Large-scale implementation of sedation and delirium monitoring in the intensive care unit: A report from two medical centers*

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Objective: **To implement sedation and delirium monitoring via a process-improvement project in accordance with Society of Critical Care Medicine guidelines and to evaluate the challenges of modifying intensive care unit (ICU) organizational practice styles.**

Design: **Prospective observational cohort study.**

Setting: **The medical ICUs at two institutions: the Vanderbilt University Medical Center (VUMC) and a community Veterans Affairs hospital (York-VA).**

Subjects: **Seven hundred eleven patients admitted to the medical ICUs for >24 hrs and followed over 4,163 days during a 21-month study period.**

Interventions: **Unit-wide nursing documentation was changed to accommodate a sedation scale (Richmond Agitation-Sedation Scale) and delirium instrument (Confusion Assessment Method for the ICU). A 20-min introductory in-service was performed for all ICU nurses, followed by graded, staged educational interventions at regular intervals. Data were collected daily for compliance, and randomly 40% of nurses each day were chosen for accuracy spot-checks by reference raters. An implementation survey questionnaire was distributed at 6 months.**

Measurements and Main Results: **The implementation project involved 64 nurses (40 at VUMC and 24 at York-VA). Sedation and delirium monitoring data were recorded for 711 patients (614 at VUMC and 97 at York-VA). Compliance with the Richmond Agitation-Sedation Scale was 94.4% (21,931 of 23,220) at VUMC and 99.7% (5,387 of 5,403) at York-VA. Compliance with the Confusion Assessment Method for the ICU was 90% (7,323 of 8,166) at VUMC and 84% (1,571 of 1,871) at York-VA. The Confusion Assessment Method for the ICU was performed more often than requested on 63% of shifts (5,146 of 8,166) at VUMC and on 8% (151 of 1871) of shifts at York-VA. Overall weighted-κ between bedside nurses and references raters for the Richmond Agitation-Sedation Scale were 0.89 (95% confidence interval, 0.88 to 0.92) at VUMC and 0.77 (95% confidence interval, 0.72 to 0.83) at York-VA. Overall agreement (κ) between bedside nurses and reference raters using the Confusion Assessment Method for the ICU was 0.92 (95% confidence interval, 0.90–0.94) at VUMC and 0.75 (95% confidence interval, 0.68–0.81) at York-VA. The two most-often-cited barriers to implementation were physician buy-in and time.**

Conclusions: **With minimal training, the compliance of bedside nurses using sedation and delirium instruments was excellent. Agreement of data from bedside nurses and a reference-standard rater was very high for both the sedation scale and the delirium assessment over the duration of this process-improvement project. (Crit Care Med 2005; 33:1199–1205)**

KEY WORDS: delirium; sedation; implementation; mechanical ventilation; protocols; monitoring; intensive care; nursing; quality improvement; process improvement; clinical practice guidelines

The 2002 clinical practice guidelines of the Society of Critical Care Medicine for the sustained use of analgesics and sedatives are geared toward the maintenance of optimal comfort for critically ill patients by focusing on three central components: pain, anxiety, and delirium (1). To accomplish the first two components of this goal (i.e., to alleviate pain and anxiety), a grade A recommendation is made that clinicians use protocols to titrate medications to defined patient-specific end points (for example, pain-free, calm, and alert). This recommendation is based on evidence from excellent outcome investigations (2–4) and is best accomplished by means of validated pain assessment (5) and agitation/sedation (6–10) scales. Unfortunately, only one third of 30 American universities, comprising the University Hospital Consortium, reported using sedation protocols and scales in 2002 (11).

The third component of these guidelines, delirium, is a form of organ dysfunction experienced by 60% to 80% of

***See also p. 1421.**

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mechanically ventilated patients (12–14) that remains unrecognized in 66% to 84% of patients, regardless of the care setting (15–18). Intensive care unit (ICU) delirium is an independent predictor of death, length of stay, cost, and cognitive outcome at discharge (19–23). Given the high incidence of this disorder and its negative associated outcomes, it is not surprising that it has become a key area of focus for quality improvement. In fact, the Society of Critical Care Medicine guidelines recommended that critically ill patients be regularly monitored for the emergence and/or persistence of delirium (a grade B recommendation) (1). There are a few tools for detecting delirium in the ICU: the Confusion Assessment Method for the ICU (CAM-ICU) (14, 24), the Intensive Care Delirium Screening Checklist (25), the Cognitive Test for Delirium (26), and the Abbreviated Cognitive Test for Delirium (27).

