

# *Awareness and knowledge levels of intensive care nurses about patient follow-up in intensive care unit*

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## **Abstract**

**Objective:** The aim of this study was to determine the awareness and knowledge levels of intensive care nurses about patient follow-up.

**Methods:** This descriptive study was conducted with 87 nurses working in the intensive care units of a training and research hospital in Istanbul between 01 May and 01 June 2021. The data were collected using the "Sociodemographic Characteristics Form", "Intensive Care Nursing-Patient Follow-up Awareness Form" and "Intensive Care Nursing-Patient Follow-up Knowledge Form" prepared by the researchers.

**Results:** The mean age of the intensive care nurses participating in the study was 25.47±2.58 years, the average working time in the profession was 3.08±2.13 years, and the average working time in the intensive care unit was 2.25±1.58 years. The mean score of the awareness level of nurses regarding

patient follow-up was  $100.54 \pm 11.66$ , and the mean knowledge level score was  $69.98 \pm 15.21$ . As the duration of working time in the profession and in the intensive care unit increased, the level of knowledge of the nurses about patient follow-up also increased ( $p < 0.05$ ).

**Conclusion:** Although the majority of nurses had a high level of awareness about patient follow-up in the intensive care unit, their level of knowledge was determined to be moderate. Regular theoretical and practical training programs should be organized for the elements of patient follow-up in the intensive care unit, and nurses should be encouraged to participate in certificate programs.

**Keywords:** awareness, intensive care units, knowledge, nursing care.

## *Yoğun bakım hemşirelerinin hasta takibine ilişkin farkındalık ve bilgi düzeyleri*

### **Özet**

**Amaç:** Bu çalışma, yoğun bakım hemşirelerinin hasta takibine ilişkin farkındalık ve bilgi düzeylerinin belirlenmesi amacıyla yapılmıştır.

**Gereç ve Yöntemler:** Tanımlayıcı tipte planlanan bu çalışma 01 Mayıs-01 Haziran 2021 tarihleri arasında İstanbul'da bir eğitim ve araştırma hastanesinin yoğun bakım ünitelerinde görev yapan 87 hemşire ile yapılmıştır. Veriler, araştırmacılar tarafından hazırlanan "Sosyodemografik Özellikler Formu", Yoğun Bakım Hemşireliği Hasta Takibi Farkındalık Formu" ve "Yoğun Bakım Hemşireliği Hasta Takibi Bilgi Formu" ile toplanmıştır.

**Bulgular:** Çalışmaya katılan yoğun bakım hemşirelerinin yaş ortalamaları  $25.50 \pm 2.58$ , meslekte çalışma süreleri ortalamaları  $3.10 \pm 2.11$  yıl ve yoğun bakım ünitesinde çalışma süreleri ortalamaları  $2.22 \pm 1.58$  yıldır. Hemşirelerin hasta takibine ilişkin farkındalık düzeyi puan ortalaması  $100.54 \pm 11.66$ , bilgi düzeyi puanı ortalamaları  $69.98 \pm 15.21$ 'dir. Hemşirelerin meslekte ve yoğun bakım ünitesinde çalışma süreleri arttıkça, hasta takibine ilişkin bilgi düzeylerinin de arttığı belirlenmiştir ( $p < 0.05$ ).

**Sonuç:** Bu çalışmada hemşirelerin büyük çoğunluğunun yoğun bakım ünitesinde hasta takibine ilişkin farkındalık düzeyleri yüksek olarak bulunsa da bilgi düzeylerinin orta düzeyde olduğu belirlenmiştir.

Yoğun bakım ünitesinde hasta takibinin unsurlarına yönelik düzenli teorik ve pratik eğitim programları düzenlenmeli ve hemşireler sertifika programlarına katılmaya teşvik edilmelidir.

