

Validation of the NEECHAM Confusion Scale for Intensive Care Delirium Assessment

Hossein Ashtarian¹, PhD;
Nasrin Mehrabi², MSc;
Mohammad-Rafi Bazrafshan³,
PhD; Mahmoud Rahmati⁴, MSc

¹Department of Health Education,
Faculty of Health, Kermanshah
University of Medical Sciences
(KUMS), Kermanshah, Iran;

²Student Research Committee, School
of Nursing and Midwifery, Kermanshah
University of Medical Sciences
(KUMS), Kermanshah, Iran;

³Department of Nursing, School of
Nursing, Larestan University of Medical
Sciences, Larestan, Iran;

⁴Department of Psychiatric Nursing,
School of Nursing and Midwifery,
Kermanshah University of Medical
Sciences (KUMS), Kermanshah, Iran

Correspondence:

Mahmoud Rahmati, MSc;
Psychiatric Nursing Department,
School of Nursing and Midwifery,
Kermanshah University of Medical
Sciences (KUMS), Kermanshah, Iran
Tel: +98 9197098870

Email: mrahmati1983@gmail.com

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Abstract

Background: Delirium measurement instruments should be highly sensitive, and their instruction for the users should also be short-term and straightforward. The objective of the present study was to investigate the validation of the NEECHAM confusion scale in predicting the delirium of ICU patients in Kermanshah health care and educational centers in 2015.

Methods: This is cross-sectional descriptive-analytic research that was conducted in 2015. The researcher acquired the consent of the administrators of Imam Reza (AS) and Taleqani hospitals. A briefing session was held in ICU units, and the objective and method of the study were explained to patients to attract their cooperation. Sampling was done using convenience sampling. Some 166 patients were selected. The NEECHAM confusion scale was used to investigate the delirium of patients. The area under the receiver operating characteristic (ROC) curve was used to assess the quality of the questionnaire. The significance level was considered 0.05.

Results: Results show that 50.6 percent of the samples were female, and most of them were married (85.2%). Most of the patients lived in cities (78.9%) and were illiterate (50.3%). Also, most of the patients were housewives (44.4%). Instruments for data collection were demographic questionnaire and the NEECHAM confusion scale. The results of this study indicated that 45.2 percent of people have delirium. The NEECHAM confusion scale has a large area under the ROC curve. Therefore, it has high predicting power in the prediction of delirium.

Conclusion: according to the findings of this study, it can be said the NEECHAM confusion scale has the validity to be able to provide accurate and rapid information about patients' delirious status. Since the cognitive impairment screening tools require regular editing; therefore, nurses working in intensive care units can use this tool to diagnose patients with delirium and prevent delirium complications quickly.

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Introduction

It is suggested to assess delirium in intensive units due to its high prevalence in these units. Delirium naturally fluctuates, and nurses play a key role in its

diagnosis since they are beside patients for the 24-hour physical care of them.¹ The studies indicate that patients experience specific fear during delirium periods, and the nurses and doctors do not recognize this condition; nurses forget their observations of the patients they care.

