

Do critical care nurses recognize delirium adequately? A cross-sectional multicenter study

Yoğun bakım hemşireleri deliryumu yeterince tanıyor mu? Kesitsel çok merkezli bir çalışma

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ABSTRACT

Objective: Delirium is a common and often misdiagnosed condition associated with increased mortality and cognitive dysfunction in intensive care units. Critical care nurses have a unique opportunity as healthcare providers to assess for and early identify delirium. This study aimed to investigate the knowledge of critical care nurses about delirium care.

Materials and Methods: The study were conducted between April 2022-July 2022 with critical care nurses who had at least one year of experience working in three hospitals. The study data were collected with the "Nurse Characteristic Form" and "Delirium Care Knowledge Questionnaire".

Results: In total, 253 nurses completed the test. The overall mean score was 10.66 ± 2.29 (possible range 0-16). Correct answers for the subject areas were as follows: (a) 71.1% in symptoms, types, and outcomes; (b) 71.4% in high-risk groups; (c) 81.5% in predisposing and precipitating factors; and (d) 42.7% in assessment and detection. The questions with a high percentage of wrong answers were related to delirium subtypes and assessment. Delirium knowledge scores increased significantly with increasing age and with greater work experience ($p < 0.05$).

Conclusion: The results of this study reveal the need to improve the ability of critical care nurses to accurately identify and assess delirium by using valid tools.

Keywords: critical care, delirium, intensive care unit, knowledge, nursing

ÖZ

Amaç: Deliryum, yoğun bakımlarda artan mortalite ve bilişsel işlev bozukluğu ile ilişkili yaygın görülen ve sıklıkla yanlış teşhis edilen bir durumdur. Yoğun bakım hemşireleri, deliryumu değerlendirme ve erken teşhis etmede sağlık profesyonelleri olarak eşsiz bir konuma sahiptir. Bu çalışmanın amacı, yoğun bakım hemşirelerinin deliryum bakımı hakkındaki bilgi düzeylerini belirlemektir.

Gereç ve Yöntem: Çalışma Nisan 2022-Temmuz 2022 tarihleri arasında üç hastanede en az bir yıl yoğun bakım deneyimine sahip hemşireler ile yürütülmüştür. Çalışma verileri "Hemşire Özellikleri Formu" ve "Deliryum Bakımı Bilgi Değerlendirme Testi" ile toplanmıştır.

Bulgular: Toplam 253 hemşire çalışmayı tamamladı. Deliryum bilgi düzeyi testine ilişkin genel ortalama puan 10.66 ± 2.29 (aralık 0-16 puan) idi. Testte yer alan konu alanları için doğru cevaplar: (a) semptomlar, tipler ve hasta sonuçları için %71.1; (b) yüksek risk grupları için %71.4; (c) predispozan ve presipitan faktörler için %81.5; ve (d) değerlendirme ve tespit etme için %42.7 olarak saptandı. Yanlış cevap yüzdesinin yüksek olduğu sorular deliryum alt tipleri ve değerlendirme ile ilgili sorulardı. Deliryum bilgi düzeyi skorlarının yaş ve iş deneyimi arttıkça anlamlı olarak arttığı saptandı ($p < 0.05$).

Sonuç: Bu çalışmanın sonuçları, yoğun bakım hemşirelerinin geçerli ve uygun araçlar kullanarak deliryumu doğru bir şekilde tanımlama ve değerlendirme becerilerini geliştirme ihtiyacını ortaya koymaktadır.

Anahtar kelimeler: kritik bakım, deliryum, yoğun bakım ünitesi, bilgi, hemşirelik

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Introduction

Delirium is a syndrome characterized by acute alteration in attention, awareness, and cognition, resulting from a medical condition that is cannot be fully explained by a pre-existing neurocognitive disorder (1). While the incidence of delirium in the intensive care unit (ICU) varies between 22-45%, this rate rises to 85% in patients receiving mechanical ventilation (MV) support (2,3).

