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Letter to the Editor

Comment on "Validity and Reliability of the DDS for Severity of Delirium in the ICU"

Timothy D. Girard,[1,] James C. Jackson,[1] and E. Wesley Ely[1,2]*

[1]Department of Medicine, Division of Allergy, Pulmonary, and Critical Care Medicine and Center for Health Services Research, Vanderbilt University School of Medicine, and [2]Veterans Affairs Tennessee Valley Geriatric Research, Education, and Clinical Center, Nashville, TN

***Correspondence to:**
Timothy Girard,
Division of Allergy, Pulmonary, and Critical Care Medicine, Center for Health Services Research, 6th Floor MCE 6100, Vanderbilt University School of Medicine, Nashville, TN 37232-8300.
E-mail: timothy.girard@vanderbilt.edu

Dear Editor,

We read with great interest the recent publication by Dr. Otter and colleagues describing the development and validation of the Delirium Detection Score (DDS) *(1)*. As the authors noted in their introduction, delirium occurs frequently in critically ill patients and its presence is associated with longer hospital stays, prolonged mechanical ventilation, and up to a threefold increase in the risk of death *(2)*. For these reasons, we agree with Otter and colleagues that routine monitoring for delirium is an essential component of the care provided in intensive care units (ICUs). However, we have several concerns with the conclusions made in this publication.

The authors state in the abstract that the DDS "demonstrated good validity with excellent sensitivity and specificity for delirium" *(1)*. When determining whether the results of a study evaluating a diagnostic test are valid, the first question to be answered is: "Was there an independent, blind comparison with a reference standard?" *(3,4)*. Unfortunately, the reference standard utilized by Otter and colleagues does not assess for delirium. Instead, the Sedation-Agitation Scale (SAS) does only what its name suggests—it is a "reliable and valid tool to describe sedation and agitation in ICU patients" *(5)*. In other words, the SAS—and therefore the DDS—has been validated to measure an abnormal *level* of consciousness rather than abnormal *content* of consciousness, an essential component of delirium. Additionally, by equating agitation with delirium, the DDS likely failed to identify a large portion of patients with delirium, as only 15% of patients with delirium demonstrate the hyperactive subtype *(6,7)*.

Traditionally, the reference standard diagnostic test for delirium has been the clinical criteria defined by the American Psychiatric Association in the Diagnostic and Stastical Manual of Mental Disorders (DSM-IV) *(8)*. Other reference standards appropriate for use when validating a new delirium assessment tool may include the Delirium Rating Scale (DRS) *(9)*, the Confusion Assessment Method (CAM) *(10)*, and the Confusion Assessment Method for the ICU (CAM-ICU) *(11,12)*, each of which were validated against the reference standard DSM criteria. In addition to using an inappropriate reference standard, the current study failed to utilize a blind comparison of the DDS and the reference standard *(3,4)*. Because the clinicians determining the DDS for each patient were aware of the SAS score (having determined it themselves), bias could have resulted in an overestimation of the accuracy of the DDS *(13)*.

A similar shortcoming calls into question the authors' conclusion that the DDS measures the severity of delirium. Although the current study does indeed show that the DDS is likely to rise with the SAS, there is no appropriate reference standard for severity. While there are ongoing conceptual questions regarding delirium severity, such standards could include mortality and long-term cognitive outcomes. Although a DDS greater than 7 is statistically associated with more ICU days and more ventilator days than a

DDS less than or equal to 7, it is unclear whether this is caused by early deaths in the low DDS group or early discharges from the ICU.

Finally, we would like to clarify the readers' understanding of the CAM-ICU as Otter and colleagues have outlined several criticisms of this delirium assessment tool. The CAM-ICU was developed and validated in two separate cohorts of mechanically ventilated, critically ill patients. As noted by Otter et al., the first cohort included 38 patients and 293 repeated observations *(11)*. The second cohort included 111 consecutive patients and a total of 471 daily paired evaluations *(12)*. In these studies the instrument was performed by critical care study nurses. Subsequently, it has been shown that the CAM-ICU can be implemented on a large scale by bedside critical care nurses. In a study involving 711 patients evaluated by 64 nurses during 4163 days of ICU care, the overall agreement (κ) between bedside nurses and reference raters was excellent (0.92 and 0.75 at two separate hospitals) *(14)*.

In conclusion, we believe the DDS is a promising tool that can be utilized to assess agitation in ICU patients. However, additional studies utilizing the DSM-IV as the reference standard are needed before it can be recommended for use to diagnose delirium or measure its severity.

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