

New Delirium Rating Scale for ICU

Yoğun Bakım Olgularında Yeni Deliryum Değerlendirme Skalası

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ABSTRACT

Objective: The New Delirium Rating Scale (NDRS) makes use of verbal assessments to evaluate the cardinal features of delirium and is an observer-rated, 10-item symptom rating scale based on both DSM-IV and the findings of the previous clinical research. In this study, we tested the validity of the NDRS for measuring the severity of delirium in intensive care units.

Methods: Thirty consecutive non-intubated patients admitted to the ICU for more than 24 hours were included in the study. Two intensivists were trained to rate delirium according to NDRS and they daily carried out structured interviews to evaluate the patients. All patients were interviewed by a psychiatrist for rating according to NDRS, and the data collected by the psychiatrist and the intensivists were compared.

Results: The cut-off score for NDRS was 11.3 patients (10%), who were rated as delirious. The inter-rater reliability of the intensivists and the psychiatrist was found to be 0.84 and 0.90, respectively ($p < 0.0001$).

Conclusion: Intensivists easily used NDRS, a detailed delirium assessing scale, and rated delirium successfully. (*Archives of Neuropsychiatry 2010; 47: 36-9*)

Key words: Delirium, Delirium Rating Scale, intensive care

ÖZET

Amaç: Yeni Deliryum Değerlendirme Skalası (NDRS); gözlemcinin sorduğu on soruya verilen yanıtlar doğrultusunda, deliryumun ana bulgularının değerlendirildiği, DSM-IV ve mevcut klinik araştırmalara dayanarak geliştirilmiş bir değerlendirme ölçütüdür. Bu çalışmada NDRS'nin yoğun bakım ünitelerinde deliryum değerlendirilmesinde ne ölçüde kullanılabileceği araştırılmıştır.

Yöntemler: Yoğun bakım ünitesinde 24 saatten daha uzun süre tedavi edilen, endotrakeal entübasyon uygulanmayan 30 olgu çalışma kapsamına alındı. Hastalar yoğun bakımda tedavi oldukları sürece her gün, NDRS'yi uygulama ve deliryum tanısı koyma konusunda eğitilen iki yoğun bakım hekimi tarafından ziyaret edildi ve değerlendirildi. Olgular ayrıca aynı yöntemle bir psikiyatri tarafından da değerlendirildi. Her iki hekim grubunun değerlendirme sonuçları birbiri ile karşılaştırıldı.

Bulgular: Deliryum tanısı için cut off değeri 11'dir ve 3 olguya (%10) deliryum tanısı konmuştur. Yoğun bakım hekiminin ve psikiyatristin değerlendirmeciler arası güvenilirliği 0.84 ve 0.90 olarak bulunmuştur ($p < 0.0001$).

Sonuç: Yoğun bakım hekimleri NDRS'yi kolaylıkla kullanabilmiş ve deliryum tanısını başarı ile koyabilmişlerdir. (*Nöropsikiyatri Arşivi 2010; 47: 36-9*)

Anahtar kelimeler: Deliryum, Deliryum Değerlendirme Skalası, yoğun bakım

Introduction

Delirium is a disturbance of consciousness characterized by an acute onset and fluctuation in impaired cognitive function. Patients with delirium can present with agitation, sleep-wake cycle disturbances, including diurnal variation and lability of mood (1). Ultimately, a patient's ability to receive, process, store, and recall information is strikingly impaired. The stress of a critical illness or injury, major surgery, lack of sleep, medications, electrolyte abnormalities or infection have all been considered factors, contributing to delirium in critical patients. Delirium is associated with poor outcomes in hospitalized patients, including increased length of stay, need

for subsequent institutionalization, and higher mortality rates (2-5). Although the prevalence rate of delirium varies from 15% to 50% among general medical or surgical patients (2,6,7), few data exist concerning the incidence of delirium in the intensive care unit (ICU) (8,9).

DSM-IV, (Diagnostic and Statistical Manual of Mental Disorders, fourth edition) and Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) have been used to assess delirium in ICU, however, some limitations exist in these tools such as: according to DSM-IV delirium frequently represents a sudden and significant decline from a previous level of functioning which cannot be better accounted for by a preexisting or evolving dementia. There is usually evidence

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from the history, physical examination, or laboratory tests that the delirium is a direct physiological consequence of a general medical condition, substance intoxication or withdrawal, use of a medication, toxin exposure, or a combination of these factors (10). CAM-ICU also has some limitations in evaluating sleep-wake cycle and diurnal mood variations (11). Some standard delirium assessment methods require special psychiatric training that constitutes another objection for their repetitive implementations (12).