The value of monitoring for delirium is questioned by some, primarily because of the lack of clear direction regarding the prevention and treatment of ICU delirium (28, 29). Others may initially be concerned with feasibility. A recent survey of the medical community's beliefs and practices regarding delirium revealed that although the majority of respondents (92%) reported delirium to be a serious problem in the ICU, fewer than 10% routinely screened for delirium with a validated clinical tool (30). Can and will ICU personnel take on such tasks routinely and with a high degree of reliability? As with the development and implementation of mechanical ventilation weaning protocols (31, 32), the feasibility of large-scale implementation incorporating agitation/sedation scales and delirium monitoring instruments must be studied and reported.

The purpose of this study was to determine the feasibility of implementing agitation/sedation and delirium monitoring via a process-improvement project and to evaluate challenges of modifying ICU nurses' practice styles. We prospectively investigated the large-scale implementation of the Society of Critical Care Medicine guidelines for monitoring sedation and delirium in two different hospital systems. During this investigation, we tracked compliance closely and measured agreement with expert reference standard raters. In addition, we surveyed the nurses to determine key features that might support and detract from successful and sustained implementation.

METHODS

Monitoring Instruments

In accordance with the Society of Critical Care Medicine guidelines, we chose to implement well-validated instruments for monitoring sedation (Richmond Agitation-Sedation Scale [RASS]) and delirium (CAM-ICU). These tools were specifically chosen because of feasibility, high specificity and sensitivity, reproducibility, and our team's familiarity with them. The RASS is a ten-point scale with high interrater reliability with scores for agitation and sedation that takes <20 secs to complete (9, 10). The CAM-ICU is a quick, valid, reliable serial assessment tool based on the Diagnostic Statistical Manual IV definition of delirium (33) and designed for bedside clinicians to monitor delirium in ventilated and nonventilated ICU patients (14, 24). The CAM-ICU has four features: feature 1 is change in mental status from baseline or fluctuating course; feature 2 is inattention; feature 3 is disorganized thinking; and feature 4 is altered level of consciousness. Delirium is present when both feature 1 and feature 2 are present, along with either feature 3 or feature 4. The presence or absence of each of these features is determined through objective evaluations incorporating aspects that are already performed in critical care assessments. Educational resources (e.g., training manuals, frequently asked questions, videos, worksheets, and pocket cards) for both the RASS and CAM-ICU can be downloaded at www.ICUdelirium.org.

Nurses and Patients

This two-site prospective process-improvement study took place in the medical ICUs (MICUs) of Vanderbilt University Medical Center (VUMC), in Nashville, TN, and the Veterans Administration Tennessee Valley Healthcare System–York Campus (York-VA), in Murfreesboro, TN. VUMC is a 658-bed tertiary-care, university-based hospital, where data were collected on all consecutively admitted adults who were patients in the MICU for >24 hrs between January 5, 2002, and January 10, 2003. The York-VA is a 322-bed community-based hospital where data were collected on all consecutively admitted adults who were MICU patients for >24 hrs between April 12, 2003, and September 29, 2003. All 40 nurses working in the 14-bed VUMC MICU and all 24 nurses working in the 10-bed York-VA MICU during the study interval were involved. Each center's institutional review board approved this process-improvement project and waived consent for both patients and staff involved. The units at both institutions chose to include all of their patients in this process-improvement project and thus did *not* exclude patients with dementia, primary neurologic disease, or baseline psychiatric illnesses.