Delirium in the ICU is associated with important clinical outcomes such as longer ICU stay or MV support, higher mortality, and long-term deterioration in cognitive status after discharge (4,5). This was emphasized by the recent COVID-19 pandemic, which caused an increase in ICU admissions, triggering several risk-factors for delirium (e.g., hypoxia, inflammation, social isolation, and distancing from family) and in effect increased the associated adverse clinical outcomes (6,7). The pandemic underscored the importance of early detection of delirium and controlling it with multi-component treatment methods (pharmacological and non-pharmacological) (6).

Critical care nurses (CCNs) are in a unique position to detect delirium early, identify possible causes, and provide appropriate care, which are critical in improving the quality of care of patients and the patient outcomes (8). Hence, CCNs must put their delirium care knowledge into practice to recognize delirium and provide effective care. However, delirium remains an often missed diagnosis in the ICU, and it has been shown that nurses do not recognize delirium and are not sufficiently familiar with using tools for the assessment of delirium (9-11). The Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU (PADIS) recommend daily routine screening with valid assessment tools for delirium in the ICU (12). However, this recommendation is not put into practice, especially in Turkey, and delirium continues to be a significant problem (13). This lack of implementation of recommendations leads to questions on whether

CCNs in Turkey provide appropriate care for patients with delirium. It is crucial for nurses to possess adequate knowledge regarding delirium to provide effective care for these patients. Therefore, this study aimed to investigate the knowledge and awareness of CCNs about delirium care.

Materials and Methods

Design, sample and setting

This cross-sectional research was conducted between April 2022-July 2022 with CCNs working in three training and research hospitals in Bursa, Turkey's 4th largest city. The ICUs in these hospitals are all secondary and/or tertiary level and provide care for critically ill patients.

At the start of the study, 654 nurses were working in the adult ICUs of the hospitals. No sample selection was performed for the study; we attempted to reach all nurses who met the inclusion criteria. The inclusion criteria were as follows: (a) volunteering to participate in the study, and (b) working in the adult ICUs for at least one year.

Data collection process and instruments

The researchers collected study data through face-to-face surveys conducted at the research centers. In the ICUs where the study was conducted, eligible nurses were informed about the study, and data collection began after obtaining their written and verbal consent. The study data were collected with the "Nurse Characteristic Form" and "Delirium Care Knowledge Questionnaire (DCKQ)".

Nurse Characteristics Form: This form, prepared by the researchers, included questions about the sociodemographic information of the ICU nurses (age, gender, educational status, etc.) and the characteristics of their work environment (type of ICU unit, work experience, etc.).

Delirium Care Knowledge Questionnaire (DKCQ): This questionnaire was developed by Ho et al. (2021)

to determine CCNs' level of knowledge about delirium care (14). During the development of the tool, available scientific evidence was taken into consideration, including: (a) the "Delirium Care Pathways," which set the national standards for delirium care in Australia; (b) the Society of Critical Care Medicine's PADIS guideline; (c) the Scottish Intercollegiate Guidelines Network evidence-based national clinical guidelines in Scotland; and (d) the results of meta-analyses for delirium assessment and detection (14). The DCKQ consists of 16 items designed to measure (a) symptoms, types, and outcomes; (b) high-risk groups; (c) predisposing and precipitating factors; and (d) assessment and detection of delirium care knowledge. The correct answer to each item is scored as 1 point and incorrect or blank answers are scored as 0 points, with the total score ranging from 0 to 16 (14). While most of the items consist of questions with four options, there are also questions with two or five options. In the validity and reliability assessments, the internal consistency and intra-class correlation of the DCKQ were high (0.85 and 0.97, respectively) (14).

