# Validation of the Confusion Assessment Method – Intensive Care Unit in the Post Anesthesia Care Unit

Nikki Townsend, 2012, U of A COM - Phoenix

Collaborators: Michael J. Murray, MD, PhD; Clint Humpherys, MD; Yu-Hui Chang, PhD; Doug Coursin, MD; Joshua D Sterns, MD; John B Leslie, MD; Catherine F. Murray, RN; Sarang Kosuik

## ABSTRACT

Introduction: Patients who develop delirium while hospitalized are increasingly recognized as at risk for the development of long term cognitive impairment. We became interested in the contribution of delirium to the development of post-operative cognitive dysfunction (POCD) when we found that patients at Mayo Clinic in Arizona, compared to patients at the Mayo facilities in Rochester, MN, were 17 times more likely to be treated for delirium in the Post Anesthesia Care Unit (PACU). However, before we could examine the relationship between delirium and POCD we needed to validate a tool we could use to quickly assess the presence of delirium in patients emerging from anesthesia in the PACU.

Hypothesis: The Confusion Assessment Method in the Intensive Care Unit (CAM-ICU) can be used in the PACU to identify patients with delirium.

Methods: Patients 65 years of age or greater were identified on the day of surgery with the CAM-ICU being used preoperatively to determine study eligibility and postoperatively, one hour after the patient was admitted to the PACU, to assess for delirium.

Results: A168 patients were assessed pre- and post-operatively with the CAM-ICU, and post-operatively by a nursing assessment for delirium. The nurse at the bedside identified 5 of 168 patients as delirious (prevalence of 2.98%). The CAM-ICU was positive for delirium in 11 of 168 (6.55%). The CAM-ICU had a sensitivity of 60% (3/5) and a specificity of 95% (155/163).

Conclusion: In this investigation, the CAM-ICU was easy to use and had a high specificity for identifying post-operative delirium.

## INTRODUCTION

Patients who develop delirium during their hospital course are increasingly recognized as at risk for the development of long term cognitive impairment. Over approximately the last 10 years there is also increasing awareness that anesthesia per se contributes to the development of cognitive dysfunction – so called POCD. It is important to note that delirium is a separate entity compared to POCD, characterized as an acute confusional state with fluctuations in attention and consciousness. It is imperative to recognize and treat delirium in postoperative patients, as its development is linked to prolonged hospitalization, functional status and cognitive decline post-discharge, increased cost and increased mortality. In order to continue studies of this problem, we needed a tool we could use in the PACU by which we could quickly assess for the presence of delirium. Delirium is also a problem in ICU patients, and the tool used most frequently in ICUs is the CAM-ICU. We used this test in several patients in the PACU. The test is readily accepted by patients, easy to use, and if we validate it we will be able to determine the incidence of delirium in our PACU patient population.

## METHODS

The Mayo Clinic Institutional Review Board (IRB) approval was sought and obtained prior to the collection of any data. From March to July, 2011, patients greater than age 65 years of age who had a general anesthetic for a surgical procedure were identified the day of surgery and were asked in the pre-anesthetic care area if they would be willing to participate in the study. From this surgical group, we documented the procedure performed knowing that certain procedures have a higher incidence of cognitive impairment. The CAM-ICU was used both pre and postoperatively, first to determine study eligibility then as an assessment for delirium. The CAM-ICU took approximately 1-2 minutes to administer, with up to three minutes in the most delirious participant. Those patients who scored less than 7 on a scale of 1-10 preoperatively were not followed further. There were no changes in the patient's anesthetic or surgical plan. One hour after the patient was admitted to the PACU the CAM-ICU was re-administered, after we had asked the patient's nurse whether or not he or she thought that the patient was delirious. Patients with a score of less than 7 on the postoperative CAM-ICU were diagnosed as having delirium.

| | CAM-ICU: Delirium | CAM-ICU: No delirium | |
|---|---|---|---|
| RN assessment: Delirium | 3 | 2 | 3/5 = 60.0% sensitivity |
| RN assessment: No delirium | 8 | 155 | 155/163 = 95.1% specificity |