Process-Improvement Project Design

The process-improvement project was approached in a systematic fashion via identification of essential characteristics of effective implementation processes (34–37): baseline assessment; utilization of existing personnel (e.g., nurse educators, unit managers, charge nurses); education in the form of lectures, posters, and one-on-one reminders; and evaluation of compliance and impact. A four-phase implementation process incorporated a planning phase, baseline phase, education phase, and maintenance phase. At VUMC the planning phase was 1 month, the baseline phase was 1 month, the education phase was 1 wk, and the maintenance phase was 12 months. At York-VA the planning phase was 2.5 months, the baseline phase was 2 wks, the education phase was 1 wk, and the maintenance phase was 6 months.

Planning Phase. No formal standard or consistent method for monitoring sedation or delirium was in place at either institution. After a thorough review of the literature and Society of Critical Care Medicine guidelines, the unit leaders (i.e., nurse manager and medical director) decided to incorporate both the RASS and CAM-ICU as part of the standard nursing clinical assessments. The VUMC MICU had been evaluating instruments for several months and was familiar with the RASS and CAM-ICU through prior research efforts (10, 14, 24), but it had not been educated about either instrument. The nurse managers at both institutions (JF and SH) embraced the projects and became the chief driving forces behind the projects. Unit leaders chose the minimum standard for RASS documentation to be every 4 hrs (3 times per 12-hr shift) and that for CAM-ICU documentation to be at least once per 12-hr shift. The RASS score was recorded as a positive or negative number ranging from $+4$ to -5. The presence or absence of delirium was recorded via the CAM-ICU as *yes*, *no*, or *unable to assess* (for those unable to respond to verbal stimulation).

Baseline Phase. From November 25, 2001, to December 17, 2001, at VUMC and from March 3, 2003, to March 18, 2003, at York-VA, the study staff rounded in the ICU, performed RASS and CAM-ICU assessments on each patient, and immediately asked the bedside nurse to rate the patient's sedation with the RASS and to rate the patient as delirious or not. The bedside staff was blinded to the study staff's ratings and was not given any education on sedation or delirium assessment.

Education Phase. Once the baseline phase was completed, both institutions modified their documentation systems to incorporate the RASS and CAM-ICU into the neurologic

assessment of the hourly flow sheet below vital signs. VUMC used a paper documentation system, whereas York-VA used a computerized charting system and inserted both scales into the hourly data record portion, which included a drop-down choice box for each scale. Neither system contained a prompt to remind the nurses to perform the scales. Education began with display of a 3 × 3-foot poster containing bulleted concepts about sedation and delirium. A 20-min unit-wide in-service was then attended by all nurses; this included in-depth descriptions of the RASS and CAM-ICU (utilizing bulletin boards, handouts, laminated pocket cards, and case studies), followed by bedside demonstration rounds.

Maintenance Phase. Graded, staged educational interventions occurred at regular time points (at VUMC, 1, 3, 6, and 9 months; at York-VA, 2, 4, and 6 months). These educational interventions (partially described above) were held at unit-wide staff meetings involving the display of posters with compliance and accuracy data, as well as a question-and-answer session. In addition, descriptions of the scales were incorporated into nurse preceptor packets and the scales were added to the orientation competency checklists. Accuracy spot-checks were performed on a random 40% of bedside nurses' assessments from both day and night shifts by an expert reference-standard rater from the study staff. After the reference-standard rater and the bedside nurse had recorded their RASS and CAM-ICU assessments, the expert would then share his or her findings from the RASS/CAM-ICU assessment with the bedside nurse and take the opportunity to educate the nurse regarding any mistakes or misconceptions. Near the end of the maintenance phase at VUMC, several staff members volunteered to undergo special training and take over a role as "expert rater" for spot-checks in order to provide an added method of sustaining the process-improvement project. These raters chose to take a month off without spot-checks to observe performance before re-instituting the spot-checks. Last, an implementation survey was created by the research staff and unit leaders and was distributed after 6 months to all 64 MICU nurses at both sites.