One of the reasons for forgetting these observations and signs is the lack of assessment and diagnosis of passive delirium in which the patient is calm and unconscious. Another reason for the lack of recognition is the unawareness of the existence of valid and reliable instruments by which they can diagnose the delirium of the patients, or if they can diagnose that, they cannot regularly use it in a principled way.² The diagnosis of delirium signs is mostly done by DSM-IV criterion.³ Reviewing the studies shows that nurses do not have enough knowledge about delirium and its measurement instruments; hence, delirium screening is not sufficient in intensive units, especially in ICU.⁴ The development of measurement instruments demands a regular plan and is an important task because it is difficult to assess a syndrome with fluctuations and different signs.¹ Nowadays, there are different instruments for delirium screening and assessment, but only some of them can be used for ICU. In their study, Devlin et al. indicated that using an appropriate valid and reliable instrument can increase the nurses' ability to diagnose delirium in ICU.² It should be noted that delirium has no specific sign; most often, it is manifested as a set of nonspecific signs, symptoms, and mental change status along with the exacerbation of a common disease. In other words, delirium may not be diagnosed quickly, and the nurses and doctors should be aware of and be trained in this regard. The first step for recognizing this problem is to increase the awareness of all personnel. It is better to assess all patients in terms of delirium signs on the first day of hospitalization.⁵ It seems that, because of the existence of delirium measurement instruments, there may be no need to design new instruments; however, the available delirium measurement criteria should be more examined and modified to provide more complete concept of delirium. Furthermore, new versions of these instruments are translated into a new language and are, in fact, specialized instruments that need to be verified in new environments and conditions in terms of the measurement criteria of an efficient instrument.⁶ Instrument selection depends on the usage purpose and the environment of the study. Delirium instruments are different in terms of content, purpose, kind of writing, writing time, and writing skill. Most of the instruments have been tested and developed on old patients. Nearly, all of the studies have been conducted on the hospitalized patients in the hospitals. The instruments should be able to screen and diagnose delirium in the bed of the patients in the hospitals.⁷ It is for more than several years that many instruments have been designed for screening, diagnosis of, and assessing delirium severity.⁸ It is necessary and important to regularly recognize the behaviors of the patients in a principled way for a better understanding and the relationship between doctors and scholars. This issue is met by using standard criteria. While doing daily works for the patients, the use of standardized instruments helps to the recognition of specific signs

of delirium, promotion of instruments, and assessment of the quality of the interventions. Furthermore, the standardized instruments help the instruction of the medical staff.⁸ Delirium instruments need to be uncomplicated, standard, easy to learn, reliable to a standard reference, and appropriately reliable among different instruments.⁹ Delirium measurement instruments should be highly sensitive, and their instruction for the users should also be simple and short-term.¹⁰ The NEECHAM confusion scale is a suitable instrument for the research and screening the hospitalized old patients and has acceptable validity and reliability.⁷ According to investigations by researchers, the NEECHAM confusion scale is designed for nurses' use and for working with adult patients with delirium. Also, scientific articles about use of this tool are available and have been tested in clinical nursing environments. On the other hand, in some countries the validity of this questionnaire has also been evaluated,^{2, 11-13} so based on the findings of the researchers the objective of the present study was to investigate the validation of the NEECHAM confusion scale in predicting the delirium of ICU patients in Imam Reza (AS) and Taleqani health care and educational hospitals of Kermanshah in 2015.

Methods

This survey is a cross-sectional descriptive-analytic study (code No. 94236) that investigated the validation of the NEECHAM confusion scale in predicting the delirium of ICU patients in Imam Reza (AS) and Taleqani health care and educational hospitals of Kermanshah in 2015.

The NEECHAM confusion scale is a delirium screening nursing tool designed by Neelon and Champagne. This fast and uninterrupted patient bedside tool can be used to evaluate patient behavior. The questionnaire has three main items, including process (attention, order, awareness with a score of 0-14), behavior (appearance, movement, speech with a score of 0-10), and physiological control (vital signs, oxygen saturation, and urinary excretion of a score of 0-6). The questionnaire has a total of 30 points. Based on the overall rating obtained by the patient, it is divided into four groups; healthy individuals with a score of 27-30, exposed to confusion with a score of 25-26, mild delirium with a score of 20-24, moderate to severe delirium with a score of 0-19. The duration of the questionnaire is 5-10 minutes. This questionnaire is a reliable tool for nurse delirium evaluation in the public ward of hospitals and has been used in non-intubated intensive care units in recent years. The validity and reliability of the NEECHAM confusion scale have been confirmed in various articles. A translated version of the tool was used to conduct the study.¹⁴

The population included all patients admitted to

ICU units of the said hospitals which had the inclusion criteria. Inclusion criteria included having a level of consciousness above nine based on the Glasgow Coma Scale (GCS), 2- not being intubated, 3- staying in the ICU ward for at least 24 hours, 4- having no vision or hearing problems, 5- having At least 18 years old, 6- not receiving sedative medication permanently, and 7- Lack of cognitive disease. patients were excluded from the study in case of dissatisfaction of the patient or his / her relatives, intubation or performing cardiovascular resuscitation (CPR) for the patient during the study, death or discharge of the patient, transferring the patient to another ward, and diagnosing the cognitive disease for the patient during the study.