**Anahtar sözcükler:** Yoğun bakım üniteleri, bilgi düzeyi, farkındalık, hemşirelik bakımı

## **INTRODUCTION**

The Intensive Care Unit (ICU) is the area where patients with or with the risk of developing life-threatening organ dysfunction are managed by a specialist multi-disciplinary team using patient-focussed technological equipment (Marshall et al.,2017). Within the ICU team, the healthcare professionals spending the most time with patients are the nurses. The main aim of ICU nursing is to provide individual care for each patient by observing and evaluating the physiological, psychological, emotional and social needs of the patient (Akbal, 2017). ICU nurses rapidly evaluate patients with the subjective and objective data obtained and apply the necessary care and treatment interventions (Terzi and Kaya, 2011).

Developments in the treatment and care of ICU patients are reflected in nursing profession and have brought about significant advances in the independent roles of nursing. One of the most important of these roles is the oldest and most traditional role of care-giving (Koç, 2011). The caregiving role of ICU nurses is a role undertaken independently of the process of specific care planning and the taking of measures to regain the well-being of the patient. Included in the caregiving role of ICU nurses are the hemodynamic monitorization, preparation for extubation with follow-up of intubation and mechanical ventilation, evaluation of blood gases and basic interventions such as aspiration, drug administration, pain management, nutritional support, oral care, and prevention of pressure wounds (Akbal, 2017).

ICUs are units where complications are frequently encountered. Moreover, the hemodynamic status of patients in these units can change very quickly. The ability to minimise unexpected situations and complications depends on advanced technological equipment, good organisation, and a sufficient number of qualified healthcare professionals (Akyol and Kankaya, 2017).

ICU nurses are healthcare professionals who may encounter changes in the patient's condition at any moment and must make instant, rapid decisions by being the first within the team to determine these changes in emergency conditions (Koç, 2011). The approach of ICU nurses to critical patients requires them to be cognitively, emotionally, and physically capable of making decisions and taking action to manage emergency conditions and rapidly changing clinical conditions. To be able to achieve this,

nurses must have experience together with specific knowledge, technical skills, awareness, decision-making ability, and compliance with team work (Akyol and Kankaya, 2017; Khamali et al., 2018).

Intensive care nurses should perceive and adopt evidence-based practices well, follow innovations in the field of health and technology closely, participate in orientation and repetitive in-service trainings on their basic education and professional skills (Feeley and Gardner, 2006; Aktaş et al., 2017). They are problem-solving, have critical thinking skills and act in collaboration with the team (Messick et al., 2019). It is stated that different aspects of knowledge sharing affect innovation differently depending on the strength of quality of care control within the unit (Li-Ying et al., 2016).

Intensive care nurses primarily consider themselves competent in fulfilling the basic skills, duties and responsibilities of nursing. Intensive care nurses should have the responsibility that requires being willing, having a certain knowledge and being able to implement their own decisions (Korkmaz, 2011). Nurses' participation in decision-making processes increases their control in nursing practices, their participation in management increases their productivity and performance (Wu, M et al., 2016). In order to transform the performance of intensive care nurses into productivity, it is necessary to have nurses in numbers and qualifications that will enable them to be empowered and to provide a working environment away from workload and stress. In Saraçoğlu's (2010) study, it is stated that nurses do non-duty jobs (Saracoglu, 2010). This can cause loss of time and burnout. Increasing the number of certified nurses in intensive care units in order to increase the quality of care will be possible by regulating working hours, providing support for continuous trainings, courses, participation in congresses and symposiums.

In this study, it was aimed to determine the levels of knowledge and awareness of ICU nurses about patient follow-up.

## **METHODS**

Ethical approval was obtained from the Ethics Committee of the university hospital (decision no: B.10.1.TKH.4.34.H.GP.0.01/226, dated: 05.08.2021). The study was conducted with intuitional permission from the hospital and all procedures were applied in compliance with the principles of the

Helsinki Declaration. Verbal informed consent was obtained from all the nurses participating in the study.