Statistical Analysis

Means and standard deviations were calculated for normally distributed baseline characteristics, while medians and interquartile ranges were calculated for nonnormally distributed variables and proportions for categorical variables. Median values were imputed for missing laboratory values used in the calculation of APACHE II (Acute Physiology and Chronic Health Evaluation II) scores. The numbers are presented for each study site. Compliance was calculated by adding the number of documented assessments per shift (up to the minimally acceptable amount) for all shifts and then dividing by the total minimum standard for that scale (i.e., at least 1 RASS assessment every 4 hrs and at least 1 CAM-ICU assessment every 12 hrs). Although all RASS and CAM-ICU assessments were tracked in the database, extra checks above the minimum rating were not credited in compliance calculations and thus were not allowed to mathematically inflate compliance. For example, 12 RASS or CAM-ICU checks on one shift could not make up for the number being lower than the minimally acceptable number on other shifts. Compliance for both the RASS and CAM-ICU were calculated by shift on a unit-wide basis (not per individual nurse) and were reported at monthly intervals during the implementation phase for each study site. Weighted-κ statistics and 95% confidence intervals (CIs) were used to evaluate agreement of RASS assessments between the study staff and bedside nurses, whereas simple κ statistics and 95% CIs were used to analyze agreement of CAM-ICU assessments between the study staff and bedside nurses. For the nurse survey results, proportions of patients who answered in each category were calculated. SAS software (8.0.2, SAS Institute, Cary, NC) was used to conduct all statistical analyses.

RESULTS

The implementation project involved a total of 64 nurses, including 40 nurses at VUMC with a mean ± SD of 7.4 ± 9.1 years of nursing experience and 24 nurses at York-VA with 13.9 ± 8.7 years of experience.

Baseline Data

At VUMC there were 270 baseline observations made. Agreement (weighted-κ) between raters of RASS was 0.69 (95% CI, 0.63–0.75), and κ for the delirium assessment was 0.20 (95% CI, 0.13–0.27). At York-VA, a total of 70 baseline observations were made and the weighted-κ between raters of the RASS was 0.71 (95% CI, −0.61 to 0.82), whereas agreement (κ) for the delirium assessment was 0.03 (95% CI, −0.08 to 0.15).

Implementation Data

Compliance data were collected on 711 patients, including 614 at VUMC and 97 at York-VA followed for 4,163 days during a 21-month study period (Table 1). Of the 614 VUMC patients, 44 (7.2%) were persistently comatose, 397 (64.7%) were delirious at some point during their ICU stay, and 173 (28.2%) were never delirious in the ICU. Of the 97 York-VA patients, 7 (7.2%) were persistently comatose, 40 (41.2%) were delirious at some point during their ICU stay, 46 (47.4%) were never delirious in the ICU, and 4 (4.1%) had missing evaluation data. The monthly compliance rates for both the RASS and CAM-ICU at both institutions are displayed in Figure 1. Compliance (3 times per 12-hr shift) for the RASS was 94.4% (21,931 of 23,220) at VUMC and 99.7% (5,387 of 5,403) at York-VA. Compliance (once per 12-hr shift) for the CAM-ICU was 90% (7,323 of 8,166) at VUMC and 84% (1,571 of 1,871) at York-VA. On 63% of shifts (5,146 of 8,166) at VUMC, the CAM-ICU was performed more often than the minimum requirement. At York-VA, the CAM-ICU was performed more often than required on 8% (151) of 1,871 shifts.

The reference standard agreement data obtained through random spot-checks were collected for 377 patients at VUMC and 131 patients at York-VA. The monthly trends in the agreement for the RASS and CAM-ICU for both institutions are displayed in Figure 2. Overall weighted-κ between raters of the RASS was 0.89 (95% CI, 0.88–0.92) at VUMC and 0.77 (95% CI, 0.72–0.83) at York-VA. Overall agreement (κ) between raters of the CAM-ICU was 0.92 (95% CI, 0.90–0.94) at VUMC and 0.75 (95% CI, 0.68–0.81) at York-VA.