Pilot test was conducted with 80 participants (five times the number of items in the DCKQ) to adapt the DCKQ into Turkish and to evaluate its psychometric properties (language and content validity; internal consistency reliability). Firstly, the language validity of the Turkish version of DCKQ (DCKQ-T) was investigated. At this stage, an expert panel was formed by individuals who were proficient in the English language and experienced in the field of ICU and delirium. An expert panel of seven, including two professors (MD), one intensive care specialist (MD), two nursing faculty members (PhD), and two CCNs (with experience of 10 years and more), translated the measurement tool from English to Turkish. By comparing the feedback of the expert panel, care was taken to select the most appropriate expressions in the translation of the measurement tool. The Turkish version of the measurement tool was translated back to English by an independent linguist who did not know about the tool. It was determined that there was a high level of similarity between the translation of the

measurement tool from Turkish to English and the original, indicating semantic equivalence.

After ensuring the DCKQ-T's linguistic validity, the content validity was investigated. An expert panel of five, including two professors (MD), two nursing faculty members (PhD), and one CCN (with over 10 years of experience), were asked to examine the suitability of the items in the DCKQ-T in terms of clarity, scientific content, and measurement and evaluation according to the Davis technique (15). The experts evaluated each item on a four-point scale as (a) the item is appropriate, (b) the item is appropriate but needs minor revision, (c) the item needs major revision, or (d) the item is not appropriate. The number of experts marking (a) and (b) for a particular item was divided by the total number of experts to obtain a content validity index (CVI), which is expected to be 0.80 or higher for a valid item (15). Based on the expert panel's assessment, the CVI values for the DCKQ-T items ranged from 0.80 to 1.00.

Finally, the internal consistency of the measurement tool was determined by the Kuder-Richardson formula (KR-20), which is commonly used to measure the reliability of binary choice tests (i.e., 0-1 or pass-fail) (16). The KR-20 values range from 0 to 1, and the closer the value is to 1, the better the internal consistency; KR-20 values of 0.70 and above are considered acceptable (16). The internal consistency of the DCKQ-T was found to be high (0.87 for pilot sample, 0.91 for main sample).

After completing the pilot test and ensuring the validity and reliability of the questionnaire, we began measuring nurses' knowledge level of delirium. Nurses who were included in the pilot test phase were excluded from this phase. The instruments were completed in 10-15 minutes.

Ethical considerations

This study was approved by the Bursa Uludağ University Health Sciences Research and Publication Ethics Committee (Decision no: 2022-03/09). Each

investigator obtained the necessary permissions to conduct the study from the management of their respective hospitals. Verbal and written informed consent was obtained from CCNs for participation in the study.

Data analysis

The data were analyzed with Statistical Package for the Social Sciences (SPSS version 23, SPSS Inc, Chicago, USA). The responses were coded as binary variables (1: correct, 0: false). The normal distribution of the data was analyzed using the Shapiro-Wilk test. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to present the data about the characteristics of participating nurses. Two-group comparisons were performed using Pearson's chi-square or Fisher's exact test, Mann-Whitney U, or Kruskal-Wallis tests, as appropriate. The level of statistical significance was set as $p < 0.05$.

Results

Socio-demographic and intensive care characteristics of nurses

The study sample consisted of a total of 333 nurses and the rate of participation among nurses was 50.9% (Figure 1). A total of 80 nurses who participated in the first pilot test for the psychometric evaluation of the questionnaire were excluded from the sample. As a result, the final sample size was 253 nurses.

The socio-demographic characteristics of the nurses and the characteristics of the ICUs where they work are summarized in Table 1. The mean age of the participants was 31.56 ± 5.41 ; the majority were female (68.4%) and had a bachelor's degree (81.8%). The average years of professional experience was 7.61 ± 5.50 while the average years of ICU work experience was 4.83 ± 3.54 . The ICUs where the nurses worked were mostly listed as mixed (medical+surgical patients) and internal medicine ICUs (34.4% and 35.2%, respectively). Only 27.3% of the nurses stated that they had received