The study was planned as a descriptive type and conducted with nurses working in the ICUs of a training and research hospital in Istanbul/Turkey between 1 May and 1 June 2021. The study universe was formed of 104 nurses working in secondary and tertiary level ICUs. It was aimed to reach the whole study universe without sample selection. The study sample consisted of 87 nurses who were actively working in the hospital at the time of data collection and voluntarily agreed to participate in the study.

The data were collected using the "Sociodemographic Characteristics Form", "Intensive Care Nursing-Patient Follow-up Awareness Form" and "Intensive Care Nursing-Patient Follow-up Knowledge Form" prepared by the researchers.

**Sociodemographic characteristics form:** This form included 6 questions to elicit from the ICU nurses of age, gender, unit of work, duration of professional experience, duration of ICU experience, and having an ICU nursing certificate.

**Intensive care nursing-patient follow-up awareness form:** This form was prepared by the researchers and included a total of 22 items in sections of monitorization (items 1, 2), mechanical ventilation (items 3, 4), blood gases (items 5, 6), aspiration (item 7), extubation criteria (item 8), drug administration (items 9, 10), pain (items 11, 12), nutrition (items 13, 14, 15), oral hygiene (items 16, 17), and pressure wounds (items 18, 19, 20, 21, 22). The responses to each item were scored from 1-5, where 1= "I completely disagree" and 5= "I completely agree", and thus the total score ranged from 22 to 110. The Cronbach's alpha coefficient of the form was calculated as 0.96

**Intensive care nursing-patient follow-up knowledge form:** This form was prepared by the researchers and included a total of 95 items related to monitorization (17 items), mechanical ventilation (12 items), blood gases (9 items), aspiration (6 items), extubation criteria (5 items), drug administration (20 items), pain (7 items), nutrition (7 items), oral hygiene (5 items), and pressure wounds (7 items). The responses to each item are in the form of "true" or "false", with each true response scored as 1 point and each false response as 0. The level of knowledge was calculated from the number of correct responses giving a maximum total of 95 points. The Cronbach's alpha coefficient of the form was calculated as 0.94.

**Statistical Analyses:** Data obtained in the study were analysed statistically using SPSS. 21.0 software. Continuous variables were stated as mean  $\pm$  standard deviation, minimum and maximum values and categorical variables as number and percentage. Conformity of continuous variables to normal distribution was assessed with the Kolmogorov-Smirnov test. Comparisons between the groups related to descriptive statistics were evaluated with the Mann Whitney U-test, One-Way ANOVA, and Pearson correlation analysis. A value of  $p < 0.05$  was accepted as statistically significant.

## RESULTS

The study included 87 nurses, comprising 72 (82.8%) females and the mean age was  $25.47 \pm 2.58$  years. The mean duration of professional experience was  $3.08 \pm 2.13$  years and duration of working in ICU was  $2.25 \pm 1.58$  years. Of the nurses, 46% (n=40) worked in Anaesthesia ICU. An ICU nursing certificate was held by 13 (14.9%) nurses (Table 1).

**Table- 1 Demographic characteristics of the ICU nurses**

	$\bar{X} \pm (SD)$	Min	Max
<b>Age (years)</b>	25.47 $\pm$ 2.58	20	32
<b>Professional experience (years)</b>	3.08 $\pm$ 2.13	1	9
<b>ICU experience (years)</b>	2.25 $\pm$ 1.58	1	8
		<b>N</b>	<b>%</b>
<b>Gender</b>	Female	72	82.8
	Male	15	17.2
<b>Unit of Work</b>	Anaesthesia ICU	40	46
	Chest Diseases ICU	18	20.7
	Neurology ICU	11	12.6
	Internal Diseases ICU	10	11.5
	Cardiology ICU	8	9.2
<b>ICU nursing certificate</b>	Yes	13	14.9
	No	74	85.1

ICU: Intensive Care unit

The mean points of the awareness and knowledge levels of the nurses related to ICU patient follow-up are shown in Table 2. The mean score of the awareness level of nurses regarding patient follow-up was  $100.54 \pm 11.66$  (range, 30-110) and the mean knowledge level score was  $69.98 \pm 15.21$  (range, 0-85).

