# Rapid Assessment of Delirium in Mechanically Ventilated Patients

*Ely EW, Inouye SK, Bernard GR, et al. Delirium in mechanically ventilated patients: validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). JAMA 2001;286:2703–10.*

## Study Overview

Objective. To develop a valid, reliable, and efficient instrument for diagnosing delirium in mechanically ventilated patients.

Design. Prospective cohort study.

Setting and participants. All participants were drawn from the medical and coronary intensive care units (ICUs) of an academic medical center. 96 of 158 mechanically ventilated patients consecutively admitted to the ICU were enrolled in the study after the following patients were excluded: patients with preexisting neurologic impairment or psychosis; patients or surrogates refusing to participate; patients who were extubated or had died prior to evaluation; or patients remaining comatose throughout the investigation.

Main outcome measures. Delirium was assessed daily in all participants during their ICU stay using the Confusion Assessment Method (CAM-ICU). The technique requires the following for a diagnosis of delirium: (1) an acute or fluctuating course of mental status change, (2) inattention, and (3) disorganized thinking or altered level of consciousness. To determine the sensitivity and specifity of the CAM-ICU, nurses' ratings were compared to gold standard evaluations made by expert clinicians using DSM-IV criteria. Interrater reliability was calculated for the 2 study nurses administering the test.

Main results. Using the CAM-ICU, the 2 study nurses diagnosed delirium with a sensitivity of 100% and 93% and specificity of 98% and 100%, respectively. Interrater reliability was high ($\kappa = 0.96$). The mean (SD) time of administering the test was 2 (1) minutes. No corresponding mean time for diagnosis using the gold standard method was reported. Delirium occurred in 83.3% of all study patients for a mean (SD) of 2.4 (1.6) days.

Conclusion. Diagnosing delirium in ICU patients is accurate, reliable, and efficient using the CAM-ICU method.

## Commentary

Delirium remains an infrequently diagnosed and undertreated condition in hospitalized patients, despite many studies documenting its negative impact on mortality and length of stay. Among mechanically ventilated patients, delirium is thought to be difficult to diagnose or distinguish from other causes of altered cognition because of the frequent need for chemical sedation and the high disease severity. A reliable and efficient diagnosis of delirium may allow clinicians to alter risk factors for delirium, such as the degree of sedation or social isolation, to improve outcomes in the ICU.

Thus, the validation of the CAM-ICU by Ely et al has several important implications. First, a diagnosis of delirium no longer requires a specially trained physician: critical care nurses are adequately qualified to administer the test. Second, a detailed history and physical are not required, and the test can be administered in 2 minutes at the bedside. Finally, the method can distinguish delirium from stupor, coma, or dementia. The excellent test characteristics demonstrated in the study allow discovery of risk factors for delirium and testing of new interventions without laborious and expensive daily clinical evaluation.

Few weaknesses were apparent in the study. The comparison of sensitivity and specificity between subgroups showed no difference but may reflect that the study was likely underpowered to perform such a comparison. The prevalence of delirium was high (83%) in this patient population, and the specificity may be reduced in a population with a markedly lower prevalence of delirium. Finally, validating the method in surgical and pediatric ICU patients would allow interventions that target the entire intensive care population.

## Applications for Clinical Practice

Delirium is a frequent complication of mechanically ventilated patients in the ICU. It can be rapidly identified in this population using the CAM-ICU.

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