Nurses' 6-Month Perspective on Implementation Survey

A total of 38 (95%) of 40 nurses at VUMC and 17 (70.8%) of 24 at York-VA completed the implementation survey questionnaire. The combined responses for all 55 nurses can be found in Table 2. The nurses reported a high degree of comfort and satisfaction with the use of both instruments, an improved ability of the team to reach consensus on a target sedation level and to administer sedation to that particular patient-specific end point, a greater understanding of delirium, and an improved organization of their overall neurologic assessment of ICU patients. The nurses were presented a list of barriers (time, confidence in performing the CAM-ICU, physicians [residents, fellows, and attendings], resources to answer questions/assist, lack of feedback on performance, knowledge support by leadership staff, and nurses) and were asked to check all that applied to this implementation project. The VUMC nurses checked a total of 56 barriers (note that some nurses marked more than one variable and others marked none). The barriers marked most

Table 1. Compliance data set: Patients' characteristics and clinical outcomes

Baseline Variable	VUMC: 3,490 ICU Days n = 614	York-VA: 673 ICU Days n = 97
Age, mean (±SD), yrs	52.5 (17.5)	65.9 (12.5)
<65, n (%)	462 (75.2)	50 (51.5)
≥65, n (%)	152 (24.8)	47 (48.5)
Gender, %		
Male	50.3	99
Female	49.7	1
Race, %		
White	81.7	84.5
Black	17.1	15.5
Asian or other	1.2	0
Mechanically ventilated, n (%)	351 (57.2)	20 (20.1)
APACHE II,[a] mean (±SD)	20.3 (9.1)	16.0 (6.9)
APACHE II[a] for mechanically ventilated patients only, mean (±SD)	23.2 (9.1)	25.5 (7.3)
Admission diagnosis,[b] n (%)		
ARDS/sepsis/multiple organ failure	46 (7)	11 (9)
Pulmonary	264 (40)	32 (25)
CHF	12 (1)	8 (6)
Cardiac	30 (4)	35 (28)
Renal	33 (5)	2 (2)
Metabolic	93 (14)	18 (14)
Neurologic	42 (6)	4 (3)
Gastrointestinal	91 (13)	10 (8)
Cancer	37 (6)	3 (2)
Surgical management	3 (0.4)	0 (0)
Other	16 (2)	4 (3)
Outcomes[c]		
Delirium prevalence in ventilated patients, %	88	79
Delirium prevalence in nonventilated patients, %	48	40
Delirium prevalence in alert or minimally lethargic patients, %	32	20
RASS score for ventilated patients, median (IQR)	−2 (−4, 0)	−1 (−3, 0)
RASS score for nonventilated patients, median (IQR)	0 (−1, 0)	0 (0, 0)
ICU length of stay, days, median (IQR)	3.1 (1.9–6.4)	3.3 (1.8–6.7)
Hospital length of stay, days, median (IQR)	8.3 (3.9–16.8)	8.0 (4.1–19.2)
In-hospital death, n (%)	143 (23.3)	13 (13.4)

VUMC, Vanderbilt University Medical Center; ICU, intensive care unit; York-VA, Veterans Administration Tennessee Valley Healthcare System–York; ARDS, acute respiratory distress syndrome; CHF, congestive heart failure; RASS, Richmond Agitation-Sedation Scale; IQR, interquartile range.

[a]APACHE II (Acute Physiology and Chronic Health Evaluation II) (46) is a severity-of-illness scoring system, and these data were calculated on the basis of the most abnormal parameters during the first 24 hrs following admission to the ICU. APACHE II scores range from 0 (best) to 71 (worst); [b]the admission diagnoses were recorded by the patients' medical team as the diagnoses most representative of the reason for ICU admission. Patients were sometimes given more than one admission diagnosis by the medical team resulting in column totals over 100%; [c]delirium rates after excluding patients in persistent coma who could never be assessed for delirium due to their profound brain dysfunction.

often, in order of frequency, were time (32%; 18 of 56); attendings, fellows, or residents (21.4%; 15 of 56); and confidence performing CAM-ICU (17.9%; 10 of 56). At York-VA a total of 15 barriers were checked. The VA nurses reported the same top three barriers: time (26.7%; 4 of 15); attendings, fellows, or residents (26.7%; 4 of 15); and confidence performing CAM-ICU (26.7%; 4 of 15).

