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Patient Safety Culture Scale in Medication Administration: A Scale Development Study

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Abstract

BACKGROUND/AIMS: Patient safety is an essential concept in all stages of patient care. The aim of this study was to develop the "Patient Safety Culture Scale in Medication Administration" as an assessment tool for safe drug administration, which is a very important concept in patient safety culture.

MATERIALS AND METHODS: This scale-development study was conducted with nurses working in a research hospital in Turkey. An item pool of 45 items was created by the researchers and presented to the experts. In line with expert opinions, an initial scale with 36 items was obtained by excluding 9 items. Exploratory and confirmatory factor analyses, test-retest reliability, and internal consistency analyses were used as the statistical methods.

RESULTS: In this study, a scale was developed to determine the importance that nurses attach to patient safety during drug administration. The final version of the scale comprises 14 items under 3 subscales. The subscales were chosen as "importance, caution, dedication" in order to help define the culture.

CONCLUSION: It can be asserted that the "Patient Safety Culture Scale in Medication Administration" has strong levels of validity and reliability in the assessment. It was observed that the developed scale model is theoretically and statistically appropriate and a valid and reliable assessment tool.

Keywords: Patient safety, medication management, medication mistakes, health care quality, nursing care management

INTRODUCTION

Medical mistakes are among the most important factors that threaten patient safety, and drug administration mistakes are the most common ones.[1] The National Coordinating Council for Medication Error Reporting and Prevention defines a medication mistake as "any preventable event that may lead to inappropriate medication use or patient harm while the medication is administered under the control of the health care professional, patient, or consumer.[2]

The American Food and Drug Administration reports that it receives over 100,000 reports of medication mistakes every year in the United States.[3] Medication mistakes can result in death or a life-threatening situation, infirmity or disability, hospitalization, and congenital anomaly.[4] Medication mistakes, which have such serious effects on human life, must be reported, and preventive developmental activities must be planned. These mistakes are related to the extent to which the patient safety culture has developed in institutions.

In healthcare systems, medication mistakes can occur at any stage of taking drugs to the pharmacy, storing them, administering them, and the disposing wastes.[5] One of these stages is the period that includes the request, acceptance, and administration of drugs.[6] At this stage, nurses

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should have direct contact with patients, should have a good command of all the practices in the care and treatment process, and assume an important role and responsibility in safe drug practices. The principle of non-maleficence is one of the basic principles in nursing care, and in this context, safe medicine practices are among the important responsibilities of the nurses.[7,8]

When the literature is examined, numerous studies have been conducted on patient safety, ranging from scale development on patient safety culture,[9] to system development for patient safety[10] and model/program development.[11] When analyzing from the nursing point of view, national and international studies have been conducted on attitudes and behaviors related to patient safety.[12-14] Studies on safe drug use and drug mistakes often cover incorrect drug administration, factors causing mistakes, and the level of knowledge and attitude of nurses.[15,16]

In these studies, it was observed that there was no scale for patient safety culture specifically designed for safe drug practices. In this sense, this research is a scale-development study on safe drug administration, which is a very important area in terms of patient safety culture, unlike studies on patient safety culture in the literature. This study is original because it focused on a specific area of patient safety. Future studies using this scale can identify cultural concerns related to safe drug administration and can then be investigated in more detail using interventional or pre-post designs.

MATERIALS AND METHODS

The methods used for this study were designed by Kartal and Bardakçı.[17] The following steps were followed in order in the development of the "Patient Safety Culture Scale in Medication Administration". The stages followed in the research are explained below;

- Stage 1: Creation of Draft Scale;

 - Establish an item pool for the draft scale by scanning the literature).

- Stage 2: Ensuring the Content Validity of the Draft Scale;

 - Submitting the item pool to experts for content validity and,

 - Submitting the initial scale to language experts to evaluate the intelligibility of the expressions in the item pool and their compliance with the language rules.

- Stage 3: Evaluation of construct validity of scale;

 - Determining the sample and applying the initial scale,

 - Exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA) were applied to evaluate the construct validity of the scale,

 - Making item analysis of the scale.

- Stage 4: Evaluation of Scale Reliability;

 - Evaluating the reliability of the scale with test-retest reliability,

 - The reliability of the scale was calculated using Cronbach's Alpha internal consistency coefficient.

