

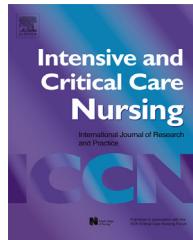


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ORIGINAL ARTICLE

Delirium among critically ill adults: Evaluation of the psychometric properties of the Italian 'Confusion Assessment Method for the Intensive Care Unit'^{☆,☆☆}

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KEYWORDS

Delirium;
Clinical assessment
tools;

Summary

Objectives: To determine the psychometric properties of the Italian version of the Confusion
Assessment Method for the Intensive Care Unit (CAM-ICU), a clinical assessment tool to detect
delirium among Intensive Care Unit patients.

Design: Validation study.

[☆] The study has already been presented (as an abstract) at 25th Annual Congress of the European Society of Intensive Care Medicine (ESICM), Lisbon, Portugal, October 13–17, 2012.

^{☆☆} The study was performed at Azienda Ospedaliero-Universitaria Santa Maria della Misericordia, Udine, Italy.

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Intensive care units;
Cognitive impairment;
Critical care;
Neurological monitoring

Research methodology: Fifty-seven patients admitted to three medical and surgical Intensive Care Units were recruited. During the study interval two trained examiners performed independent delirium assessment by the CAM-ICU for a maximum of four times per patient.

Main outcome measures: Interrater reliability and internal consistency of the tool, which were measured using Cohen's κ and Cronbach's α coefficients respectively.

Findings: Seventy-two paired evaluations were collected. The 35% of the studied cohort tested positive for delirium. The Italian version of the CAM-ICU demonstrated a substantial interrater reliability ($\kappa = 0.76$, $p < 0.0001$) and a very good internal consistency ($\alpha = 0.87$, 95% confidence interval: 0.81–0.91).

Conclusion: The Italian CAM-ICU was found to be a viable instrument by which to approach a standardised monitoring of delirium among Italian speaking ICU patients. The use of such tools may facilitate ICU physicians and nurses in detecting delirium, thus improving both quality and safety of care.

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Implications for Clinical Practice

- The Italian version of the CAM-ICU demonstrated to be a reliable, practical, and time-saving tool for delirium detection among ICU patients.
- Clinical assessment tools such as the CAM-ICU can help healthcare professionals to avoid the underdiagnosis of delirium, improving ICU patients' quality of care.
- Using a same valid assessment tool available in multiple languages promotes the international debate, encouraging healthcare professionals to share research findings.

Introduction

Delirium is an acute brain dysfunction, which frequently occurs in critically ill patients with a prevalence as high as 80% in some reports (Ely et al., 2001a,b; Pun and Ely, 2007). The occurrence of delirium is a significant predictor of adverse outcomes such as self-extubation and removal of catheters (Dubois et al., 2001), longer Intensive Care Unit (ICU) and hospital stay (Ely et al., 2001c; Ouimet et al., 2007a; Shehabi et al., 2010), increased costs (Milbrandt et al., 2004), higher six-month and one-year mortality (Ely et al., 2004; Lin et al., 2004; Pisani et al., 2009), and long term cognitive impairment (Girard et al., 2010; MacLullich et al., 2009; van den Boogaard et al., 2012).

Delirium is missed by clinical personnel 75% of the time when a formal delirium assessment is not performed using validated instruments (Spronk et al., 2009; Van Eijk et al., 2009). Different available tools have been studied and used in the daily ICU practice such as the Confusion Assessment Method for the ICU (CAM-ICU), Delirium Detection Score, Intensive Care Delirium Screening Checklist (ICDSC), Cognitive Test for Delirium, and Neelon and Champagne Confusion Scale (Devlin et al., 2007). The most well validated and reliable delirium detection tools are the CAM-ICU (Ely et al., 2001a) and ICDSC (Bergeron et al., 2001), which have been recently recommended by the American College of Critical Care Medicine in the Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium (Barr et al., 2013).