The researcher referred to the ICU units to start sampling. After acquiring the consent of the administrators of Imam Reza (AS) and Taleqani hospitals, also obtain verbal consent from patients, the researcher carried out the sampling in the bed of the patients for approximately five months.

A briefing session was held in the ICU units of the named hospitals. The purpose and method of the work were explained to them to attract the nurses' cooperation. Sampling was done based on a convenience sampling method. The number of the samples for determining sensitivity was 71, and for determining specificity was 80, with a confidence coefficient of 95% and power of 80%. Some 151 patients were selected.^{2, 9} Thus the sample size was calculated as follows:

$$\frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 (p_1q_1 + p_2q_2)}{(p_1 - p_2)^2} = \frac{(1.96 + 0.84)^2 (1 \times 0 + 0.91 \times 0.09)}{(1 - 0.91)^2} = 80$$

For determining sensitivity with a power of 80%, the sample size calculated 71 patients.

$\frac{(2.8)^2(0.09)}{(0.1)^2} = 71$, and for determining specificity with a power of 80%, the sample size calculated 80 patients.

$$\frac{(1.96+0.84)^2(1 \times 0 + 0.91 \times 0.09)}{(1-0.91)^2} = \frac{(2.8)^2(0.09)}{(0.1)^2} = 80$$

The number of samples reached 166 people, considering the sample declined by 10 percent. Some 166 patients were selected for both sensitivity and specificity. Descriptive statistics (frequency distributions) were used to analyze the data. Also, in this study, the rock curve was used to determine the cut-off point and to calculate diagnostic indices. Data were analyzed using SPSS 21. The significance level was considered 0.05.

Results

In the present study, a total of 166 patients hospitalized in ICU units of Imam Reza (AS) and Taleqani hospitals participated in the study. They had the inclusion criteria and included 151 patients in Imam Reza (AS) hospital and 15 patients in Taleqani hospital. The characteristics of the units in this research are summarized in Table 1. According to the findings of Table 1, 50.6 percent of the samples were female, and most of them were married (85.2%). Most of the patients lived in cities (78.9%) and were illiterate (50.3%). Also, most of the patients were housewives (44.4%).

Furthermore, the findings of this study showed that 45.2 percent of the people have delirium in measurement with the NEECHAM confusion scale. The results of this section are summarized in Table 2.

The area under the ROC curve (AUC) was used to assess the quality of the questionnaire. This curve is the sensitivity in terms of one minus the specificity; the area under which is a number between 0 and 1 and is used as a criterion for evaluating the ability to have a correct prediction. The closer this number to one, the more able that criterion is. As such, the NEECHAM confusion scale has a large area under the

Table 1: The absolute and relative frequency distribution of the demographic variables of the research units

Variable		Frequency	Percent
Gender	Female	84	50.6
	Male	82	49.4
Marital status	Single	22	13.6
	Married	138	85.2
	Divorced	2	1.2
Place of living	City	120	78.9
	Village	32	21.1
Educational level	Illiterate	81	50.3
	Below diploma	56	34.8
	Associate's degree	6	3.7
	Bachelor's degree	4	2.5
	Master's degree	1	0.6
Job	Unemployed	33	24.4
	Housewife	60	44.4
	Self-employed	19	14.1
	Clerk	5	3.7
	Other	18	13.3

Table 2: Final classification of the individuals in terms of delirium recognition based on the NEECHAM confusion scale

Delirium	Number	Percentage
No	91	54.8
Yes	75	45.2
Total	166	100

Table 3: The area under curve, error, p-value, lower bound, and upper bound of the NEECHAM confusion scale

Test Result Variable	AUC	Std. Error	P-value	Lower bound	Upper bound
The NEECHAM confusion scale	0.938	0.022	0.000	0.898	0.980

ROC curve. Therefore, it has high predicting power in the prediction of delirium (Table 3).