Sample

The population consisted of 650 nurses working in training and research hospitals in Türkiye. A simple random sampling method was used to determine the sample group. According to the method of sample size calculation for a finite population, the sample size was calculated as 242 with a power of 95%, margin of error of 5%, and effect size of 0.05.[18] Data were collected from 637 nurses in the sample group who were voluntary to participate in the study and filled out the online questionnaires. Links to the prepared forms were sent to the nurses via email, and they were asked to fill them out. 13 nurses did not participate in the study because they declined to participate in the study or were on leave. As suggested by Kartal and Bardakçı,[17] different sample groups should be selected for EFA, CFA, and test-retest. In this context, the nurses were divided into 3 groups. Data were collected from 387 nurses for EFA, 200 nurses for CFA, item analysis, and calculation of Cronbach's alpha coefficient, and 50 nurses for test-retest reliability. Nurses were assigned to the groups using an online randomization program.[19] The data were collected between September 1 and November 1, 2021. Nurses who were not specifically trained in drug safety, worked in clinics where treatments were intensive, had high patient circulation, and who filled out the research form completely were included in the study. Nurses who received drug safety training and completed the forms incompletely were excluded from the study.

Structure of the Scale

A 7-point likert type structure is safer because it is more sensitive than 5-point likert one.[17] For this reason, a 7-point Likert type structure was chosen for the developed scale. The items in the scale are rated as "7= Strongly agree", "6= Agree", "5= Partially agree", "4= Undecided", "3= Partially disagree", "2= Disagree", and "1= Strongly disagree". The scale scores were close to seven, it means that the level of agreement with the statement in that item was high. It approaches one, it signifies low level of agreement.

Establishing an Item Pool

The researchers established the initial pool of items based on a literature review[15,16,20-22] and their expertise. The initial item pool for the scale consisted of 42 positive items and 3 negative items.

Seeking Expert Opinion on Content Validity

To ensure content validity on a scale, all items included in the assessment tool should assess the targeted feature, and all details of the targeted feature should be questioned by the items in the scale. Thus, the assessment tool should have content validity at the level that it assesses the conceptual infrastructure of the quantity it aims to assess.[17] The experts were asked to evaluate each item and the overall scale using a rating scale. The items of the first draft scale were submitted to the opinion of 13 academic experts. These academics also have strong nursing backgrounds. The fields of these experts are surgical diseases nursing, pediatric nursing, internal medicine nursing, obstetrics and gynecology nursing, public health nursing, nursing management, and psychiatric nursing. The experts were reached via a corporate email, and their opinions were obtained. All experts evaluated all questions. After obtaining expert opinions, 9 items were not included in the item pool and were removed from the scale by content validity (CVI, Content Validity Index) analysis. Lawshe's method was used to calculate the CVI. As a result of the analysis, the CVI was 0.95 for the overall scale

and ranged from 0.90 to 0.97 for the items. The significance of the content validity index exceeded 0.80 and was accepted as acceptable.[23] The initial scale was also submitted to translation and grammatical structure experts for review of the 36 items.

Ethical Considerations

Ethics committee approval was obtained from the Adıyaman University Social and Human Sciences Ethics Committee (approval number: 125, date: 29.07.2021) and the permission was obtained from the Ministry of Health of the Republic of Turkey (date: 23.06.2021, form no: 2021-06-23T14_23_07).

Assessment tools were sent to the participants online, and they were asked to respond at a convenient time for them to ensure that their business plans did not disrupt. In addition, they were informed that they could withdraw from the study at any time without being subjected to any negative situations in their work life.

Statistical Analysis

The SPSS v.23.0 and SPSS AMOS Graphics v23.0 programs were used for statistical analysis. Exploratory and CFA, test-retest method, and internal consistency analysis were used as statistical methods. The reliability of the scale was examined by test-retest method and internal consistency analysis.

RESULTS

Sociodemographic Characteristics of the Participants

The majority of nurses participating in the study were female, in the same age range, married, had a bachelor's degree, and worked in internal medicine units. Moreover, 36.4% of them stated that they made a mistake in administering drugs at least once, 33.8% did not consider themselves competent in patient safety, and 87.4% wanted to receive up-to-date training on patient safety (Table 1). Considering the distribution of nurses based on their sociodemographic data, it was observed that the number in each group was sufficient. Nurses were categorized according to their demographic variables. The homogeneity test for these variables is presented in Table 2. Levene's test was used for homogeneity testing; $p>0.05$ indicates that the groups are homogeneous.[24] According to Levene's test, which was performed to check whether the groups were homogeneously distributed, the p-value was calculated as 0.05 <0.867, indicating that the group variances were homogeneously distributed (Table 2).