**Table 2-** The mean points of the patient follow-up awareness and knowledge levels of the ICU nurses

	$\bar{X} \pm SD$	Min	Max
<b>Awareness Level</b>	100.54±11.66	30	110
<b>Knowledge Level</b>	69.98±15.21	0	85
<i>Monitorization</i>	11.32±3.01	0	15
<i>Mechanical Ventilation</i>	8.45±2.43	0	11
<i>Blood Gases</i>	6.02±2.12	0	10
<i>Aspiration</i>	4.82±1.18	0	6
<i>Extubation Criteria</i>	3.92±1.43	0	6
<i>Drug Administration</i>	14.87±4.04	0	20
<i>Pain</i>	5.50±1.12	0	7
<i>Nutrition</i>	4.93±1.58	0	7
<i>Oral Care</i>	4.06±0.97	0	5
<i>Pressure Wounds</i>	6.08±1.28	0	7

The correlations between the awareness level and the knowledge level are shown in Table 3. A statistically significant positive correlation was determined between the total awareness level and the total knowledge level of the nurses related to ICU patient follow-up ( $r=0.296$ ,  $p<0.001$ ). As the awareness related to patient follow-up of the ICU nurses increased, the knowledge levels increased. A statistically significant positive correlation was determined between the awareness levels of the nurses and the aspiration ( $r=0.256$ ), extubation criteria ( $r=0.308$ ), drug administration ( $r=0.336$ ), nutrition ( $r=0.344$ ), and oral care ( $r=0.216$ ) sub-dimensions of the knowledge level ( $p<0.001$ ).



**Table 3-** The correlations between the points of the patient follow-up awareness and knowledge levels of the ICU nurses

	A	B	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Awareness Level (A)	1											
Knowledge Level (B)	<b>0.296*</b>	1										
Monitorization (B1)	0.181	<b>0.888*</b>	1									
Mechanical Ventilation (B2)	0.148	<b>0.813*</b>	<b>0.746*</b>	1								
Blood Gases (B3)	0.153	<b>0.721*</b>	<b>0.640*</b>	<b>0.573*</b>	1							
Aspiration (B4)	<b>0.256*</b>	<b>0.768*</b>	<b>0.666*</b>	<b>0.562*</b>	<b>0.476*</b>	1						
Extubation Criteria (B5)	<b>0.308*</b>	<b>0.790*</b>	<b>0.671*</b>	<b>0.562*</b>	<b>0.540*</b>	<b>0.578*</b>	1					
Drug Administration (B6)	<b>0.336*</b>	<b>0.880*</b>	<b>0.715*</b>	<b>0.687*</b>	<b>0.497*</b>	<b>0.672*</b>	<b>0.650*</b>	1				
Pain (B7)	0.151	<b>0.721*</b>	<b>0.606*</b>	<b>0.519*</b>	<b>0.479*</b>	<b>0.460*</b>	<b>0.526*</b>	<b>0.592*</b>	1			
Nutrition (B8)	<b>0.344*</b>	<b>0.751*</b>	<b>0.607*</b>	<b>0.468*</b>	<b>0.491*</b>	<b>0.586*</b>	<b>0.633*</b>	<b>0.578*</b>	<b>0.578*</b>	1		
Oral Care (B9)	<b>0.216*</b>	<b>0.601*</b>	<sup>0.428*</sup>	<b>0.414*</b>	<b>0.288*</b>	<b>0.550*</b>	<b>0.439*</b>	<b>0.554*</b>	<b>0.380*</b>	<b>0.473*</b>	1	
Pressure Wounds (B10)	0.193	<b>0.668*</b>	<b>0.491*</b>	<b>0.400*</b>	<b>0.453*</b>	<b>0.474*</b>	<b>0.563*</b>	<b>0.492*</b>	<b>0.605*</b>	<b>0.623*</b>	<b>0.456*</b>	1

