and the mean age was 80.1 years (SD, 7.2) and 79.9 years (SD, 7.5), respectively. At baseline, the mean number of long-term medications was 7.0 (SD, 2.1) in the intervention group and 7.0 (SD, 2.2) in the control group. The proportion of patients taking any PIMs was 30.5% in the intervention group and 29.6% in the control group. At 6 months, the mean number of long-term medications was 6.4 in the intervention group and 6.5 in the control group, with an adjusted difference of –0.1 (95% CI, –0.2 to 0.04; $P = .14$); the proportion of patients with any PIMs was 17.8% in the intervention group and 20.9% in the control group, with an adjusted difference of –3.2% (95% CI, –6.2 to 0.4; $P = .08$). Preplanned analyses to examine subgroup differences for those with a higher number of medications (7+ vs 5 or 6 medications) did not find different effects of the intervention.

Conclusions: This educational intervention on deprescribing did not result in reductions in the number of medications or the use of PIMs in patients with cognitive impairment.

Study 2 Overview (Gedde et al)

Objective: To examine the effect of a deprescribing intervention (COSMOS) on medication use for nursing home residents.

Design: This was a randomized clinical trial.

Setting and participants: This trial was conducted in 67 units in 33 nursing homes in Norway. Participants were nursing home residents recruited from August 2014 to March 2015. Inclusion criteria included adults aged 65 years and older with at least 2 years of residency in nursing homes. Exclusion criteria included diagnosis of schizophrenia and

a life expectancy of 6 months or less. Participants were followed for 4 months; participants were considered lost to follow-up if they died or moved from the nursing home unit. The analyses were per protocol and did not include those lost to follow-up or those who did not undergo a medication review in the intervention group. A total of 217 and 211 residents were included in the intervention and control groups, respectively.

Intervention: The intervention contained 5 components: communication and advance care planning, systematic pain management, medication reviews with collegial mentoring, organization of activities adjusted to needs and preferences, and safety. For medication review, the nursing home physician reviewed medications together with a nurse and study physicians who provided mentoring. The medication review involved a structured process that used assessment tools for behavioral and psychological symptoms of dementia (BPSD), activities of daily living (ADL), pain, cognitive status, well-being and quality of life, and clinical metrics of blood pressure, pulse, and body mass index. The study utilized the START/STOPP criteria[1] for medication use in addition to a list of medications with anticholinergic properties for the medication review. In addition, drug interactions were documented through a drug interaction database; the team also incorporated patient wishes and concerns in the medication reviews. The nursing home physician made final decisions on medications. For the control group, nursing home residents received usual care without this intervention.

Main outcome measures: The primary outcome of the study was the mean change in the number of prescribed psychotropic medications, both regularly scheduled and total medications (which also included on-demand drugs) received at 4 months when compared to baseline. Psychotropic medications included antipsychotics, anxiolytics, hypnotics or sedatives, antidepressants, and antidementia drugs. Secondary outcomes included mean changes in BPSD using the Neuropsychiatric Inventory-Nursing home version (NPI-NH) and the Cornell Scale for Depression for Dementia (CSDD) and ADL using the Physical Self Maintenance Scale (PSMS).

Main results: In both the intervention and control groups, 76% of participants were women, and mean age was 86.3 years (SD, 7.95) in the intervention group and 86.6 years (SD, 7.21) in the control group. At baseline, the mean number of total medications was 10.9 (SD, 4.6) in the intervention group and 10.9 (SD, 4.7) in the control group, and the mean number of psychotropic medications was 2.2 (SD, 1.6) and 2.2 (SD, 1.7) in the intervention and control groups, respectively. At 4 months, the mean change from baseline of total psychotropic medications was –0.34 in the intervention group and 0.01 in the control group ($P < .001$), and the mean change of regularly scheduled psychotropic medications was –0.21 in the intervention group and 0.02 in the control group ($P < .001$). Measures of BPSD and depression did not differ between intervention and control groups, and ADL showed a small improvement in the intervention group.

Conclusion: This intervention reduced the use of psychotropic medications in nursing home residents without worsening BPSD or depression and may have yielded improvements in ADL.

Commentary

Polypharmacy is common among older adults, as many of them have multiple chronic conditions and often take multiple medications for managing them. Polypharmacy increases the risk of drug interactions and adverse effects from medications; older adults who are frail and/or who have cognitive impairment are especially at risk. Reducing medication use, especially medications likely to cause adverse effects such as those with anticholinergic properties, has the potential to yield beneficial effects while reducing the burden of taking medications. A large randomized trial found that a pharmacist-led education intervention can be effective in reducing PIM use in community-dwelling older adults,[2] and that targeting patient motivation and capacity to deprescribe could be effective.[3] This study by Bayliss and colleagues (Study 1), however, fell short of the effects seen in the earlier D-PRESCRIBE trial. One of the reasons for these findings may be that the clinician portion of the intervention was less intensive than that

used in the earlier trial; specifically, in the present study, clinicians were not provided with or expected to utilize tools for structured medication review or deprescribing. Although the intervention primes the patient and family for discussions around deprescribing through the use of a brochure and questionnaire, the clinician portion of the intervention was less structured. Another example of an effective intervention that provided a more structured deprescribing intervention beyond education of clinicians utilized electronic decision-support to assist with deprescribing.[4]

The findings from the Gedde et al study (Study 2) are comparable to those of prior studies in the nursing home population,[5] where participants are likely to take a large number of medications, including psychotropic medications, and are more likely to be frail. However, Gedde and colleagues employed a bundled intervention[6] that included other components besides medication review, and thus it is unclear whether the effect on ADL can be attributed to the deprescribing of medications alone. Gedde et al's finding that deprescribing can reduce the use of psychotropic medications while not leading to differences in behavioral and psychologic symptoms or depression is an important contribution to our knowledge about polypharmacy and deprescribing in older patients. Thus, nursing home residents, their families, and clinicians could expect that the deprescribing of psychotropic medications does not lead to worsening symptoms. Of note, the clinician portion of the intervention in the Gedde et al study was quite structured, and this structure may have contributed to the observed effects.

Applications for Clinical Practice and System Implementation

Both studies add to the literature on deprescribing and may offer options for researchers and clinicians who are considering potential components of an effective deprescribing intervention. Patient activation for deprescribing via the methods used in these 2 studies may help to prime patients for conversations about deprescribing; however, as shown by the Bayliss et al study, a more structured approach to clinical encounters may be needed when deprescribing, such as the use of tools in the electronic health record, in order to reduce the use of medication deemed unnecessary or potentially harmful. Further

studies should examine the effect of deprescribing on medication use, but perhaps even more importantly, how deprescribing impacts patient outcomes both in terms of risks and benefits.

Practice Points

- A more structured approach to clinical encounters (eg, the use of tools in the electronic health record) may be needed when deprescribing unnecessary or potentially harmful medications in older patients in community settings.
- In the nursing home setting, structured deprescribing intervention can reduce the use of psychotropic medications while not leading to differences in behavioral and psychologic symptoms or depression.

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