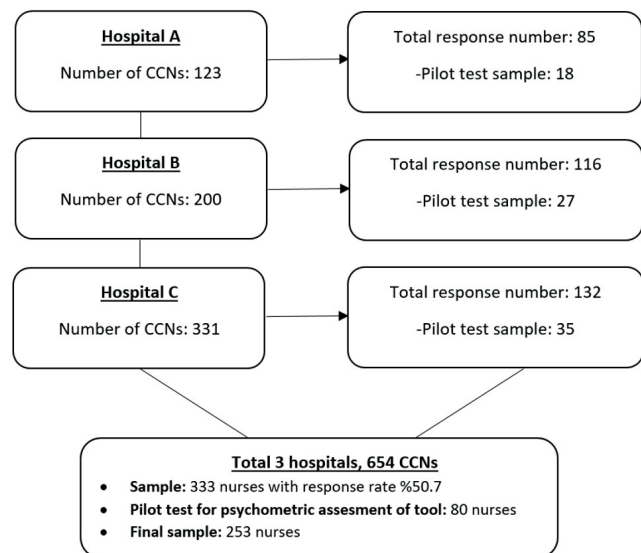


Figure 1. Sampling characteristics of the critical care nurses

training on delirium care in the last one year, while 65.2% of the trainees did not find this training sufficient and up-to-date. More than half of the nurses (56.5%) stated that they did not evaluate delirium in their ICUs, which was attributed to the complexity of performing cognitive testing (25.4%), lack of hospital-based education (23.9%), and workload (28.0%). Other reasons included the perception that delirium is “normal” since it is common in the ICU (16.7%) and the belief that delirium had no effect on patient outcomes (12.7%). Of the nurses, 40.7% considered the delirium assessment very important.

Delirium care knowledge

The participants' mean DCKQ-T score was 10.66 ± 2.29 . Rates of correct answers in the four sections of the DCQK-T were as follows: (a) 71.1% for symptoms, types, and outcomes, (b) 71.4% for high-risk groups, (c) 81.5% for predisposing and precipitating factors, and (d) 42.7% for assessment and detection (Table 2). When the rates of correct answers given to individual items were examined, the rates were less than 50%, particularly for the item related to delirium subtype and two items about delirium assessment based on the CAM-ICU (45.1%, 32.8%, and 26.9%; Table 2).

Table 1. Socio-demographic and ICU characteristics of nurses (N = 253)

Characteristics	n (%) or M±SD
Age (years)	31.56±5.41
Age (categorical)	
20-25 years	18 (7.1)
26-30 years	109 (43.1)
31-35 years	67 (26.5)
> 35 years	59 (23.3)
Gender	
Female	173 (68.4)
Male	80 (31.6)
Education	
Associate degree	28 (11.1)
Bachelor's degree	207 (81.8)
Postgraduate degree	18 (7.1)
Type of ICU ward	
Mixed/General	89 (35.2)
General surgery	36 (14.2)
Internal medicine	87 (34.4)
Coronary/Cardiology	41 (16.2)
Work experience (years)	
General	7.61±5.50
As an critical care nurse	4.83±3.54
General work experience (categorical)	
1-5 years	111 (43.9)
6-10 years	74 (29.2)
11-15 years	50 (19.8)
> 15 years	18 (7.1)
Critical care nurse work experience (categorical)	
1-3 years	107 (42.3)
4-6 years	77 (30.4)
7-10 years	40 (15.8)
> 10 years	29 (11.5)
Status of any receiving delirium training (for last 1 year)	
Yes	69 (27.3)
No	184 (72.7)
If 'yes', was this training sufficient and up to date?	
Yes	24 (34.8)
No	45 (65.2)
Status of daily delirium assessment in ICU	
Yes	110 (43.5)
No	143 (56.5)

M: mean, SD: standard deviation, ICU: Intensive care unit, a: multiple answers.