r= Pearson Correlation

\*p<0.001

When the relationships between awareness and knowledge level and other characteristics of the ICU nurses were examined, no significant relationship was determined between age and gender and the awareness and knowledge level ( $p>0.05$ ). A statistically significant positive relationship was determined between the duration of professional experience of the nurses and the pain ( $r=0.236$ ) and pressure wounds ( $r=0.275$ ) sub-dimensions of knowledge level and between the duration of working in ICU and the total knowledge level ( $r=0.228$ ), and the pain ( $r=0.302$ ), nutrition ( $r=0.263$ ) and pressure wounds ( $r=0.307$ ) sub-dimensions of knowledge level ( $p<0.05$ ) (Table 4, Table 5).

**Table - 4** The relationships between the points of the patient follow-up awareness and knowledge levels and some characteristics of the ICU nurses

	Age		Professional experience		ICU experience	
	r	p	r	p	r	p
Awareness Level	-0.019	0.864	0.173	0.109	0.183	0.089
Knowledge Level	-0.102	0.349	0.105	0.332	<b>0.228</b>	<b>0.033*</b>
<i>Monitorization</i>	-0.187	0.082	0.001	0.990	0.122	0.260
<i>Mechanical Ventilation</i>	-0.164	0.129	0.022	0.839	0.188	0.081
<i>Blood Gases</i>	-0.136	0.210	-0.039	0.720	0.099	0.363
<i>Aspiration</i>	-0.121	0.266	-0.017	0.874	0.119	0.271
<i>Extubation Criteria</i>	-0.116	0.286	0.071	0.515	0.132	0.221
<i>Drug Administration</i>	-0.058	0.595	0.125	0.248	0.203	0.059
<i>Pain</i>	0.098	0.368	<b>0.236</b>	<b>0.028*</b>	<b>0.302</b>	<b>0.005*</b>
<i>Nutrition</i>	0.022	0.838	0.195	0.071	<b>0.263</b>	<b>0.014*</b>
<i>Oral Care</i>	0.031	0.776	0.116	0.285	0.142	0.188
<i>Pressure Wounds</i>	0.055	0.610	<b>0.275</b>	<b>0.010*</b>	<b>0.307</b>	<b>0.004*</b>

r= Pearson Correlation

\*p<0.05

**Table- 5** The relationships between the points of the patient follow-up awareness and knowledge levels and some characteristics of the ICU nurses