Findings on Construct Validity

In scale development studies, factor analysis is the most frequently used method to reveal the assessment structure of the scale. As a result of factor analysis, information about the general factor, subscales, and number of subscales was obtained.[17] Using data from the participants, we primarily aimed to determine the assessment structure of the scale. EFA was used on the data. In general, the sample size is requested to be 5-10 times the number of items in the scale. The most important criterion for applying EFA to a dataset is whether the sample is adequate or not. In EFA, Kaiser-Meyer-Olkin (KMO) statistics are considered to determine the adequacy of the sample and the rate of variance among the variables. The KMO test on the initial scale data was calculated as 0.810. In this context, it was determined that the sample adequacy was sufficiently good for EFA. Another important test to apply EFA to a dataset is Bartlett's test of sphericity. A high correlation between variables was sought in the factor analysis. This study aims to determine whether or not the scale is not an identity matrix. As a result of the analysis, it was determined that there was a high and significant correlation between the variables on the initial scale. Furthermore, the sphericity assumption was satisfied (χ^2=1844.160; $p<0.001$).

In order to determine the factor structure of the scale, EFA was applied to 36 items in the initial scale using Principal Component analysis and Varimax Rotation methods. Cross-loading items that did not fit into any factor were determined and removed from the scale. After removing 10

Table 1. Socio-demographic characteristics of the nurses (n=637)

Socio-demographic characteristics	n	%
Gender		
Female	412	64.7
Male	225	35.3
Age		
20-25 years	223	35.0
26-30 years	190	29.8
31 years and above	224	35.2
Marital status		
Married	405	63.5
Single	232	36.5
Educational background		
High school	85	13.4
Associate degree	146	22.9
Bachelor's degree	348	54.6
Postgraduate	58	9.1
Unit		
Internal medicine units	309	48.5
Surgical units	234	36.8
Outpatient clinic	94	14.7
Tenure in the profession		
0-5 years	367	57.6
6-10 years	118	18.6
11-15 years	58	9.1
16 years and above	94	14.7
Have you ever made a medication mistake?		
Yes	232	36.4
No	405	63.6
Do you find yourself sufficient in terms of patient safety?		
Yes	422	66.2
No	215	33.8
Do you want to receive up-to-date patient safety training?		
Yes	557	87.4
No	80	12.6

Table 2. Homogeneity test results according to the demographic variables of nurses

Levene's test	df1	df2	p
0.028	1	184.62	0.867

p>0.05.

items from the scale, EFA was applied to the remaining 26 items, and the results shown in Table 3 were obtained.

The eigenvalue is an important coefficient used to determine the number of factors. An eigenvalue of >1 is used to determine the number of factors to be extracted. This criterion is known as the Kaiser criterion in the literature.[17] According to the EFA result, 3 subscales with an eigenvalue of >1 were obtained within the scope of the Kaiser criterion. The total explained variance is an important criterion for determining the number of subscales and ensuring construct validity. The EFA results revealed that the total variance of the 3 factor initial scale structure was 46.943%. The variance rates explained by the factors were 28.20% for factor 1, 38.073% for factor 2, and 46.943% for factor 3 (Table 3). It is stated that the rate of variance explained by the assessment tool should be at least 40%.[17] In this context, the scale has an explained total variance rate above the lowest explained total variance rate reported in the literature.

In the literature, factor load values of ≥0.45 for items have been reported to be sufficient criteria for item selection.[17] When the factor loadings of the items were evaluated, it was determined that the factor loadings were in the range of 0.602-0.783. In this context, the factor loading levels of the items in the 3 factor model were high and sufficient.

In order to examine the validity of the assessment structure of the scale consisting of 3 subscales and 14 items after EFA, a CFA was conducted using data obtained from an independent sample of 200 nurses using the AMOS 23 program. Fit indices are used to determine whether or not the measurement model designed after CFA is compatible with the data. χ^2/SD, GFI, CFI, TLI, IFI, and Root Mean Square Error of Approximation (RMSEA) are fit indices commonly used in the literature.[25] Table 4 shows the reference intervals of the fit indices and scale values.[26] When the fit indices of the scale were examined as a result of CFA, it can be asserted that χ^2/SD and GFI values showed a good level of fit, wherease IFI, TLI, CF, andd RMSEA values showed an acceptable level of fit. Therefore, the validity of the 3-dimensional assessment structure determined by EFA was verified using an independent sample. Additionally, CFA findings are presented in Figure 1.