The CAM-ICU is a valid, brief screening tool to detect delirium in the ICU setting both in ventilated and non-ventilated patients (Ely et al., 2001b). It has been widely studied (Gusmao-Flores et al., 2012), can be easily administered by non-psychiatrist clinicians after a minimal training, and takes only few minutes (Vasilevskis et al., 2011). These excellent features led several researchers to translate the CAM-ICU in several languages (visit www.icudelirium.org for more information) and to validate nine translated versions of the tool (Table 1). The CAM-ICU has also been translated into Italian (Fig. 1; also available on www.sedaicu.it, reproduced with permission) but a validation study is currently missing.

Objectives

This study was carried out to evaluate the psychometric properties of the Italian translation of the CAM-ICU, in order to implement its standardised use in the Italian ICU setting.

Methods

Ethics

The study was designed according to the current ethical standards set forth in the Helsinki Declaration of 1975. The Institutional Review Board of the local Hospital approved the study design, and written informed consent was obtained

from patients or their relatives, if the patients were temporarily unable to decide for themselves.

Setting

The study took place in three different medical and surgical ICUs, including a total of 28 beds, during a one-month period in 2012.

Both ventilated and non-ventilated patients aged 18 or older who were admitted to the three ICUs during the study interval were enrolled. Patients' demographics, admission diagnosis and Sequential Organ Failure Assessment (SOFA) Score (Ferreira et al., 2001) were collected or calculated from medical records on the day of the enrollment. Patients were excluded a priori if a diagnosis of dementia/psychosis had been previously established, if non-Italian speaking, if unwilling to participate, or if their discharge from the ICU had been already scheduled. Patients with acute stroke were also included since the CAM-ICU has been proven to have high validity and reliability even in this subset of patients (Mitasova et al., 2012).

Each included patient was monitored until ICU discharge, and data regarding the duration of mechanical ventilation and the overall ICU length of stay were collected. Since non-invasive mechanical ventilation (NIMV) was often part of the ventilator weaning techniques, the time elapsed in invasive and non-invasive ventilation was counted as a single time interval.

Translation procedures

Permissions were obtained from the authors of both the original and the Italian version of the CAM-ICU. These authors joined the present study and significantly contributed to its design and review. The original CAM-ICU had been previously translated into Italian according to the 'Principles of Good Practice' suggested by Wild et al. (2005) for the Translation and Cultural Adaptation Study Group, so that it reflected as closely as possible the content of the English version. The key points of these Guidelines focus on the translation of the instrument from the original language, its back translation, and a review of contents. The same Guidelines had been

previously followed by all the Authors listed in Table 1 (with the exception of Chuang et al., 2007) for their translation of the tool.

Delirium assessment

The CAM-ICU presents a two-step approach (Ely et al., 2001b). Level of consciousness (arousal) is first evaluated with the Richmond Agitation Sedation Scale [RASS] (Sessler et al., 2002), a 10 point scale ranging from -5 (no response to voice or physical stimulation) to +4 (overtly combative, violent, immediate danger for staff), with a score of 0 denoting a calm and alert patient. Comatose patients (RASS -5 or -4) cannot be assessed for delirium. Patients with a RASS score of -3 or higher (-2 to +4) can be assessed by the CAM-ICU, which comprises four features. To be diagnosed as delirious, one needs to show an acute change or fluctuation in mental status (Feature 1), accompanied by inattention (Feature 2), and either altered level of consciousness (Feature 3) or disorganized thinking (Feature 4).