Discussion

Nowadays, delirium in ICU is one of the prevalent problems of the patients, and if it is not diagnosed and treated, it results in many problems for the patients and their families. The results of the study indicated that sensitivity, specificity, positive and negative predictive values, and the accuracy of the NEECHAM confusion scale in this study were respectively 93.55%, 81.73%, 75.32%, 95.51%, and 86.14%. This finding shows that this instrument is susceptible and is consistent with some of the previous studies. For example, Jimert Wan showed 86-100 percent of sensitivity in his research.¹⁵

Moreover, Grover,⁸ Immers,¹⁶ and Matarese¹⁷ reported the sensitivity of this instrument as 95, 97, and 99, respectively; they are close to the values obtained in the present study. Van Rompaey showed 87 percent sensitivity in his study; however, it seems that this close value has less consistency with the result obtained in this study.¹⁸ The result of the investigation of the instrument is comparable with those of other studies in terms of specificity. Immers study is one of the surveys that are close to the present study in terms of both sensitivity and specificity value such that its specificity has been obtained as approximately 83 percent.¹⁶ In addition to sensitivity and specificity, the positive and negative predictive values of the NEECHAM confusion scale were also evaluated. These results are in line with the positive and negative predictive values of the study done by Van Rompaey which were respectively 79 and 97 percent¹⁸ and with the negative predictive value of the survey done by Schuurmans et al. that was 100 percent.¹⁵ However, its positive predictive value is not in line with the study of Schuurmans that was 43 percent.¹⁵ The prevalence of delirium was 25.9 percent in the present study and 19.4 percent in Immers study; the values are close to each other. Data collection was done by the nurses.

Taking the physical and mental aspects of the patients into consideration is very important and various studies have referred to it.¹⁹⁻²¹ Generally, it can be concluded from the study that the instruments used in this study have a very strong predicting power

in diagnosing delirium in the patients admitted to intensive care units. Because it is needed to diagnose with higher precision, it seems that the NEECHAM confusion scale has high power in this regard. Furthermore, as it was mentioned in the study of Van Rompaey that the NEECHAM confusion scale as an instrument that can be used to better identify and classify the patients in terms of delirium, the accuracy of this issue was made evident in this study.¹⁸ Using the NEECHAM confusion scale, the patients can be categorized in other categories in addition to the diagnosis of delirium; these categories include “healthy person”, “at-risk”, and “exposed to confusion (mild delirium)”. Therefore, the patients who are exposed to confusion or mild delirium are diagnosed sooner; as such, their treatment is begun earlier, and the unwanted complications of delirium would be reduced. Moreover, the final objective is that the nurses involving in the care and treatment of the patients admitted to ICU immediately diagnose delirium while doing their tasks. Therefore, according to the results of this study, it seems that using the NEECHAM confusion scale would be helpful for fulfilling this need and facilitating delirium screening by the nurses. Like other similar studies, this study had also some limitations. One of the limitations of the present study was the absence of a psychiatrist to prove delirium as a golden standard. Of course, this was done by investigating the written report of the resident anesthesiologist who was familiar with delirium in intensive units and is of the necessary experience. The diagnosis and treatment of delirium are done by them.

Conclusion

The findings of this study indicate that the NEECHAM confusion scale is suitable for assessing patients' delirium status in the ICU ward. Because delirium is a common symptom in patients and nurses' knowledge of the detection and risk factors for delirium is fundamental, the NEECHAM confusion scale can be used for the rapid screening of such patients. The immediate diagnosis and treatment of delirium, as well as the identification and use of delirium screening instruments, are stressed to the same extent in various papers. It is important to use a simple and efficient instrument for diagnosing

delirium along with the importance of other vital and critical care for the patients admitted to ICU. The use of the appropriately valid and reliable screening instruments by the nurses would help them to behave with the patients admitted to ICU in an intelligent and certain way. This study indicated that the NEECHAM confusion scale is appropriate in terms of sensitivity, specificity, and accuracy.

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Conflict of Interest: None declared.

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