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Confusion assessment method for the intensive care unit (CAM-ICU): translation, retranslation and validation into Swedish intensive care settings

C. Larsson[1], A. Granberg Axell[2] and A. Ersson[1]
[1]*Intensive Care Unit, University Hospital MAS, Malmoe and* [2]*Department of Clinical Sciences, Division of Anesthesiology and Intensive Care, Lund University Hospital, Lund Sweden*

Background: Becoming critical ill or severely injured leads to a process of worry, anxiety and pain. Patients in intensive care sometimes have strange and frightening experiences and may show symptoms of acute confusion or delirium. CAM-ICU, the confusion assessment method for the intensive care unit, was based on the DSM IV, the *Diagnostic and Statistic Manual of Mental Disorders IV*, and today, healthcare professionals and researchers are increasingly accepting this concept of diagnosing ICU delirium. In Sweden, there is no commonly used, single instrument or method to test the development of ICU delirium. The aim of this study was to translate, retranslate and validate CAM-ICU for use in Swedish ICU settings.
Methods: The translation of the instrument was done according to the guidelines suggested by The Translation and Cultural Adaptation group which includes preparation, forward translation/reconciliation, back translation, back translation review, harmonization, cognitive debriefing and validation. In the validation process, the applicability of the Swedish version of the instruments was tested in a Swedish intensive care unit.
Results: Fourteen adult patients were included in the study, 40 paired tests were carried out, and 80 CAM-ICU instruments were completed. The participating patients were given CAM-ICU ratings using independent paired evaluations by two nurses, specialized in intensive care, at least twice during the patients' stay in the ICU. Interrater reliability was calculated using kappa statistics. In the 40 paired observations, interrater reliability was 'very good' (kappa statistics > 0.81). In our material, we recognized a delirium rate of 48%, which is in accordance with previous studies.
Conclusion: The translation of the instrument CAM-ICU showed good correlation with the original version and could therefore be applicable in a Swedish ICU setting. In the 40 paired observations, interrater reliability was very good. Although there are limitations in using CAM-ICU, previous studies reveal a need for a homogeneous screening instrument making it possible to detect and determine ICU delirium; and from this basis are able to implement and make the necessary decisions required in medical and nursing care practice preventing ICU delirium.

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Key words: Acute confusion; CAM-ICU; delirium; intensive care; nursing.

The experience of receiving critical care is usually frightening for the patient (1). Becoming critically ill or severely injured leads to a process of worry, anxiety and pain, there are even researchers who describe intensive care as 'torture' and refer to Amnesty International's definition (2, 3). It has been known from the early days of intensive care that patients sometimes have strange and frightening experiences and may show symptoms of acute confusion. Patients have shown various reactions such as total passivity, bizarre dreams and/or schizophrenic behavior. These symptoms of psychological crises have been referred to in a number of ways, but were jointly compiled in 1966 and then described and defined as the intensive care unit syndrome (ICU syndrome) (4). The reason that some patients develop ICU syndrome is still unknown, and researchers in this field have concluded that there is not any single responsible factor, but a complex interaction among many factors (1, 5–7). These factors include the metabolic/chemical factors affecting the central nervous system (CNS), the patient's previous psychological/psychiatric problems, the psychological trauma created in connection with the patient falling critically ill and the so-called 'ICU stressors' in connection with the ICU environment (6, 7). The

factors do not all need to appear or be present, but one or two may be of crucial importance for the development of the syndrome (1, 6, 7). Nevertheless, symptoms of acute confusion among ICU patients are still given different definitions and named in a variety of different terms. The present lack of a fully accepted definition and a homogeneous classification for mental disturbances, not only in the ICU, has been an obstacle for a uniform definition. Those disorders which should be, respectively, included and excluded in order to specify the optimal method to organize treatment for these mental disturbances and ICU syndrome/delirium is associated with poor outcomes in hospitalized patients, reflected in increased length of stay, higher mortality rates and greater need for nursing care (8, 9).

The American Psychiatric Association has been involved in these problems for many years. This society published in 1994 *The Diagnostic and Statistical Manual of Mental Disorders IV* (DSM IV) (10) in which the concept of delirium is described by the definition of Lipowski (11). Quantification of delirium was obtained by the confusion assessment method (CAM) (12). In clinical practice there are several problems in using the DSM IV manual in the ICU setting. ICU patients are in a unique situation with life-threatening illness, undergoing mechanical ventilation, and experiencing mental impairment as a result of their sedation, other medical treatment and in an advanced technical environment (1, 7). These circumstances could bias the use of the manual from DSM IV (13). To overcome these difficulties and to enable use by ICU personnel who had no formal psychiatric training, Ely et al. (2001) developed an instrument that was named 'the confusion assessment method for the intensive care unit (CAM-ICU)' (www.icudelirium.org), based on the DSM IV and CAM (12, 14).