The New Delirium Rating Scale (NDRS) has been developed by Aydemir and his colleagues for intensive care unit physicians working in the ICU (13). The NRDS makes use of verbal assessments to evaluate the cardinal features of delirium (i.e. acute or fluctuating onset, inattention, disorganized thinking and altered level of consciousness) and it is a 10-item, observer-rated scale based both on DSM-IV and on symptoms drawn from previous clinical research. In this study, we tested the validity of the NDRS for measuring the severity of delirium.

Methods

The study was carried out in a ten-bed medical/surgical ICU of a university hospital. Thirty consecutive non-intubated patients admitted to the ICU for more than 24 hours during a 6 month-period were included in the study. Medical history, selected laboratory values, drugs received, and factors that may influence patients' psychological and emotional well-being were recorded and patients who use sedative agents were excluded. Two intensivists were trained to rate delirium according to NDRS (Table 1) and they carried out daily structured interviews lasting approximately 10 minutes with the patients from admission until ICU discharge. All patients were interviewed by a psychiatrist for rating NDRS, and the psychiatrist confirmed the diagnosis of delirium. For inter-rater reliability, intensivists rated all patients with the psychiatrist concurrently.

NDRS is a ten-item, observer-rated scale with probe questions. The main feature of the scale is that it contains psychotic symptoms beside cognitive symptoms. The validation of the NDRS was performed in a hospital setting with patients with delirium (Aydemir Ö, Noyan A, Gülseren Ş, Kayahan B, Bodur Z, Elbi H, Kültür S (1998) Development, reliability and validity of Delirium Rating Scale. *Journal of Psychiatry Psychology Psychopharmacology* 6: 21-27). In reliability studies, Cronbach's alfa coefficient of NDRS was found to be 0.8804 and item-total score correlation coefficients were between 0.8616 and 0.8819. For inter-rater reliability (three raters), the correlation coefficient was 0.9815 and it was statistically significant ($p < 0.0001$). Factor analysis yielded two factors, labeled as cognitive impairment and psychotic symptoms, respectively. In the ROC analysis, the cut-off point was calculated to be 10/11 with a sensitivity of 89.65% and a specificity of 88.88%.

For statistical analyses, Pearson correlation test was performed.

Results

The mean age was 48.6 ± 17.24 (42-55) and 24 of the patients were male. The mean value of blood urine nitrogen (BUN) was 32.4 ± 3.5 mg/dl of creatinin was 0.8 ± 0.2 mg/dl and of blood glucose was 139 ± 4.7 . Severity of illness as measured by APACHE II (14) was a mean of 7.6 ± 2.3 . Diagnoses at admission are listed in Table 2. When the cut-off score, 11, was taken into consideration, 3 patients (10%) were rated as delirious. The inter-rater reliability of the intensivists and the psychiatrist was found to be 0.84 and 0.90 ($p < 0.0001$). When the items were taken into consideration, all of the items, except item # 7 (thought content), were significantly correlated ($p < 0.05$).

Discussion

We assessed the usefulness of the NDRS developed by Aydemir et al. (13) in diagnosing delirium in ICU. The delirium rating scale introduced by Trzepacz et al. (15) was designed to differentiate delirium from the other psychiatric disorders; the NDRS examines the clinical signs of delirium. Therefore, cognitive functions such as attention, memory, orientation and perception were questioned by NDRS. The cognitive functions were presented only in one sentence (very limitedly) in delirium rating scale previously proposed by Trzepacz et al. and Trzepacz's scale was mainly aimed to distinguish delirium from other psychosis, rather than to identify the clinical circumstances (15). Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) is another tool which uses nonverbal assessments to evaluate acute or fluctuating onset of delirium, inattention, disorganized thinking and altered level of consciousness, however, sleep-wake cycle, diurnal variation and lability of mood are not questioned by CAM-ICU, while they are well evaluated by NDRS.

The intensivists in the ICU and the psychiatrist who rated the patients concurrently agreed on the diagnosis in all interviews. This finding of our study may be secondary to intensivists' interest in the clinical presentation of delirium, but also suggests that the initial clinical diagnosis of delirium could be made by an intensivist without the eventual delay due to obtaining a consultation from a psychiatric liaison team.