DISCUSSION

This study has demonstrated the feasibility of large-scale implementation of newly validated tools to monitor the level of sedation and to detect delirium in ICU patients. Nursing compliance was excellent at both institutions during the combined 18 months of study, although it was slightly higher at the university hospital than at the more rural VA hospital. Likewise, agreement rates between the reference standard experts and bedside nurses were high for both instruments. Such data are especially important for the delirium assessments, since they have not traditionally been part of the ICU environment. Within the first month of implementation of the CAM-ICU, agreement between the bedside nurses and the reference standard raters for delirium assessment at VUMC and York-VA increased from 0.20 and 0.03 to 0.64 and 0.87, respectively. The survey data from this report revealed that nurses felt the tools provided a more comprehensive patient assessment and improved communication with the rest of the healthcare team. Quite unlike most circumstances in which more is asked of a healthcare provider, the RASS and the CAM-ICU were performed and charted up to 63% more often than required.

The process-improvement framework presented in this project was simple and flexible enough to be adjusted to the needs of the two institutions. A key feature of this framework was the incorporation of feedback both on an individual level, via the random spot-checking, and at the unit level, via bimonthly reports. This allowed timely identification of both individual and administrative obstacles and the opportunity to address them in a prompt fashion (e.g., clarification of the scales, education on the topics). The 6-month implementation survey was helpful as a tool to identify barriers and educational needs. For example, physician buy-in was seen consistently as a problem that needed addressing. Residents and attendings are now participating in in-services during rounds at the beginning of each month. The survey also helped us realize that fewer than half of the nurses could provide a written definition of delirium. Such foci have been incorporated into ongoing educational sessions.

This report also reveals some information on sustaining process-improvement projects. There was overall high compliance in the study at both institutions that generally improved over time. However, compliance is influenced by the presence of observers, and 1 month after a deliberate break in spot-checking near the end of the 12-month observation period at VUMC (see Methods), there was a small but unexpected dip in compliance for both instruments. While the compliance stayed above 80% and accuracy remained at $\kappa > 0.90$, this dip indicated to us that some mode of accountability such as point-of-use reminders was necessary to sustain full compliance.

It is important to comment on several other strengths and limitations of this investigation. Although it is a limitation to have data from only two MICUs, the

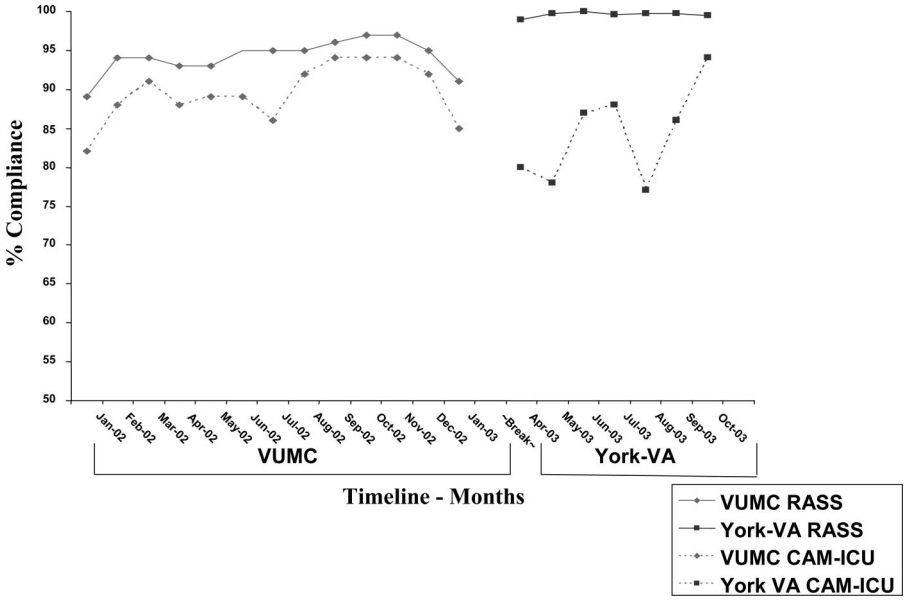

Figure 1. Compliance data. This line graph shows compliance of the medical intensive care unit (MICU) with the agitation/sedation scale (Richmond Agitation-Sedation Scale, or *RASS*) and with delirium monitoring (Confusion Assessment Method for the Intensive Care Unit, or *CAM-ICU*). Data are for all 40 MICU nurses at the university-based hospital (Vanderbilt University Medical Center, or *VUMC*) over 12 months and all 24 MICU nurses at the community-based Veterans Affairs hospital (*York-VA*) over 6 months.