For the diagnosis of delirium, four criteria were established: acute onset and fluctuating course, inability to concentrate or pay attention, disorganized thinking, or an altered level of consciousness. The CAM-ICU algorithm requires the presence of both the first and the second criteria, and of either one of the third or the fourth criteria. The second feature, inability to pay attention includes the attention screening examination (ASE) (15). The ASE consists of two parts, one visual and one auditory.

In Sweden, there is no commonly used or any single instrument/method to test the development of ICU syndrome/delirium. However, a review and examination of the literature shows that the CAM-ICU is a commonly used instrument for detecting delirium in international ICU settings. Thus, the CAM-ICU could be very useful in Swedish ICU settings.

The aim of this study was to translate, retranslate and validate CAM-ICU for use in Swedish ICU settings.

Methods

To achieve as clear and unambiguous results as possible when translation of questionnaires or instruments are required, the language of the translated instrument must be understandable and meaningful and the translation must reflect as closely as possible the original text or instrument (16).

Translation and retranslation

After permission from Ely et al., translation of the instrument was done according to the guidelines suggested by The Translation and Cultural Adaptation group. This group has proposed guidelines and a model for principles of good practice in the translation process (16).

The translation process is described as follows:

- Preparation
- Forward translation/Reconciliation
- Back translation
- Back translation review
- Harmonization
- Cognitive debriefing
- Review of cognitive debriefing results and finalization.

Preparation. Permission to use the instrument from Ely et al. (CAM-ICU including the limited ASE) was required and they accepted the retranslation of the instruments.

Forward translation/reconciliation. A group of experienced intensive care nurses, the author – master student, the second author – PhD and one doctoral student, translated the text from English to Swedish. This was carried out independently and then they met to compare their translations.

Back translation. The final Swedish version was given to a professional translator for retranslation to English without seeing the original version.

Back translation review. The group who had made the original translation compared the retranslated version of the instruments to the original.

Harmonization. The retranslated version was sent to Ely et al. for approval and acceptance of the Swedish version.

Cognitive debriefing. Ten experienced nurses spe cialized in intensive care and to a great extent interested in ICU delirium, were asked to read and

examine the translated and accepted instruments to see if there were any unclear words, concepts or other elements that they were unable to understand.

Review of cognitive debriefing results and finalization. This involves the validation process testing the applicability of the Swedish version of the instruments used in a Swedish intensive care unit.

Patients and validation into a Swedish ICU setting

Included in the study were patients mechanically ventilated, sedated to level 3 as measured by the motor activity assessment scale (MAAS) (17). Patient's characteristics are presented in Table 1.

Excluded were patients with an addiction to alcohol or narcotics, previous diagnosis of severe psychiatric conditions, cardiopulmonary resuscitation with neurological sequelae and patients with cephalic trauma or coma.

The participating patients were given CAM-ICU ratings by independently paired evaluations of two experienced intensive care nurses at least twice during the patients' stay at the ICU. The first author of this article performed all the observations recorded, but the observer nurse could vary from time to time depending on who was caring for the patient. After finishing the test the instrument was completed independently and separately.

Ethical considerations

The Local Ethical Committee of the University of Lund approved the study (LU 457–03). After oral and written information, informed consent was obtained from the patient or from the relatives if the patient was unable to decide for him/herself.

Statistical method

Interrater reliability was calculated using kappa statistics for each feature in the instrument. SPSS software version 12.0 (SPSS Inc., Chicago, IL) was used in the statistic analyses. The strength of agreement of the kappa statistics refers to the guidelines from Landis and Koch (18).

Table 1

Patient's characteristics ($n = 14$, 11 men and three women).

	Mean	Standard deviation
Age (years)	63	± 17
APACHE II	19	± 9
Length of stay in ICU (hours)	512	± 387
Duration of mechanical ventilation (hours)	390	± 344

ICU, intensive care unit; APACHE II, acute physiology and chronic health evaluation II.

Results

The translation process was done as described in the Methods section. This process was uneventful and the instrument was successfully translated to Swedish and its final version accepted by the original author as required. After that, the accepted instrument was evaluated in a series of adult ICU patients in the final part of the translation process (review of cognitive debriefing results and finalization).

The results are presented after the translation process as described in the Methods section.

Forward translation/reconciliation

The Swedish translation group met a number of times, at weekly intervals, to allow sufficient time for reflection, so that a consensus could be reached on both the instrument's contents and structure and eventually a Swedish version could be agreed upon. In part II, 'Inattention', the limited ASE is used, which had not previously been translated into Swedish. The translation of this was done using the same method as the translation of the rest of the CAM-ICU instrument.

Harmonization

Ely et al. accepted the Swedish retranslated version of the instruments.

Cognitive debriefing

According to the team of nurses who undertook the cognitive debriefing and reading of the instruments, there were no unclear words or elements that they were unable to understand.

Review of cognitive debriefing results and finalization

Fourteen adult patients were included in the study, 40 paired tests were carried out and 80 CAM-ICU instruments completed. Demographic data are presented in Table 1.