Table 1. Continued

Characteristics	n (%) or M±SD
If not, what do you think is/are the reason(s)?^a	
(a) Workload	42 (21.3)
(b) Complexity of conducting cognitive testing	50 (25.4)
(c) Considering 'normal' as it is common in ICU	33 (16.7)
(d) Believing that it has no effect on patient outcomes	25 (12.7)
(e) Absence of a hospital-based training	47 (23.9)
The importance of assessing delirium	
(a) Very important	103 (40.7)
(b) Important	73 (28.9)
(c) Neither important or Unimportant	44 (17.4)
(d) Unimportant	24 (9.5)
(e) Very Unimportant	9 (3.6)

M: mean, SD: standard deviation, ICU: Intensive care unit, a: multiple answers.

The nurses were compared with respect to their delirium assessment status and delirium training status for items with a high rate of wrong answers (Items 8, 13 and 14; Table 3). The rate of correct answers by those who assess delirium in their ICU and those who do not were similar. This was the same for the comparison between those who received delirium training and those who did not. No significant differences were found in the chi-square analyses ($p>0.05$).

The relationship between nurses' total DCQK-T scores and their characteristics was also examined (Table 4). As the age of the participants increased, the score of delirium care knowledge increased significantly ($p=0.30$). The DCQK-T scores were significantly higher with more than 15 years of professional experience than those with 1–5 years, 6-10 years or 11–15 years ($p=0.01$). Participants with more experience as CCN also scored significantly higher (10.18 ± 2.30 points for 1-3 years, 10.53 ± 2.12 points for 4-6 years, 11.20 ± 2.43 points for 7-10 years, and 12.06 ± 1.90 points for > 10 years; $p=0.001$).

Table 2. Scores and correct response rates of all items and sections (N = 253)

Items	Percentage of correct answer (%)	M ± SD	Max. Score
Symptoms, types, and outcomes	71.1	3.55±1.09	5
Item 1 (Features of delirium)	87.7		
Item 2 (Signs and symptoms #1)	67.2		
Item 7 (Signs and symptoms #2)	76.7		
Item 8 (Sub-type of delirium)	45.1		
Item 10 (Delirium outcomes)	79.1		
High risk groups	71.4	2.14±0.87	3
Item 3 (Risk groups #1)	72.7		
Item 4 (Risk groups #2)	76.3		
Item 5 (Risk groups #3)	65.2		
Predisposing and precipitating factors	81.5	3.26±0.93	4
Item 6 (Cause of delirium)	87.4		
Item 9 (Risk factors-older patient)	85.8		
Item 11 (Predisposing factors)	76.3		
Item 12 (Precipitating factors)	76.7		
Assessment and detection	42.7	1.70±1.02	4
Item 13 (CAM-ICU assessment #1)	32.8		
Item 14 (CAM-ICU assessment #2)	26.9		
Item 15 (PRE-DELIRIC detection #1)	51.4		
Item 16 (PRE-DELIRIC detection #2)	59.7		
Total score	66.6	10.66±2.29	16

M: mean, SD: standard deviation; CAM-ICU: The Confusion Assessment method for the Intensive Care Unit; PRE-DELIRIC: PREdiction of DELIRium in Intensive Care Unit patients

Table 3. A comparison of nurses based on their delirium assessment and training status for the questions with a high percentage of wrong answers (N = 253)

Items		Delirium assessment			Delirium training		
		Yes (%)	No (%)	p value	Yes (%)	No (%)	p value
Item 8 ^a	Correct	48.2	51.8	0.166	28.1	71.9	0.796
	Incorrect	39.6	60.4		26.6	73.4	
Item 13 ^b	Correct	44.6	55.4	0.805	22.9	77.1	0.274
	Incorrect	42.9	57.1		29.4	70.6	
Item 14 ^b	Correct	41.2	58.8	0.654	23.5	76.5	0.418
	Incorrect	44.3	55.7		28.6	71.4	

a: Question about delirium subtypes; b: Questions about CAM-ICU assessment.

Significance value: p<0.05

Discussion

The primary objective of this study was to evaluate the level of knowledge among CCNs about providing appropriate care to patients with delirium. Additionally, potential relationships between CCNs' knowledge

levels and their demographic and professional characteristics were examined. The findings provide valuable information about nurses' knowledge of delirium care and highlight key areas that need attention to improve education and practice related to delirium for nurses.