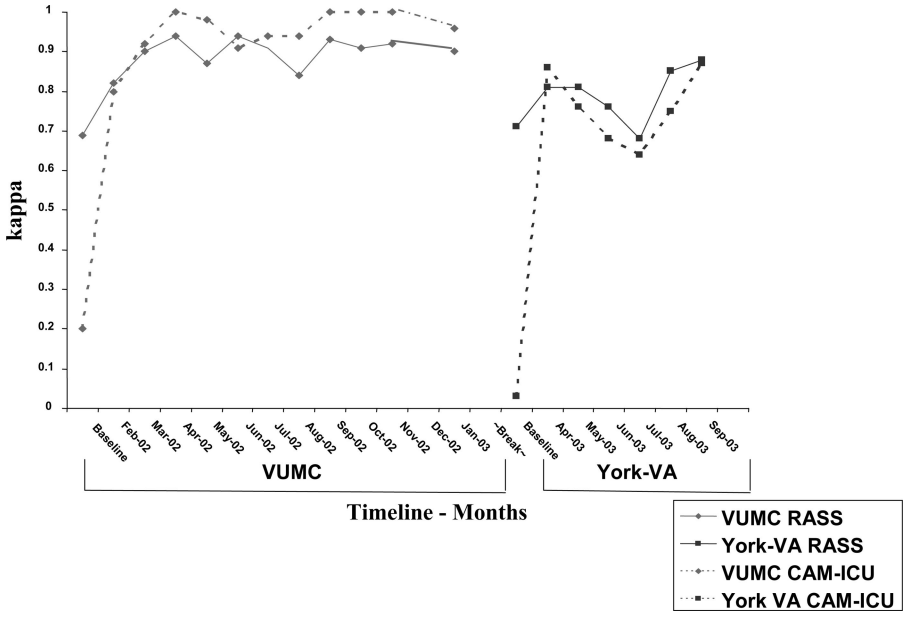

Figure 2. Agreement data. This line graph shows agreement between bedside medical intensive care unit (MICU) nurses and expert reference-standard raters using an agitation/sedation scale (Richmond Agitation-Sedation Scale, or *RASS*) and a delirium tool (Confusion Assessment Method for the Intensive Care Unit, or *CAM-ICU*). Data are for all 40 MICU nurses at the university-based hospital (Vanderbilt University Medical Center, or *VUMC*) over 12 months and all 24 MICU nurses at the community-based Veterans Affairs hospital (*York-VA*) over 6 months. The baseline values noted on the x-axis were obtained during a preimplementation phase to allow comparison with data obtained in subsequent months following educational in-services and hands-on feedback sessions geared to improve the quality of the bedside nurses' performance.

strengths are linked to the varied hospital settings and the inclusion of all nurses in both ICUs. The study involved 64 nurses from two institutions who cared for >700 patients for >4,000 ICU days with >28,000 RASS assessments and >10,000 CAM-ICU assessments. The two participating sites represent diverse critical care settings (large university medical center vs. a smaller community VA hospital). Future work in surgical ICUs would add to the generalizability of the success noted in this report. In another effort to improve generalizability, we did not exclude patients with dementia, primary neurologic disease, or baseline psychiatric illness. However, this could be considered a limitation in that these diagnoses could theoretically confound the diagnosis of delirium. We consider it a limitation of our study design that doctors were not trained and monitored during this process, and physician involvement should be incorporated in future studies. Nevertheless, it is remarkable how high the compliance rates were in the absence of active physician involvement, which may have served to reinforce the uniquely important role of the acute care nurse in the cognitive assessment of critically ill patients. An unanticipated but repeatedly perceived benefit was the help of delirium assessments in discussions regarding the ability to obtain informed consent and with end-of-life planning. Indeed, nurses reported that some patients were unexpectedly found to be overtly delirious at a time when they had just signed a consent form for nonemergent procedures. We are not suggesting the CAM-ICU as a tool for competency but are merely pointing out, as recently noted by Davis et al. (38), that instruments such as the CAM-ICU might help improve the appropriateness of the consent process for critically ill patients.