It is important that the regression coefficients in CFA are significant. Regression values express the predictive power of the items, namely, the factor loadings. A standard factor load value of >0.40 in CFA is necessary for construct validity.[25] In this context, the regression coefficients obtained by CFA are presented in Table 5.

According to the CFA results, the factor loadings were greater than 0.40 and acceptable in terms of the structure and validity of the scale (Table 5). Another important indicator of construct validity is average variance extracted (AVE) values. If the AVE value, which gives important information about whether items under the factor are in harmony or not, is greater than 0.5, the factor has concordance validity. If the AVE value is less than 0.5, then there is a measurement error; that is, there is no concordance validity.[17] It was determined that the AVE exceeded 0.5 in all factors of the scale (Table 5). Accordingly, it can be concluded that the scale has constructed validity.

Table 3. Results of exploratory factor analysis (n=387)

Subscales	Items	Factor load value	Eigenvalue	Variance (%)	Cumulative variance (%)
Importance	14. I know the absorption time of the drug to be administered.	0.602	6,486	28,201	28,201
	15. I know the importance of recording medication administration errors immediately.	0.769			
	18. I know the importance of reporting medication administration errors.	0.762			
	20. I report when medication administration errors occur.	0.702			
	30. I take precautions to prevent the mixing up of drugs that look and sound (by name) similar to one another.	0.704			
	32. I pay attention to intra-team communication to prevent medication administration errors.	0.618			
Precaution	5. I know the precautions to be taken to prevent medication administration errors.	0.693	2,270	9,871	38,073
	6. I participate in in-service training sessions to prevent medication administration errors.	0.712			
	7. I pay attention to the necessary precautions to prevent medication administration errors.	0.741			
	8. I take the necessary precautions to prevent the development of drug-induced allergy.	0.644			
	9. In the administration of narcotic drugs, I pay attention to practices within the scope of the institution's "Narcotic drug administration procedure".	0.609			
Devotion	11. When the clinic is busy, if the doctor has not written down the medicine/prescription in the patient's file, I follow what was requested the day before. Thus, patients receive their medication on time.*	0.783	2,040	9,871	46,943
	13. I will keep frequently used/difficult-to-find drugs in reserve.*	0.761			
	16. It is more appropriate to keep the medicines brought by patients with them.*	0.777			

*Negative items.

Item Analysis Findings

The item analysis process of the scale, which consists of 3 subscales and 14 items and was determined to have construct validity, was carried out using data collected from 200 nurses. Therefore, item analyses based on both item-total score correlations and lower-upper groups were used. Each of these analyses is used to evaluate whether or not items should be retained.

Item Analysis Based on Item-Total Score Correlation

This analysis was used to examine the correlation between the scores for each item in the scale and the total score of the scale. Items with an item-total correlation coefficient of <0.20 are excluded from the scale. Items with 0.20-0.30 can remain on the scale after evaluation of their remaining on the scale. Items with a coefficient of >0.30 were included in the scale because they were similar to the scale in general.[17]

The item-total correlation coefficient was greater than 0.30 for all 14 items of the scale. Accordingly, since all items on the scale were in the same direction as the entire scale, no item was removed from the scale (Table 6).

Table 4. References of fit indices and scale values

Fit indices	Good fit	Acceptable fit	Scale values
χ^2/SD	≤3	≤5	1.974
GFI	≥0.90	≥0.85	0.911
IFI	≥0.95	≥0.90	0.922
TLI	≥0.95	≥0.90	0.900
CFI	≥0.97	≥0.95	0.958
RMSEA	≤0.05	≤0.08	0.070

GFI: Goodness of fit index, IFI: Incremental fit index, TLI: Tucker-lewis index, CFI: Comparative fit index, RMSEA: Root Mean Square Error of Approximation.