Patients treated in ICU are exposed to serious physical and psychological stressors as metabolic disorders, medications, sepsis-associated encephalopathy which may have an important impact on the development of delirium. Furthermore, the disturbing environmental physical factors such as noise, artificial illumination, etc. also predispose critically ill patients to delirium (2). Agitation causes many adverse effects in intensive care. Its occurrence may complicate medical care, raise metabolic-respiratory requirements, increase length of stay in the ICU and hospital, and also increase morbidity and mortality (16). All of these negative influences raise hospital costs. The post-discharge mortality rate was reported to be higher in patients having agitation and delirium compared to that of similar but non-delirious patients (17). In order to avoid all these negative contributing factors, the mental status of the patients should be monitored closely and mental disorders

should be managed through a systematic approach (18). Generally, it is accepted that delirious symptoms represent signs of acute cerebral insufficiency. Despite the fact that delirium occurs in 15% to 40% of ICU patients (17), it seems that the performance of critical care physicians' in diagnosing it remains poor; nearly two-thirds of these patients are not identified (2-9, 19-22).

An essential principle in the psychiatric management of delirium is the identification and correction of the etiologic factors. Careful review of the patient's medical history and interview of family members or others close to the patient may

provide some direction. Appropriate laboratory and radiological investigations may be necessary to determine the underlying cause(s) of delirium (23). Simple and well-defined tools that can be used at the bedside without being too time-consuming are always needed by intensivists. Evaluation methods that have been validated in the ICU combine several clinical parameters and psychological measurements into a continuous scale score (8,10,24-26). These scores carry the risk of specificity lacking regarding some particular aspects of mental alterations. For research purposes, an algorithm aimed at detecting delirium has been recently developed (27), but bedside

Table 1. New Delirium Rating Scale (NDRS)

1) Psychomotor activity
0. Normal
1. Mild increase (agitation or restlessness) or decrease (mild retardation) in activity
2. Moderate increase (intending to leave the ward, grasping the tubes, groping the bed) or decrease (performing activity on command) in activity
3. Excessive increase (excitation deserving fixation) or decrease (not even performing activity on command) in activity
2) Orientation
0. Normal
1. Disorientation for time, or place, or person
2. Disorientation for time and place, or time and person, or place and person
3. Disorientation for time, and place, and person (rate no answer due to confusion here)
3) Attention
0. Normal
1. Difficulty in concentration (maintaining his/her attention by himself/herself)
2. Moderate disturbance in attention, distractibility (maintaining his/her attention on command)
3. Total disturbance in attention (not even maintaining his/her attention on command)
4) Memory
0. Normal
1. Disturbance in immediate or recent memory
2. Disturbance in immediate and recent memory
3. Disturbance in immediate and recent and remote memory (rate no answer due to confusion here)
5) Perception
0. Normal
1. Vivid dreams and/or nightmares
2. Transient illusions and/or hallucinations
3. Definite illusions and/or hallucinations (hallucinatory experience)
6) Thinking
0. Normal
1. Partially disrupted thinking
2. Totally disrupted thinking
3. Incoherence
7) Thought content
0. Normal
1. Overvalued thought (does not act consistently and knows that it is false)
2. Drafts of delusion (sometimes acts consistently and can inquire that it is false)
3. Delusion (acts consistently and cannot inquire that it is false) or delusional experience
8) Sleep-wake cycle
0. Normal
1. Marked drowsiness daytime while being awake most of the night
2. Sleeping daytime while being awake all of the night
3. Almost not sleeping or always sleeping during both the day and the night
9) Diurnal variation
0. No fluctuation
1. Occurrence of symptoms during the night while normal during the day
2. Occurrence of symptoms continuously during the night and interruptedly during the day
3. Occurrence of symptoms both during the day and the night fluctuatingly
10) Lability of mood
0. No fluctuation
1. Alteration or change in mood over the course of hours
2. Alteration or change in mood over the course of minutes (mood changes which are inappropriate to situation, including fear, anger or tearfulness)
3. Severe disinhibition of emotions (temper outbursts, uncontrolled laughter or crying)

	Patients (n:30)
Age, mean (SD)	48.6±17.24
Gender (Male:Female)	24: 6
Blood urine nitrogen (BUN), (mg/dl) (SD)	32.4±3.5
Creatinin, (mg/dl) (SD)	0.8±0.2
APACHE II score, mean (SD)	7.6±2.3
Multiple trauma	14
Abdominal surgery	12
Gastrointestinal bleeding	4

evaluation of delirium by the intensivist carries some difficulties. Trzepacz's Delirium Rating scale evaluates attention, memory, orientation and cognitive abilities in one clause (19), therefore, assessing the symptoms through this scale should be complex for the intensivists, since they are not familiar with psychotic symptoms. On the other hand, NDRS is a well-structured scale that questions the cognitive abilities individually and intensivists could assess the patients easily by using these clear definitions and assessment of sleep-wake cycle, diurnal variation and lability of mood are the superiority of this tool over CAM-ICU.

In conclusion, intensivists used NDRS, a detailed delirium assessing scale, easily and rated delirium so successfully that the inter-rater reliability for rating delirium between the intensivist and the psychiatrist was comparable.

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