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Meeting the Challenges of Delirium Assessment across the Aging Spectrum

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Delirium is anything but simplistic. The ability for medical personnel to monitor for delirium across the continuum of human life requires consideration of the intricate neurobehavioral changes from infancy to late adulthood to the end of life. Acute brain dysfunction in these settings of ongoing physiologic and anatomic changes is a manifestation of the elaborate spectrum of neuroscience. It thus is remarkable that despite these challenges valid and reliable tools have been developed and successfully used for delirium monitoring. In fact, by any standards, many of these tools represent some of the most efficient and accurate tools in clinical practice. This accuracy has been accomplished by thoughtful researchers recognizing that delirium assessment requires a neurodevelopmental and behavioral approach in order to assess key delirium features within different populations. In other words, one tool does not fit all patients. Both adult and pediatric delirium screening tools, whether largely observational or interactive, have led to the successful monitoring of delirium in our most fragile patients, and have laid the foundation for further study of delirium epidemiology. Despite the significant accomplishment of researchers in creating developmentally unique delirium tools for use in these varied populations, the question of whether a singular approach to all of delirium monitoring has been proposed in this issue of Critical Care Medicine.

Schieveld and Zwietsen recommend a unified approach to delirium screening across the entire age span (i.e., using the same tool for infants, adolescents, adults, and the aged). Their rationale is based upon the “idea hypothesis” that there is a “common underlying mechanism of delirium” and the current Diagnostic and Statistical Manual of Mental Disorders (DSM) and International Classification of Diseases (ICD) criteria for delirium are “identical across

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ages.” They assume that delirium has essentially the same symptomatology and pathophysiology from infants up to the elderly. First, while delirium epidemiology is well established in older and critically-ill patients, there remains a dearth of information regarding the epidemiology of pediatric delirium. Only recently has the extremely high prevalence of delirium among critically ill infants and children been demonstrated. (1) Furthermore, pediatric specific risk factors and outcomes associated with delirium have not been well delineated, though a recent study reveals that patient factors such as developmental delay, duration of mechanical ventilation, and age are associated with delirium during critical illness. (2) Similarly, the underlying mechanism of pediatric delirium has yet to be fully realized and therefore many aspects of delirium management remain in the exploratory phase. These very important but undefined areas of delirium within the very young also remain poorly described in the elderly, particularly in patients with delirium superimposed on dementia. Second, delirium *phenomenology* and the disparities in delirium manifestations between pediatric and adult patients have been previously illustrated. In fact, the limitations of DSM criterion not addressing these important variations in development and age differences, within patient populations such as pediatrics and elderly with dementia, has been considered as a disadvantage to core criterion by Dr. Schieveld himself. (3) Sleep–wake cycle disturbances, impaired psychomotor activity, irritability, agitation, and lability in affect/mood are more common among pediatric patients with delirium. (4)(5) The need for pediatric specific delirium tools has been historically defended due to the more subtle neuropsychiatric symptoms such as inconsolability, reduced awareness of the caregiver or environment, purposeless actions, and autonomic dysregulation often observed in children. (3,5) DSM-5 criteria specifically focuses on the importance of determining a “change in cognition not better explained by a pre-existing, established or evolving neurocognitive disorder,” such as dementia. (6) In order to determine this, delirium tools will have to embrace the unique assessments required for inattention and cognition in these complex populations.

Schieveld and Zwielen suggest that “one comprehensive and simple screening tool for all ages would be highly useful and practical.” They advocate using observational delirium scales such as the Cornell Assessment of Pediatric Delirium (CAPD) (7) or the Delirium Observational Screening Scale (DOS) (8) to achieve this goal. They state that observational scales are less cumbersome to perform because they require less patient contact compared with more interactive delirium tools such as the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), the pediatric CAM-ICU (pCAM-ICU), and the preschool CAM-ICU (psCAM-ICU). (1, 9-12) While we are also advocates of observational delirium screening tools (including the Intensive Care Delirium Screening Checklist or ICDSC) (13), there are unique limitations to each one. The CAPD and DOS are heavily reliant upon observation and recognition of specific delirium symptoms over a clinical shift, these assessments can be operator-dependent and their diagnostic accuracy may vary depending on the rater’s clinical experience. (14) The use of these observational delirium scales will not absolve the rater from knowing age-specific and disease related neurobehaviors, especially in the pediatric age group. For example, the CAPD requires the clinician to refer to specific developmental anchor points within eight different age groups spanning newborn to 2 years of age, as it is generally accepted that an infant is not a toddler, nor an adolescent,

and so on. An anchor point is required as a reference for each of the 8 features of the CAPD, which then requires a clinician to score severity using ‘not at all,’ ‘just a little,’ ‘quite a bit,’ ‘very much,’ or ‘extremely’ for each feature. Furthermore, the CAPD asks whether or not a child is inconsolable, which may not be relevant to older children and adults. Likewise, the DOS scale assesses whether a patient “reacts slowly to instructions,” which will not apply to an infant or an older patient with end-stage dementia. The tool has to conform to the limitations of the patient for delirium assessment due to age related development or disease state. To create a “unified” approach to delirium assessment, anchor points for every age group and specific modifiers for each disease state, along with adaptations to the actual behavioral observations would need to be created. In essence, one tool becomes many.