In the 40 paired observations, overall interrater reliability was 'very good' (kappa statistics > 0.81) between nurse one and nurse two. The separate features of the instrument were calculated separately (Table 2).

In criteria I (acute onset or fluctuating course), there were some observer disagreements in the completed instruments although kappa was very

good. When using the ASE instrument, in criteria II, it was sometimes difficult to use pictures because the patient could not see them properly: therefore the auditory part of the ASE was mainly used.

In part III, 'disorganized thinking', the patient was asked to hold up his/her fingers to correspond to the fingers held up by the examiner. However, some patients did not have enough strength to hold up their fingers and then, as instructed and in these situations, only the questions in part III of CAM-ICU were used.

In our material, the incidence of ICU delirium was 48% identified by the instrument. This is in accordance with previous reports. The high interrater reliability indicates that the translation had produced an operational tool for use in a Swedish ICU setting.

Discussion

This study showed a high reliability in using the translated instrument CAM-ICU and it was successfully used in the clinical trial. The identified delirium rate was found to be well in the range of previous reported results (19–21) and thus indicates that the translated instrument could be used in a Swedish ICU setting. The CAM-ICU was translated by a group of researchers and experienced nurses in intensive care. This experience was of great value in the translation process, so that not only the obvious meaning of the words and concepts were correct, but that they were also used in the specific context of the ICU environment as emphasized by several authors (7, 8, 14, 20, 22).

When starting the translation, it appeared that the CAM-ICU in its first part, 'acute onset or fluctuating course', used the Richmond agitation sedation scale (RASS) (23) or the Glasgow coma scale (GCS) (24). Intensive care units in Sweden do not use the RASS, but rather the MAAS to examine and determine the level of sedation. To examine levels of consciousness, the reaction level scale (RLS 85) (25) is used and the GCS is used to register levels of consciousness within trauma patients. The RLS 85 scale is tested, commonly used and accepted in Sweden. The decision was made to use RLS 85 rather than the GCS and the same regarding MAAS vs. RASS.

Table 2

Interrater reliability for each part of the CAM-ICU calculated by kappa statistics ($n = 40$).

		Kappa	Strength of agreement*
Part I	Acute onset or fluctuating course	0.83	Very good
Part II	Inattention	0.95	Very good
Part III	Disorganized thinking	0.84	Very good
Part IV	Altered level of consciousness	0.84	Very good

*The strength of agreement refers to the guidelines from Landis and Koch (18).

During the validation process, difficulties sometimes occurred in explaining to the relatives the results of the tests. In Swedish culture, the word 'delirium' is often connected with alcohol abuse, and some found the word 'confusion' as being an insult to their relatives. We spent a lot of time explaining what these words mean in the intensive care context, and when we gave a full explanation, the relatives accepted it.

In the paired tests there was a general level of agreement between the nurses, but in criteria I (acute onset or fluctuating course) there were sometimes some observer disagreements. This observed disagreement could be explained by the fact that the nurse who performed all the tests was not always caring for the patient, and therefore did not know the patient as intimately as the observer nurse. Another explanation could be that Swedish intensive care nurses are not used to adopting scanning instruments and recording the mental status of the patient. Despite this disagreement in criteria I, the interrater reliability in this criteria was 'very good' and therefore this disagreement was only a minor problem.

A limitation in using the instrument could be that patients with severe delirium or patients sedated to MAAS under level 3 could not contribute. In these cases, the nurses have to decide objectively whether the patients have delirium or not. The instrument gives an 'on the spot' account. Patients with periods of relapsing delirium are therefore easily missed as shown in earlier studies (1, 26, 27). These problems could be prevented by regular use of the CAM-ICU instrument.

It is well known that this form of mental disturbances is often unrecognized, and among older people the delirium is often hypoactive, also called 'quiet delirium'. These patients are often misdiagnosed as over sedated or depressed (28).

In this study, the same nurse performed all the observations recorded, and was well trained in using the instrument, but a recently published study establishes that it does not take more than minimal training to record excellent compliance when using delirium instruments by bedside nurses (27).

Although there are limitations in using the instrument, the literature and international researchers' conclusions show that there is a great need for a homogeneous screening instrument to detect and

determine delirium; and from this basis be able to implement and take the necessary decisions required in medical and nursing care practice (8, 9, 29, 30).

Conclusion

The translation of the CAM-ICU instrument showed good correlation with the original version and could therefore be applicable in a Swedish ICU setting. In the 40 paired observations, interrater reliability was very good. Although there are limitations in using the CAM-ICU, previous studies reveal a need for a homogeneous screening instrument making it possible to detect and determine ICU delirium; and from this basis are able to implement and make the necessary decisions required in medical and nursing care practice preventing ICU delirium.

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Address:
Catarina Larsson
Intensive Care Unit
University Hospital MAS
Malmoe
SE 205 02
Malmoe
Sweden
e-mail: catarina.k.larsson@skane.se