Table 4. The relationship between nurses' characteristic variables and questionnaire performance (N = 253)

Demographic Variables		Total Performance	Test statistics
Age	20-25 years	10.27±2.67	H= 8.976 ^a , p= 0.030*
	26-30 years	10.19±2.29	
	31-35 years	10.98±1.93	
	> 35 years	11.30±2.40	
Gender	Male	10.22±2.34	z= -1.860 ^b , p= 0.063
	Female	10.87±2.25	
Education	Associate	9.90±2.14	H= 2.388 ^a , p= 0.303
	Bachelor's	10.71±2.31	
	Post-graduate	10.94±2.20	
Type of ICU ward	Mixed/General	10.24±2.34	H= 7.655 ^a , p= 0.054
	General surgery	10.69±1.98	
	Internal medicine	10.21±2.10	
	Coronary/Cardiology	11.39±2.65	
Work experience (General)	1-5 years	10.11±2.30	H= 11.147 ^a , p= 0.011*
	6-10 years	11.00±2.12	
	11-15 years	11.38±2.20	
	> 15 years	11.72±2.56	
Work experience (As an critical care nurse)	1-3 years	10.18±2.30	H= 18.956 ^a , p= 0.001*
	4-6 years	10.53±2.12	
	7-10 years	11.20±2.43	
	> 10 years	12.06±1.90	
Previous training	Yes	10.76±2.27	z= -0.030 ^b , p= 0.976
	No	10.63±2.31	
Delirium assessment	Yes	10.94±2.36	z= -1.737 ^b , p= 0.082
	No	10.45±2.23	

ICU: Intensive care unit; a: Kruskal-Wallis H Test; b: Mann Whitney U test; *: significance value (p<0.05).

The findings of our study revealed that the CCNs had a moderate level of knowledge about delirium care (mean correct response rate = 66.6%). This finding supports previous studies that have shown that healthcare professionals, especially nurses, often have deficiencies in their understanding and implementation of delirium management and assessment (17-20). In addition, increasing years of overall work experience and ICU experience with age were associated with higher delirium care knowledge scores. This linear relationship between work experience and delirium care knowledge has also been highlighted in previous studies (11,17,21). As in many professions, experiences gained during work are an important source of knowledge in nursing (22,23).

Nurses with more experience may have a higher level of knowledge about the patient care management due to practical experience and ongoing professional development. We believe that experienced nurses can be key figures in providing continues learning and also mentor colleagues in delirium knowledge and management.

The distribution of the correct responses across the sections of the DCKQ-T highlights variations in knowledge domain mastery. The relatively high rates of correct responses in the symptoms, high-risk groups, predisposing and precipitating factors sections suggest that CCNs may have a more robust understanding of recognizing delirium symptoms, distinguishing high-risk patients, and identifying

factors that contribute to delirium risk. On the other hand, low rates of correct responses to questions about delirium subtypes and the assessment and detection of delirium indicate the need for targeted educational interventions in these specific areas. One possible explanation for this finding might be attributed to the lack of a daily standardized delirium evaluation protocol in the ICUs of the study centers. Instead, patients are assessed only when delirium is suspected, which can lead to the detection of cases of hyperactive delirium that are easily identified simply because the patient is agitated (24). Hyperactive patients exhibit characteristic heightened psychomotor behaviors or “positive symptomatology,” ranging from mild agitation to combativeness, or even psychosis (25). Although hyperactive delirium may be more easily recognized, studies have shown that the hypoactive delirium type, which is characterized by decreased psychomotor activity, is generally overlooked because of its “silent” symptoms and is even more common than hyperactive delirium (50–55.6% for the hypoactive type, 11–34.0% for the hyperactive type) (26,27). It is critical that nurses have a high level of awareness of all delirium subtypes because a recent meta-analysis of 20 studies and 26,442 adult ICU patients reported that hypoactive delirium was associated with higher mortality compared to hyperactive and mixed delirium (28). This meta-analysis also showed that hypoactive delirium was missed in two-thirds of adult ICU patients. Among the ICU healthcare team, nurses are those who spend the most time with ICU patients during continuous monitoring and care (29). Therefore, they are in a key position in helping to identify patients at risk of delirium, detecting acute cognitive changes in the patient, and applying necessary preventive interventions. With appropriate training given to nurses and on-site practices, hypoactive delirium cases can be prevented from being overlooked, and thus, mortality can be reduced with the correct diagnosis.