Table 1: Sensitivity/Specificity of CAM-ICU

| Procedure | Total | RN assessment: Delirium | CAM-ICU: Delirium |
|---|---|---|---|
| Urologic | 47 | 1 | |
| Orthopedic | 34 | | 2 |
| Other | 25 | 1 | |
| Abdominal | 21 | 2 | 5 |
| Head/Neck | 12 | | 2 |
| Back/Neuro | 11 | | |
| Vascular | 9 | | |
| Gynecological | 6 | 1 | 2 |
| Thoracic | 3 | | |
| Totals | 168 | 5 | 11 |

Table 2: Delirium rate by procedure type

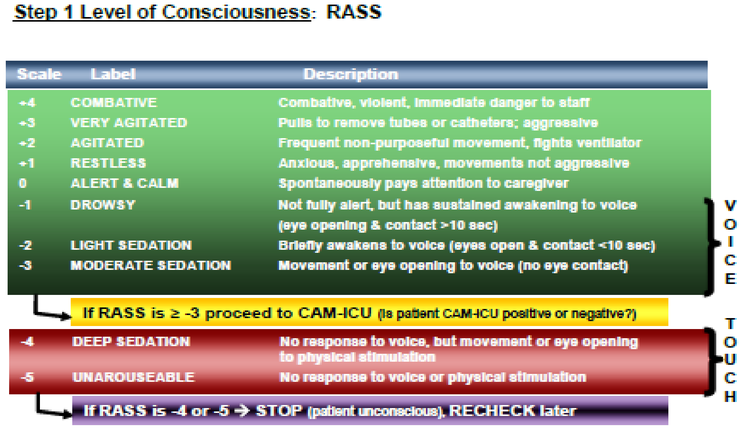


Figure 1: CAM-ICU

## RESULTS

A total of 168 patients were assessed pre- and post-operatively with the CAM-ICU, and post-operatively by a nursing assessment for delirium. Assuming the nursing assessment is the gold standard, a PACU delirium prevalence of 2.98% (5/168) was determined. However, the CAM-ICU was positive for delirium in 6.55% (11/168). There were no patients who withdrew from the study.

Again compared to our gold standard, the CAM-ICU portrayed a sensitivity of 60% (3/5) and a specificity of 95% (155/163).

The mean age of the study population was 75 ± 7 (SD) with the majority of participants having urologic or orthopedic procedures. Other surgical categories included abdominal, vascular, thoracic, gynecological, head and neck, back and neurological, and "other."

## DISCUSSION

According to previous studies, postoperative delirium can affect 10–70% of patients older than 65 years undergoing surgery depending on the investigated group of patients, the type of surgery and the delirium assessment tool used. With a measured incidence of 2.98% in our PACU (based on the standard RN assessment) or a rate of 6.55% (based on the CAM-ICU), we suspect our results are lower secondary to excluding the more critically ill patients admitted to the ICU and delaying reassessment until the patient was one hour post-operation allowing for further metabolism and excretion of anesthetic medications. Although we report a lower incidence compared to other studies, this value is concerning, representing an alarmingly high rate of delirium in an otherwise healthy population of patients.

Currently, there is no validated method by which to assess delirium in the PACU. In this investigation, the CAM-ICU was shown to be a valid, easy to use delirium assessment tool with a specificity of 95.1% (155/163) and a sensitivity of 60.0% (3/5), again based on the standard, which was the RN's assessment. Given the lack of identification of the hypoactive phase of delirium during the RN assessment, it is no surprise the CAM-ICU assessment resulted in a higher incidence of delirium. This is also likely the reason for the relatively low sensitivity of the CAM-ICU. To resolve this issue in future studies, we would likely need the assessment of a delirium expert to use as the gold standard.

## CONCLUSION

It is well known that patients who develop delirium can have long-term cognitive impairment and higher mortality rates, which emphasize the importance of allowing for a quick and accurate diagnosis. In conclusion, we have found that the CAM-ICU can be adapted to the PACU allowing for a rapid diagnosis and determination of the incidence of delirium in PACU patients.