Gender		ICU Nursing Certificate				Intensive Care Unit					
Female $\bar{X} \pm SD$	Male $\bar{X} \pm SD$	$Z_{MWU}$ p	Yes $\bar{X} \pm SD$	No $\bar{X} \pm SD$	$Z_{MWU}$ P	Chest Diseases $\bar{X} \pm SD$	Cardiology $\bar{X} \pm SD$	Internal Diseases $\bar{X} \pm SD$	Neurology $\bar{X} \pm SD$	Anaesthesia $\bar{X} \pm SD$	F p
100.47±12.32	100.87±8.11	- 0.259 0.795	105.15±5.3 0	99.73±12.2 9	-1.691 0.091	101.11±8.6 6	102.37±6.4 3	104.40±8.5 7	96.00±8.73	100.20±14.5 8	0.751 0.560
70.01±13.96	69.80±20.79	- 0.641 0.521	77.61±5.30	68.63±15.9 9	<b>-2.127</b> <b>0.033*</b>	76.67±4.65	73.87±3.60	78.20±4.98	45.81±20.0 8	70.77±13.52	<b>13.925</b> <b>0.000*</b>
11.19±2.89	11.93±3.59	- 1.409 0.159	12.85±1.82	11.05±3.11	<b>-2.058</b> <b>0.040*</b>	12.28±1.60	11.37±0.52	12.00±1.25	6.19±2.86	12.12±2.78	<b>15.600</b> <b>0.000*</b>
8.42±2.40	8.60±2.64	- 0.435 0.664	10.00±0.91	8.17±2,51	<b>-3.001</b> <b>0.003*</b>	9.61±0.04	8.87±0.99	9.50±1.08	5.54±3.61	8.65±1.86	<b>14.010</b> <b>0.000*</b>
6.04±2.03	5.93±2.60	- 0.028 0.977	6.46±1.90	5.94±2.16	-0.536 0.592	6.33±1.89	5.75±1.58	7.00±1.70	3.27±2.00	6.45±2.13	<b>7.349</b> <b>0.000*</b>
4.79±1.12	4.93±1.44	- 1.075 0.282	5.38±0.87	4.72±1.20	<b>-2.561</b> <b>0.010*</b>	5.22±0.73	4.75±0.71	5.20±0.92	3.54±1.91	4.90±1.01	<b>4.782</b> <b>0.002*</b>
3.90±1.39	4.00±1.65	- 0.571 0.568	4.69±0.63	3.78±1.49	<b>-2.019</b> <b>0.044*</b>	4.89±0.96	4.12±1.36	4.40±0.70	0.09±1.37	3.82±1.32	<b>9.708</b> <b>0.000*</b>
14.89±3.97	14.80±4.55	- 0.023 0.982	16.15±1.62	14.65±4.30	-0.888 0.374	16.72±1.67	17.62±0.74	16.80±2.35	9.54±5.45	14.47±3.69	<b>10.535</b> <b>0.000*</b>
5.60±0.99	5.07±1.58	- 1.292 0.196	5.77±0.72	5.46±1.17	-0.710 0.478	5.55±0.70	6.12±0.64	6.60±0.70	4.09±1.58	5.47±0.88	<b>10.785</b> <b>0.000*</b>
4.86±1.55	5.27±1.75	- 1.214 0.225	5.54±1.13	4.82±1.63	-1.469 0.142	5.17±0.98	5.25±1.28	5.60±1.07	3.36±1.69	5.02±1.72	<b>3.794</b> <b>0.007*</b>
4.10±0.89	3.87±1.30	- 0.458 0.647	4.38±0.51	4.00±1.02	-1.124 0.261	4.61±0.50	3.50±0.75	4.40±0.52	3.91±1.51	3.87±0.96	<b>3.150</b> <b>0.018*</b>

$Z_{MWU}$ : Mann Whitney U-test

F: One-Way Anova

A statistically significant relationship was determined between the having an ICU nursing certificate and the total knowledge level ( $Z=-2.127$ ), and the monitorization ( $Z=-2.058$ ), mechanical ventilation ( $Z=-3.001$ ), aspiration ( $Z=-2.561$ ), and extubation criteria ( $Z=-2.019$ ) sub-dimensions of knowledge level ( $p<0.05$ ). Nurses with an ICU nursing certificate were determined to have higher knowledge level than nurses without a certificate (Table 5).

In the examination of the awareness and knowledge level of the nurses according to the ICU in which they worked, a statistically significant relationship was determined between the ICUs and the total

knowledge levels ( $F=13.925$ ), and the monitorization ( $F=15.600$ ), mechanical ventilation ( $F=14.010$ ), blood gases ( $F=7.349$ ), aspiration ( $F=4.782$ ), extubation criteria ( $F=9.708$ ), drug administration ( $F=10.535$ ), pain ( $F=10.785$ ), nutrition ( $F=3.794$ ), and oral care ( $F=3.150$ ) as sub-dimensions of knowledge level ( $p<0.05$ ) (Table 5). As a result of post-hoc analysis, the total knowledge level of nurses working in the Chest Diseases ICU and Internal Diseases ICU were determined to be statistically significantly higher than those of nurses working in Neurology ICU ( $p=0.004$ ,  $p=0.003$ ). The difference according to the knowledge points of monitorization, mechanical ventilation, blood gases, extubation criteria, drug administration, pain and nutrition was due to the points of the nurses working in all the other ICUs being statistically significantly higher than those of the nurses in Neurology ICU ( $p<0.001$ ). The difference according to the aspiration knowledge points was due to the statistically significantly higher points of the nurses working in Chest Diseases ICU and Anaesthesia ICU compared to the nurses in Neurology ICU ( $p=0.001$ ,  $p=0.004$ ). The difference according to the oral care knowledge points was due to the statistically significantly higher points of the nurses working in Chest Diseases ICU compared to those of the nurses in Anaesthesia ICU ( $p=0.004$ ).