The fact that the rate of correct answers to items 8, 13 and 14 was similar among the nurses who reported that they received or did not receive delirium training highlights the inadequacy of the training provided

and the urgency of the need for more training. The low level of knowledge about assessment, especially among nurses who reported that they performed delirium assessment is striking. We believe that this may lead to misdiagnosis due to incomplete or incorrect assessment, reduce the accuracy of assessments and lead to high false positive and incomplete assessment rates. In light of these results, it is important to emphasize the necessity of up-to-date and continuing training to be provided by hospital management. To eliminate the lack of knowledge about delirium care and increase the number of correctly diagnosed delirium cases, we believe that it would be beneficial to plan institution-specific trainings. Theoretical trainings is a potentially effective strategy for improving nurses’ delirium-related knowledge and their ability to recognize and manage delirium (30). However, the effectiveness of theoretical training may decrease or disappear over time. Therefore, it may be more effective to use various approaches in combination with theoretical training. A quasi-experimental study found that multi-modal delirium training (online didactics with video simulation and 1:1 bedside coaching) provided to nurses increased their knowledge and confidence in performing delirium assessment (31). Another study examined the impact of an interactive e-learning program comprising four sections on preventing, diagnosing, screening, and treating delirium for CCNs (32). The intervention group demonstrated significantly higher mean scores in delirium recognition skills compared to the control group.

The findings of our study indicated that more efforts are needed to improve the quality of delirium care education. In Turkey, many public and university hospitals under the Ministry of Health carry out “Critical Care Nursing Certificate” programs. In addition, several associations related to ICUs organize Critical Care Nursing courses, and some hospitals offer in-house training and seminars. We believe that further research is necessary to analyze the content of delirium care education offered in these courses or programs. It is important that the content

of delirium care training is developed in line with the recommendations in the PADIS guidelines.

Strengths and limitations

One of the strengths of this study is that it was a multi-center study performed in the 4th largest city in Turkey. Another strength is that an up-to-date, evidence-based, valid and reliable assessment tool was used to determine the nurses' knowledge about delirium care, and the psychometric properties of the Turkish version of this tool were tested and presented to the use of the nursing community in Turkey.

However, this study has some limitations. Since the study was completed with volunteer nurses in the centers, nurses who participated voluntarily may have shown more interest in the subject than those who decided not to participate, which may have led to selection bias. Given the timing of the study, which was conducted shortly after the pandemic, it is possible that the level of knowledge measured may have been lower due to missed training that would normally have been followed, and therefore may not be an adequate representation of the level of knowledge in a 'normal situation'.

Conclusion

According to the findings of the present study, CCNs show acceptable levels of knowledge on delirium symptoms, outcomes, predisposing and precipitating factors, and high-risk groups. However, there are gaps in knowledge on delirium subtypes and detection. Future studies and training programs should focus on improving the ability of CCNs to accurately detect and assess delirium with current delirium assessment tools.

Ethical approval

This study has been approved by the Bursa Uludağ University Health Sciences Research and Publication

Ethics Committee (approval date: 30.03.2022, number: 2022-03/09). Written informed consent was obtained from the participants.

Author contribution

Study conception and design: ÖED; data collection: GÇ, HES, VD, FK; analysis and interpretation of results: ÖED, YY; draft manuscript preparation: ÖED, GÇ, HES, VD, YY, FK. The author(s) reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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