Agreement of data from bedside nurses and a reference-standard rater was very high for both the sedation scale and the delirium assessment over the duration of this process-improvement project.

Future work needs to focus on the next and most challenging aspect of this process-improvement project: whether clinical outcomes will improve through coupling monitoring with interventions.

Table 2. Survey results from 55 bedside intensive care unit nurses

Survey Item	n	Agree/Strongly Agree, %	Neither Agree nor Disagree, %	Disagree/Strongly Disagree, %
I understand what delirium is	55	94.5	3.6	1.8
My knowledge base about delirium has increased since using the CAM-ICU	55	80	18.2	1.8
If asked on the spot, I can give a definition for delirium	54	48.1	27.8	24.1
The CAM-ICU is a useful tool	55	70.9	23.6	5.5
The RASS levels for agitation (+1 to +4) are clinically relevant and easy to score	55	81.8	16.4	1.8
The CAM-ICU is easy to administer	55	67.3	18.2	14.5
I feel confident in administering the CAM-ICU	55	70.9	20.2	9.1
It makes sense clinically that the RASS assessment begins with *verbal* stimulation (−1 to −3) and then moves to *physical* stimulation (−4 to −5)	53	88.7	11.3	0
Monitoring for delirium has helped me to perform a more comprehensive patient assessment	55	65.5	25.5	9.1
The RASS allows the healthcare team to communicate better during rounds about the patient's level of sedation	54	72.2	22.2	5.96
The CAM-ICU has improved the organization of my neurological assessment	55	60	27.3	12.7
The physicians value the CAM-ICU data	53	32.1	35.8	31.1
The RASS has improved our ability to administer sedation at a particular "patient-specific" target level	55	61.8	34.5	3.6
The use of the RASS provides a team consensus for target-level sedation	55	72.7	23.6	3.6

CAM-ICU, Confusion Assessment Method for the intensive care unit; RASS, Richmond Agitation-Sedation Scale.

Data shown are combined results for surveys at the Vanderbilt University Medical Center and Veterans Administration Tennessee Valley Healthcare System—York, which were completed 6 months following the start of implementation. Overall survey response rate was 55 of 64 nurses (86%).

Merely detecting delirium will not change clinical outcomes, yet the medical team's awareness of this organ dysfunction could herald an unsuspected nosocomial infection or the need to alter a medication, or it could prompt a number of other nonpharmacologic steps to help reverse this process (39, 40). It was neither the purpose nor the expectation of this study to modify clinical management or outcomes of delirium; the intent was to document the feasibility of successfully monitoring sedation/agitation and delirium by means of a simple implementation design. Future investigators and clinical ICU teams can now be assured of their ability to monitor patients' brain function (e.g., arousal and delirium) with very high compliance and agreement.

Recently some have suggested that delirium monitoring in the ICU should be halted until appropriate treatments are identified (28, 29). This recommendation appears to be related to the concern that busy ICU nurses would not embrace the instrument readily without proven treatments for delirium. In contrast to this sentiment, the current study suggests that nurses found the bedside assessment of delirium helpful and felt that awareness of brain dysfunction improved the care they delivered, even in the absence of abundant evidence-based delirium prevention and treatment options (39, 40). The alternative to monitoring for delirium is to persist with monitoring current status, in which an estimated 60% to 80% of occurrences of delirium are missed (41–46). Because symptoms of ICU delirium are largely hypoactive (45) and present in up to half of awake and mildly lethargic patients (21), anything short of actively looking for delirium results in this organ dysfunction being invisible to the clinical team.

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