## **DISCUSSION**

The main aim of intensive care nursing is to provide the necessary care and treatment interventions for patients by evaluating the physiological, psychological, emotional and social needs with the subjective and objective data obtained (Akbal, 2017; Terzi and Kaya, 2011). ICU nurses must be cognitively, emotionally, and physically capable of making decisions and applications in rapidly changing clinical situations. The knowledge and awareness levels of the nurse are important in achieving this capability. As a result of this study that was conducted to determine the levels of awareness and knowledge of ICU nurses related to patient follow-up, it was seen to be a high level of patient follow-up awareness, but the knowledge of the nurses was at a moderate level (Table 2). Studies in literature that have evaluated the knowledge and awareness levels of ICU nurses have usually been based on a single subject, and there are very few studies that have evaluated all the subjects related to patient follow-up together. In a study of 372 nurses, Alastalo et al evaluated the knowledge levels of nurses with a knowledge test and reported a mean knowledge level of 77% (Feeley and Gardner, 2006; Saracoglu, 2010). In a study

conducted with 207 nurses in Turkey, the level of mindfulness of the nurses participating in the research was moderate (Aşık and Albayrak 2021).

The results of this study showed a statistically significant, low-level positive relationship between the patient follow-up awareness and knowledge level of the ICU nurses. As the knowledge levels of the nurses increased, the awareness levels also increased (Table 3). Awareness is the deliberate directing of knowledge and attention to instant experiences, and having knowledge of a subject also brings awareness of that subject (Çatak and Ögel, 2010).

The frequent use of advanced technology devices and medical materials in ICUs makes it necessary for nurses to know how to use these devices and materials, and the hemodynamic effects on the patient. When using devices that require close monitoring such as infusion pumps, mechanical ventilation, and hemodynamic monitorization, nursing interventions are necessary to prevent problems such as pain, feeding problems and pressure wounds that can develop (Çimen and Eti, Arslan, 2020). Prevention of these problems is directly related to the levels of knowledge and awareness of ICU nurses. By predicting potential problems, nurses with a high knowledge level and awareness can undertake interventions to improve patient care quality (Korkmaz and Gür, 2021; Tiryaki and Kelağalar, 2019). Therefore, the positive correlation between knowledge and awareness levels of nurses is an expected result. In a study which evaluated the knowledge/skill, attitude and application of nurses about evidence-based applications, the highest mean points were determined as attitude, knowledge and application, and the knowledge, attitude, and applications of nurses working in ICU with degree-level education were determined to be higher compared to the other groups (AbuRuz et al., 2017; Korkmaz, 2011).

The levels of patient follow-up knowledge and awareness of ICU nurses can be affected by many factors. In this study, while there was no statistically significant relationship between age and gender and the levels of knowledge and awareness, there was a statistically significant relationship between the duration of professional experience and the knowledge level of pain and pressure wounds, and between the total duration of working in ICU and the total knowledge level and knowledge of pain, nutrition and pressure wounds (Table 4, Table 5), The experience gained with duration in the profession has an effect on accumulated knowledge and awareness (Akbal, 2017). In a previous study which evaluated the knowledge levels related to pain of 370 nurses, it was determined a significant correlation between the

knowledge level of the nurses and education level, clinical competence level, and the hospital accreditation category (Wang and Tsai, 2010). In another study of the attitude and knowledge level of ICU nurses related to pressure wounds, it was determined that as the knowledge points increase, the duration of professional experience increased (Khojastehfarb et al., 2020).