We already have a common diagnostic language for delirium that takes into account and recognizes patient diversity. This diagnostic language is based upon the Confusion Assessment Method (CAM) algorithm, which is the most widely used delirium assessment and consists of four features: 1) acute alteration/fluctuation from baseline mental status, 2) inattention, 3) disorganized thinking, and 4) acute altered level of consciousness. (15) Delirium diagnosis (positive CAM) requires that both features 1 and 2 are present, with either a present feature 3 or 4. The original version of the CAM takes over 10 minutes to complete and is reliant upon subjective impression to determine the presence of each feature. (16) The CAM has since been modified to increase the ease of use and reduce the time spent with the patient (Table), while remaining highly valid and reliable. The CAM-ICU series incorporates brief and age/population specific objective tests with pre-specified cutoffs to determine the presence of inattention and disorganized systems/thinking. Schievelde and Zwieten describe these interactive tools as “cumbersome or time consuming”, but in reality, these assessments can in most patients be completed in less than 2 minutes. It is true that these instruments require the rater to interact with the patient, yet while this could be viewed as a negative by some, others see the increased patient interaction as an asset. In fact, many people have realized that engaging with the patient during delirium monitoring has brought them joy and fulfillment at a time in critical care medicine when modern technology and other time pressures draw us away from the patient’s bedside.

Finally, Schievelde continues with the argument that a unified approach will facilitate useful comparisons. Yet, even if a standardized delirium tool was used across populations, what comparisons can be made when taking into account such significant differences in neuropsychiatric development, co-morbid disease states, diagnoses, and management styles within different patient populations. Instead, it would be prudent to consider age as a covariate of delirium and control for this very important modifier when analyzing patient cohorts.

Rather than pursue a singular tool for measuring delirium, we believe the focus should be to inspire and empower clinicians to assess for delirium accurately in all patients of all ages with varied disease states, respecting that patient diversity across the aging spectrum requires individualized assessment. Most of the delirium tools, both objective and interactive, rally behind those known DSM features that are important and specific for delirium diagnosis. The variability in bedside tools really allows for the clinician to tailor patient interactions considering both age and disease state. Observation and interaction each

provide different pieces to the puzzle of a patient's neuropsychiatric health. Clinicians practice differently and need the opportunity to use delirium tools that fit their clinical routine. The goal for delirium assessment in the future, we believe, comes down to personalizing medicine as much as possible. To consider that engaging a patient becomes your strength and using your hands and voice to interact and observe patient reactions provides the ultimate delirium assessment. The excitement is that we use tools that allow us to connect to our patients and understand their mind while we are trying to heal their body.

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TableDelirium tools - Derivatives of the Confusion Assessment Method (CAM)^a.

CAM Derivative	Population	Inattention	Disorganized Thinking / Systems
CAM-ICU	Adult ICU	Vigilance A "Squeeze my hand every time you hear the letter 'A'." (SAVEAHAART)	Four simple yes/no questions and a command
Preschool CAM-ICU (psCAM-ICU)	Pediatric ICU 6 months –5 years	Picture Presentation Eye contact to series of 10 pictures	Sleep-wake cycle disturbance
Pediatric CAM-ICU (pCAM-ICU)	Pediatric ICU > 5 years of age	Vigilance A (ABADBADAAY)	Four simple yes/no questions and a command
Brief Confusion Assessment Method (b-CAM) (17)	Adult Emergency Department	Months of the year backwards	Four simple yes/no questions and a command
3D-CAM (18)	Adult Emergency Medical	Digit span 3/4 digits backwards. Months/days of the year/week backwards. Clinical evidence of inattention	Disorientation to year, day of the week, or place. Clinical evidence of disorganized thinking

^aEach of the above delirium assessment tools use the basic framework of the four feature algorithm of the Confusion Assessment Method (CAM). However, each tool is an adaptation and has been validated using brief, objective, and age-specific assessments to determine the presence or absence of inattention and disorganized thinking/systems in unique patient populations.