Data collection

Two trained examiners (examiner 1: a qualified critical care nurse with more than 20 years of clinical experience; examiner 2: a senior student in Nursing at the time of the study) enrolled newly admitted patients each morning, and performed Monday to Friday independent delirium assessments using the Italian version of the CAM-ICU. Prior to the beginning of the study the examiners received a formal training on delirium among ICU patients and its assessment by the tool. A structured meeting was then arranged weekly in order to discuss potential issues related to the assessments and to improve their standardisation. To limit potential bias related to changes in patients' conditions, the blinded paired assessments were performed within a maximum time interval of 4 hours between 11 AM and 7 PM. To be evaluated by the CAM-ICU the patient had to be able to follow simple commands when aroused: this approach was decided upon a priori to avoid stupor being mischaracterised as delirium by the tool, which would have potentially falsely elevated its reliability (Ely et al., 2001b). Both the examiners assessed each included patient once per day and no more than five times during his ICU stay, starting from the first non-comatose evaluation of his/her mental status. Time required to complete the CAM-ICU was measured during 82 assessments collected by both nurses.

Table 1 Validated non-English versions of the CAM-ICU.

Language	Year of publication	Authors
Swedish	2007	Larsson et al.
Chinese	2007	Chuang et al.
Dutch	2009	Vreeswijk et al.
German	2010	Guenther et al.
Spanish	2010	Tobar et al.; Toro et al.
Korean	2011	Heo et al.
Portuguese	2011	Gusmao-Flores et al.
Czech	2012	Mitasova et al.
Greek	2012	Adamis et al.

Nine validated versions of the CAM-ICU are currently available from the literature. Their translation moved from the original English version of the tool, firstly developed by Ely et al. (2001a).

Data analysis

In keeping with previous studies, incident delirium was defined as the first positive CAM-ICU assessment following a period of normal mental status (i.e. free from delirium), while prevalent delirium was defined as a positive CAM-ICU assessment during the first non-comatose mental status evaluation (Pandharipande et al., 2007; Peterson et al., 2006). The RASS scores associated to each delirium assessment were used to determine the motoric subtype of delirium (Pandharipande et al., 2007; Peterson et al., 2006). Purely hyperactive delirium was determined to

CAM-ICU: Scheda di lavoro

Punto 1: Alterazione Acuta o Fluttuazione dello Stato Mentale	Punteggio	Segna se presente
Il paziente si presenta in modo diverso dal suo stato mentale di base? OPPURE Il paziente ha presentato fluttuazioni dello stato mentale nelle ultime 24 ore come evidenziato da una variazione in una scala di sedazione (i.e., RASS), di stato di coscienza (GCS), o in un precedente assessment sul delirium?	Se almeno una risposta è SI →	<input type="checkbox"/>
Punto 2: Disattenzione		
Test 'Lettere' (in alternativa consulta il manuale per il test ' Immagini ') Indicazioni. Dire al paziente: "Sto per leggerle una serie di 10 lettere. Mi stringa la mano quando dico la lettera A". Leggere le lettere dalla seguente lista con un tono di voce normale e costante ad intervalli di 3 secondi. S A V E A H A A R T	Numero di errori > 2 →	<input type="checkbox"/>
Viene contato un errore quando il paziente non stringe la mano sulla lettera "A", o quando la stringe in risposta alle altre lettere		
Punto 3: Alterato Livello di Coscienza		
Il paziente è agitato, sedato o incosciente?	RASS ≠ 0 →	<input type="checkbox"/>
Punto 4: Pensiero Disorganizzato		
Domande a cui si può rispondere solo Sì/No , come ad esempio: 1. Un sasso galleggia nell'acqua? 2. Ci sono pesci nel mare? 3. Un chilo pesa più di due chili? 4. Si può usare il martello per piantare un chiodo? Errore: quando il paziente risponde in maniera scorretta alla domanda. Ordine semplice 5. Dire al paziente: "Mi mostri queste dita" (mostrare 2 dita); "Ora faccia lo stesso con l'altra mano" (senza mostrarle) se il paziente non riesce a muovere entrambe le braccia dire: "Aggiunga un altro dito" Errore: quando il paziente non è in grado di completare l'intero esercizio.	Numero totale di errori > 1 →	<input type="checkbox"/>