In this study, there was a statistically significant relationship between the status of having an ICU nursing certificate and the knowledge level total points and the knowledge levels of monitorization, mechanical ventilation, aspiration, and extubation criteria (Table 5). The knowledge levels of nurses with an ICU nursing certificate were higher than those without a certificate. The ICU nursing certificate program is delivered by healthcare professionals specialised in areas of evidence-based current knowledge about the follow-up, treatment, and care of critical patients in ICU (Çatak and Ögel, 2010). In studies of the nursing care criteria of ICU nurses, it has been reported that repeated theoretical and practical training sessions on updated knowledge and evidence-based applications have increased the levels of awareness and knowledge (Çatak and Ögel, 2010; Çimen and Eti, Arslan, 2020; Xu et al., 2017; Marvanova and Henkel, 2018; Savages, 2015; Faizi et al, 2021; Karimian et al., 2020). In another study that examined the personal competencies of ICU nurses, courses in specialism, expertise and advanced health manoeuvres were seen to achieve a clear improvement in the nurses (Alfieri et al., 2017). A total of 117 ICU nurses were evaluated before and after training with a multiple choice questionnaire and after training with clinical evaluation and a short oral examination, and it was determined that the knowledge levels of the nurses who had participated in the training had increased to a statistically significant level (De Silva et al., 2015).

In this study, a statistically significant relationship was determined between the intensive care unit where the nurses work and all sub-dimensions of knowledge levels except pressure sub-dimension and total knowledge of nurses. (Table 5). It is expected that there will be variability in the knowledge levels according to the patient profile and frequently performed applications in the ICUs in which the nurses work. ICUs are categorised as Levels 1, 2, and 3 according to the treatment and care needs of the patients. In level 1 ICUs, a little more intensive care is required than is given in ward nursing but there is no requirement for life-supporting interventions such as respiratory support. Level 2 ICUs are the units where patients are accepted who require invasive monitorization and vital support treatments in addition

to the Level 1 ICU care. Level 3 ICUs are the units where complicated patients are accepted, such as those with multiple organ dysfunction or failure (URL1). There is a difference in patient characteristics and in the healthcare services required by these patients according to the unit levels, and this difference may affect the knowledge and awareness levels of the nurses working in the relevant units. In the hospital where this study was conducted, the Chest Diseases, Cardiology, and Neurology ICUs are Level 2, and the Internal Diseases and Anaesthesia ICUs are Level 3. That there was a difference in the patient follow-up knowledge levels of the ICU nurses according to the ICU in which they worked can be attributed to this difference between the levels of the units.

## **CONCLUSION**

The results of this study demonstrated high levels of patient follow-up knowledge and awareness of ICU nurses. High levels of knowledge and awareness of nurses related to ICU patient follow-up will have a positive effect on patient care outcomes and will increase the quality of care. To increase the knowledge and awareness levels of ICU nurses, it is recommended to create positive working environments for nurses, to ensure nurses to participate in management, to continue education with ongoing in-service training, to encourage nurses to participate in certificate programs, to evaluate knowledge, attitudes, and behaviours with different training methods, and to consider the recommendations about patient care from nurses with more ICU experience.

**Ethical approval:** Obtained from the Ethics Committee of the university hospital (decision no: B.10.1.TKH.4.34.H.GP.0.01/226, dated: 05.08.2021).

**Author Contribution:** FA, Study conception and design, Data collection, Data analysis and interpretation, Drafting of the article, Critical revision of the article; Öİ and HE, Data analysis, interpretation and Drafting of the article; AÖ, Study conception and design

## **Limitations**

The sampling pool was restricted to nurses at one institution and the participants were also a fairly homogenous group.

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