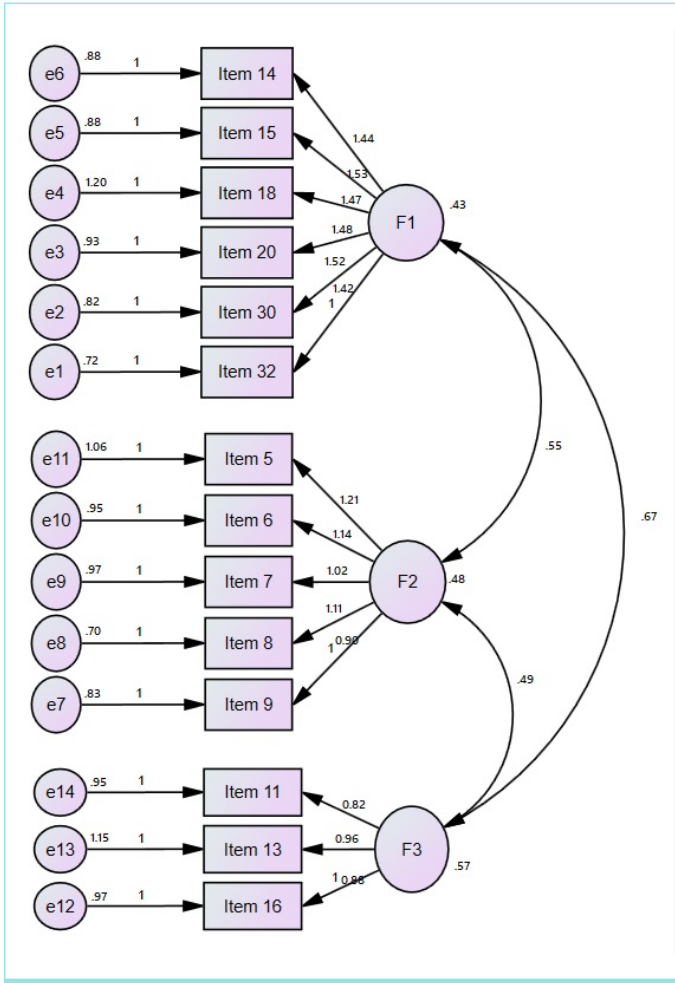

Figure 1. Confirmatory factor analysis results of the patient safety culture scale for the medication administration factor structure.

Table 5. Standard regression coefficients of items as a result of CFA (n=200)

Items	Importance	Precaution	Devotion
14. I know the absorption time of the drug to be administered.	**0.702**	0.553	0.578
15. I know the importance of recording medication administration errors immediately.	**0.819**	0.612	0.542
18. I know the importance of reporting medication administration errors.	**0.801**	0.428	0.603
20. I report when medication administration errors occur.	**0.775**	0.455	0.559
30. I take precautions to prevent the mixing up of drugs that look and sound (by name) similar to one another.	**0.796**	0.632	0.591
32. I pay attention to intra-team communication to prevent medication administration errors.	**0.689**	0.429	0.501
5. I know the precautions to be taken to prevent medication administration errors.	0.482	**0.703**	0.529
6. I participate in in-service training sessions to prevent medication administration errors.	0.379	**0.712**	0.598
7. I pay attention to the necessary precautions to prevent medication administration errors.	0.561	**0.741**	0.497
8. I take the necessary precautions to prevent the development of drug-induced allergy.	0.389	**0.721**	0.566
9. In the administration of narcotic drugs, I pay attention to practices within the scope of the institution's "Narcotic drug administration procedure".	0.474	**0.681**	0.512
11. When the clinic is busy, if the doctor has not written down the medicine/prescription in the patient's file, I follow what was requested the day before. Thus, patients receive their medication on time.*	0.601	0.558	**0.743**
13. I will keep frequently used/difficult-to-find drugs in reserve.*	0.485	0.597	**0.731**
16. It is more appropriate to keep the medicines brought by patients with themselves.*	0.563	0.643	**0.807**
AVE	0.585	0.503	0.579

*Negative items. CFA: Confirmatory factor analysis, AVE: Average variance extracted.

Table 6. Total score correlations							
Item	**Item 5**	**Item 6**	**Item 7**	**Item 8**	**Item 9**	**Item 11**	**Item 13**
Item-total	0.332	0.455	0.370	0.453	0.530	0.368	0.432
Item	**Item 14**	**Item 15**	**Item 16**	**Item 18**	**Item 20**	**Item 30**	**Item 32**
Item-total	0.552	0.484	0.544	0.512	0.609	0.514	0.589

Item Analysis Based on Lower-Upper Groups

In order to select items that have the capacity to discriminate, item total correlation calculation and significance of differences between 27% upper-lower group item averages are used in likert-type scale development studies.[27] The total scale scores obtained with the participation of 200 nurses were ordered from largest to smallest. To examine the discrimination capacities of the 14 items in the scale. The total mean scores of 57 nurses in the 27% upper-lower groups were determined using the independent samples t-test (Table 7). In addition, the overall scale and each item were compared separately (Table 8). When the mean scores of the lower and upper groups were compared, the difference was statistically significant ($p<0.05$).

When the mean scores of the 14 items in the scale were compared between the upper and lower groups, it was determined that there was a significant difference ($p<0.05$). According to the findings, all 14 items in the scale were distinctive and should be retained.