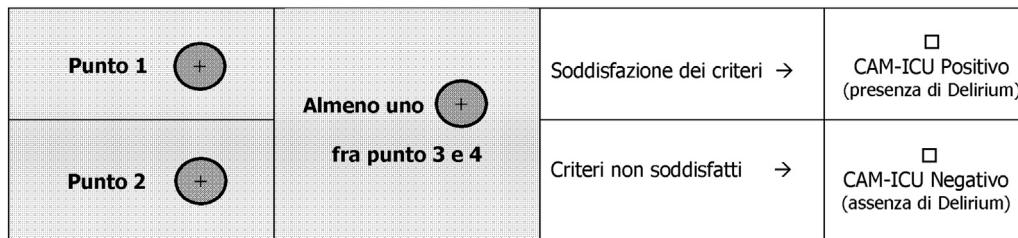


Figure 1 The Italian CAM-ICU Worksheet. In Feature 2, the original sequence of Letters ('SAVEAHAART') was kept, but is possible to use other Letter sequences easier to remember in Italian (i.e. 'LARANCIATA' or 'CASABLANCA'). Despite in Feature 3 the level of consciousness is determined by RASS score, other sedation scales can be used. Visit www.icudelirium.org or www.sedaicu.it for further information.

be present when RASS scores were positive (i.e. +1 to +4) during all the assessments. Purely hypoactive delirium was determined to be present only when neutral or negative RASS scores (i.e. 0 to -5) were recorded. To conclude, the mixed motoric subtype was determined to be

present when both positive and negative RASS scores were recorded.

Differences concerning demographics and baseline characteristics between patients with and without delirium were analysed with Student's *t* test or the Mann-Whitney test

Table 2 Baseline characteristics of included patients.

Demographics	All (n = 57)	Delirium (n = 20)	No delirium (n = 37)	p-Value
Male gender	36 (63.1%)	15 (75.0%)	21 (56.7%)	.251
Age (years)	67.9 (13.3)	69 (11.7)	67.4 (14.2)	.669
Mechanical ventilation at enrollment	47 (82.5%)	17 (85.0%)	30 (81.0%)	>.999
SOFA score	7 [5.0–10.0]	8 [5.5–11.7]	6 [5.0–8.7]	.095
Type of patient				
Medical	28 (49.1%)	6 (30.0%)	22 (59.5%)	.052
Surgical	23 (40.3%)	10 (50.0%)	13 (35.1%)	.396
Trauma	6 (10.5%)	4 (20.0%)	2 (5.4%)	.169
Main reason for ICU admission				
Respiratory failure	15 (26.3%)	3 (15.0%)	12 (32.4%)	.213
Cardiovascular problems	8 (14.0%)	2 (10.0%)	6 (16.2%)	.699
Neurological problems	3 (5.2%)	0 (0.0%)	3 (8.1%)	.544
Acute abdomen	8 (14.0%)	3 (15.0%)	5 (13.5%)	>.999
Sepsis	1 (1.7%)	0 (0.0%)	1 (2.7%)	>.999
Neurosurgical procedures	5 (8.7%)	2 (10.0%)	3 (8.1%)	>.999
Abdominal surgery	5 (8.7%)	2 (10.0%)	3 (8.1%)	>.999
Lung surgery	1 (1.7%)	1 (5.0%)	0 (0.0%)	.351
Vascular surgery	1 (1.7%)	1 (5.0%)	0 (0.0%)	.351
Other surgery	4 (7.0%)	2 (10.0%)	2 (5.4%)	.606
Multiple trauma	5 (8.7%)	3 (15.0%)	2 (5.4%)	.332
Traumatic brain injury	1 (1.7%)	1 (5.0%)	0 (0.0%)	.351
Mechanical ventilation duration (hours)	168.4 (177.0)	241.2 (188.7)	122.9 (155.5)	.0176
ICU length of stay (hours)	200 (169.5)	263 (130.5)	165 (179.7)	.0377

The distribution of gender shows number and percentage of male patients. Age, mechanical ventilation duration and ICU length of stay are given as means and standard deviation, and were compared using Student's *t* test. SOFA (Sequential Organ Failure Assessment) scores are given as median and interquartile range and were compared with Mann–Whitney *U* test. The remaining variables are given as proportions and were compared using Fisher's exact test.

when appropriate. Proportions were compared using Fisher's exact test.

To determine reliability of the Italian CAM-ICU, the ratings of the two examiners were compared using Cohen's κ coefficient. For this purpose, each pair of evaluations had to be rigorously collected within the established time interval of four hours. Internal consistency of the tool was determined by calculating Cronbach's α coefficient on the assessments collected by examiner 1.

Since our institution lacked a reference standard rater for regularly assessing the presence of delirium using the diagnostic reference standard, i.e. the DSM-IV criteria (American Psychiatric Association, 2000), the tool's sensitivity and specificity could not be evaluated. For this same reason, the sample size calculation that we had previously developed from Guenther et al. (2010) analysis in consideration of similar expected parameters (a minimum acceptable sensitivity of 75%; an expected delirium prevalence of 40%; a confidence interval [CI] of 95%) was not considered. However, the predetermined minimum number of 50 patients was exceeded.

Patients' characteristics were analysed with GraphPad Prism 5.04 (© 2010 GraphPad Software Inc., San Diego, CA, USA). Cohen's κ and Cronbach's α analysis were performed using SPSS 17.0 (© SPSS Inc., Chicago, IL, USA). For each analysis, a *p*-value of <0.05 was considered statistically significant.

Results

Patients' characteristics

Of 109 patients screened during the one-month study period, 29 met the a priori exclusion criteria and 80 were included. Twenty-three of these patients were also excluded because they deceased ($n=10$) or were discharged ($n=7$) before the first assessment, or remained comatose throughout the whole study period ($n=6$). The final sample size was consequently composed of 57 patients (Table 2). Demographics and baseline characteristics showed that the mean (SD) age of the cohort was 67.9 (13.3) years. Most of the included patients were male (63.1%) and received mechanical ventilation at the time of enrollment (82.5%). The majority had been admitted to the ICU because of a medical condition (49.1%), most commonly an acute respiratory failure (26.3%). Surgical and trauma patients represented 40.3% and 10.5% of the cohort respectively. A median SOFA Score of 7 (IQR 5–10) points demonstrated how the studied population was composed both from critically ill and sub-critically ill patients.

Delirium epidemiology

A total of 234 independent delirium assessments were performed by the two raters. According to the Italian CAM-ICU

Table 3 Interrater reliability of the Italian CAM-ICU.

CAM-ICU items	Each pair of assessments (n = 72)		Pairs of assessments collected within 60' (n = 40)	
	κ	p-Value	κ	p-Value
1 – Acute onset or fluctuating course	0.91	<.0001	0.95	<.0001
2 – Inattention	0.72	<.0001	0.85	<.0001
3 – Altered level of consciousness	0.69	<.0001	0.80	<.0001
4 – Disorganized thinking	0.70	<.0001	0.90	<.0001
Overall interrater reliability	0.63	<.0001	0.76	<.0001

The table shows how the strength of agreement between the two raters increased when the paired assessments were collected within a time interval of 60 minutes. The reported p-values are unilateral.

20 of 57 patients developed delirium at least once during their ICU stay, so that in the studied cohort delirium had a prevalence of 35%. Moreover, 8 of these patients developed delirium after a period of normal mental status thus identifying an incidence of 14%. Among patients with delirium, the purely hypoactive form was the most frequent ($n=12$; 60%), followed by the mixed subtype ($n=7$; 35%). Only one patient developed the purely hyperactive form (5%).

Psychometric properties of the Italian CAM-ICU

The two raters collected 78 paired assessments within the established time interval of four hours, but six paired evaluations were excluded because the patients had undergone deep sedation for diagnostic procedures just before the second rater's assessment. A total of 72 paired assessments were considered for interrater reliability analysis (Table 3). The strength of agreement between the two raters was substantial as shown by a $\kappa = 0.63$ ($p < 0.0001$); κ value was even higher when the raters assessed the same patient within one hour (40 paired evaluations, $\kappa = 0.76$, $p < 0.0001$).

The internal consistency of the Italian CAM-ICU was "very good" (Table 4), as shown by a Cronbach's $\alpha = 0.87$ (95% CI: 0.81–0.91). Additionally, α values did not change significantly neither removing independently each item of the tool.

The median time required to complete the whole CAM-ICU (all the four items) was 110 seconds (IQR 90–130).

Discussion

The aim of this study was to test the psychometric properties of a well-known, recently translated instrument for delirium detection and monitoring in the Italian ICU setting. Though our focus concerned the reliability and the internal consistency of the CAM-ICU, many other studies have proved its validity in terms of sensitivity and specificity (Gusmao-Flores et al., 2012); the statistical analysis of such parameters could not be included among aims of the present study due to the lack of a reference standard rater; hence, in the case of the Italian version of the CAM-ICU, this could be the main goal of future research.

The Italian CAM-ICU proved to be internally consistent and reliable in evaluating the presence of delirium. A similar α value of 0.84 had been reported by Tobar et al. (2010) and Adamis et al. (2012) in validating the Spanish

Table 4 Internal consistency of the Italian CAM-ICU.

Items	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's α if item deleted
Feature 1	1.04	1.327	0.851	0.769
Feature 2	1.00	1.507	0.644	0.860
Feature 3	1.09	1.374	0.822	0.783
Feature 4	1.28	1.795	0.571	0.882
Overall Cronbach's α : 0.87				

The internal consistency of the Italian CAM-ICU was good as shown by a Cronbach's $\alpha = 0.87$ [95% CI: 0.81–0.91]. This could signify that the CAM-ICU effectively measures the presence of delirium. Additionally, data show that the removal of Feature 4 could improve the tool's internal consistency. This could be explained from the fact that it is not always necessary to investigate this domain.

and the Greek version of the tool respectively. On the other hand, the Italian CAM-ICU showed to have a slightly lower κ value when compared to other versions of the tool. Indeed, excluding the value of 0.75 reported by Adamis et al. (2012), κ varied from 0.79 (Toro et al., 2010) to 0.96 (Ely et al., 2001b; Guenther et al., 2010). Nonetheless, according to Landis and Koch (1977) a strength of agreement between 0.61 and 0.80 can be considered substantial. An analysis of κ calculation processes additionally showed that the obtained distribution of values clearly responded to the first κ paradox stated by Feinstein and Cicchetti (1990): since a high number of negative paired assessments, but only a moderate number of positive paired assessments were collected, κ value resulted to be lower than what was expected by the effect of chance. According to previous reports by Ely et al. (2001a) and Guenther et al. (2010) it is also possible that the fluctuating nature of delirium facilitated a certain degree of discrepancy between the raters. In particular, this hypothesis could explain why the strength of agreement between the raters grew when the paired assessments had been performed within one hour. A review of the nine discordant paired evaluations additionally pointed out that two possible reasons could explain the disagreement: (1) sedatives or analgesics administration and/or (2) a time interval of more than one hour occurred between the assessments. Nevertheless, in six of these discordant evaluations the patient, rated as negative by one of

the examiners, seemed more likely to have "subsyndromal delirium" (Ouimet et al., 2007b) than no delirium, testing positive to only one between Features 1 and 2, and at least another one between Features 3 and 4. When compared to asymptomatic subjects, patients who only display some symptoms of delirium without developing the full clinical syndrome have been shown to represent a group at higher risk of prolonged ICU and hospital stay, with greater need of assistance following discharge (Ouimet et al., 2007b). These aspects underline the importance to detect early symptoms of the syndrome, encouraging clinicians to employ severity scoring scales – and particularly the ICDSC – when opportune (Barr et al., 2013). Finally, assessing delirium by the CAM-ICU required less than two minutes, though it was decided a priori to assess all the four Features of the tool. In clinical practice, however, the time required for the delirium assessment may be even lower, since it is not necessary to investigate Feature 4 (disorganized thinking), when a patient positive to Feature 1 (acute change or fluctuation in mental status) and 2 (inattention) rate positive to feature 3 (altered level of consciousness, i.e. RASS ≠ 0).

In this study delirium had a prevalence of 35%, in line with previous investigations, which also enrolled patients with an intermediate severity of illness (Gusmao-Flores et al., 2011; Toro et al., 2010; Vreeswijk et al., 2009). Using RASS scores to distinguish between "positive" and "negative" symptoms of delirium, delirious patients were classified depending on the psychomotor subtype. As already reported by Pandharipande et al. (2007) and Peterson et al. (2006) in their studies, our analysis revealed that the majority of the included patients had hypoactive delirium. Being characterised by withdrawal, flat affect, apathy, lethargy and decreased responsiveness, this form is often unrecognised or misdiagnosed as sedation or depression (Stagno et al., 2004) and consequently tends to be more deleterious in the long term (Pun and Ely, 2007; Stagno et al., 2004). For these reasons, Clinical practice Guidelines for the management of pain, agitation and delirium (Barr et al., 2013) recommend routine monitoring for delirium in adult ICU patients. The results of this study highlight the importance of a regular delirium monitoring in the ICU, or many delirium episodes will be otherwise invisible because of negative symptomatology (Pun and Ely, 2007; Spronk et al., 2009).

Limitations of the study

Several limitations of this study deserve comment. Firstly, since sensitivity and specificity of the Italian CAM-ICU could not be evaluated, a specific study for this new translated version is recommended. Nevertheless, for the original CAM-ICU (Ely et al., 2001a,b) and for the Spanish, German, Korean, Czech, Portuguese and Greek translated versions of the tool (Table 1), sensitivity and specificity varied from 72.5% to 100% and from 72.4% to 100% respectively. These results were additionally reviewed and confirmed by Gusmao-Flores et al. (2012) in a recent meta-analysis. Secondly, the fact that there could be up to four hours between the two raters' observations constituted a critical point. Previous reliability studies conducted on the CAM-ICU have used simultaneous assessments by two raters to determine their strength of agreement (Ely et al., 2001b; Guenther et al., 2010; Mitasova et al., 2012). The excellent results

reported by these same studies, however, suggest how a CAM-ICU based delirium assessment is clearly reliable. Another significant limitation concerns the design of the study which – although developed on three different ICUs – was carried out at a single centre; future collaborations among different hospitals are encouraged in order to test CAM-ICU validity and reliability in the long term. Lastly, since each patient was assessed once a day during daytime while delirium fluctuates over time (Stagno et al., 2004) it is possible that both incidence and prevalence of ICU delirium had been underrated.

Conclusion

The Italian version of the CAM-ICU demonstrated to be a reliable, practical, time-saving tool for delirium detection among ventilated and non-ventilated ICU patients. The results of this study provide support for delirium screening and monitoring using instruments such as the CAM-ICU. Nurses, who spend more time at the bedside than physicians, play a key role in the recognition of delirium: the ease of use of such tools may facilitate both ICU physicians and nurses in detecting this highly prevalent form of acute brain dysfunction, thus improving quality and safety of care. The early recognition of delirium should be considered the first step for an effective management of the syndrome in the ICU, with much to learn about how to manage this organ dysfunction still to come in future studies. Consequently, implementing a standardised assessment of delirium in clinical practice constitutes as the starting point for each strategy of prevention, treatment and quality improvement.

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Conflict of interest

The authors have no conflict of interest to declare.

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