Table 7. Comparison of the mean scores of the lower and upper groups on the scale					
Groups	**n**	**x̄**	**SD**	**t**	**p***
Lower	54	66.72	10.65	28,385	0.002
Upper	54	95.9	3.27		
*p<0.01, SD: Standard deviation.					

Findings on the Reliability of the Scale

Test-Retest Reliability of the Scale

In the test-retest reliability, the scale was administered twice with an interval of 15 days. During this phase, we matched the participants by giving them nicknames. The absence of a significant difference between the mean scores obtained from the scale as a result of the application indicates the similarity of the two measurement results. Consistency, on the other hand, is among the well-known reliability criteria in assessment tools, which include measurement in the target, whose continuity is similar to attitudes and whose change feature is limited.[17] In this context, the stability of the scale was evaluated with the test-retest reliability on data obtained with the participation of all 50 randomly selected nurses.

There was no significant difference between the results of the 1st and 2nd application of the scale and its subscales ($p>0.05$). However, the test-retest stability coefficients of the scale and its subscales were found to be quite high and significant ($p<0.01$) (Table 9).

Internal Consistency Analysis

In scale development, there should be a correlation between the items in the scale and the characteristics that are aimed to be measured using Likert-type scales, and each item in the scale should assess a similar attitude.[28] In the literature, the Cronbach's α coefficient is generally used to control this hypothesis and determine its reliability level. It can be asserted that the higher the α coefficient, the more consistent are the items on the scale with each other. A Cronbach's α coefficient of >0.70 indicates that the scale is reliable.[17] Cronbach's α coefficients for the scale and its subscales were calculated using data obtained from 200 nurses who participated in the internal consistency reliability and item analysis stage (Table 10). The obtained data indicated that the reliability of the scale was sufficient, as evidenced by the Cronbach's α coefficient was greater than 0.70 (Table 10).

Table 8. Comparison of mean scores for item discrimination						
Item	**Groups**	**n**	**x̄**	**SD**	**t**	**p***
Item 1	Upper	54	6.87	0.52	10,031	**0.001**
	Lower	54	3.25	0.39		
Item 2	Upper	54	6.77	1.09	12,735	**0.001**
	Lower	54	2.99	1.07		
Item 3	Upper	54	6.03	0.35	11,843	**0.001**
	Lower	54	2.77	0.33		
Item 4	Upper	54	6.51	0.70	10,220	**0.001**
	Lower	54	3.12	0.68		
Item 5	Upper	54	6.21	0.45	9,888	**0.001**
	Lower	54	3.11	0.47		
Item 6	Upper	54	6.37	2.17	15,421	**0.001**
	Lower	54	2.57	2.43		
Item 7	Upper	54	5.96	1.18	11,553	**0.001**
	Lower	54	2.88	1.08		
Item 8	Upper	54	5.63	1.28	7,521	**0.001**
	Lower	54	2.85	1.16		
Item 9	Upper	54	6.66	0.63	6,591	**0.001**
	Lower	54	3.57	0.80		
Item 10	Upper	54	6.31	0.71	14,523	**0.001**
	Lower	54	2.79	0.87		
Item 11	Upper	54	6.81	0.74	13,728	**0.001**
	Lower	54	2.75	0.83		
Item 12	Upper	54	5.88	0.80	7,567	**0.001**
	Lower	54	2.96	0.57		
Item 13	Upper	54	5.87	0.64	8,312	**0.001**
	Lower	54	2.59	0.56		
Item 14	Upper	54	6.08	0.72	5,428	**0.001**
	Lower	54	3.44	0.61		
*p<0.01. SD: Standard deviation.						

Table 9. Results of test-retest (n=50)

	Application	n	x̄	SD	t	p	r	p*
Importance	1.	50	31.42	4.01	0.884	0.421	0.921	**0.001**
	2.	50	31.58	3.96				
Precaution	1.	50	28.77	11.28	0.781	0.394	0.901	**0.001**
	2.	50	28.96	11.33				
Devotion	1.	50	17.23	13.29	0.326	0.567	0.945	**0.001**
	2.	50	17.39	13.17				
Total	1.	50	76.25	14.23	1,253	0.183	0.936	**0.001**
	2.	50	76.39	14.31				

*p<0.01. SD: Standard deviation.

Table 10. Cronbach's α coefficients of the overall scale and its subscales (n=50)

	Number of Items	Cronbach's α
Importance	6	0.796
Precaution	5	0.810
Devotion	3	0.756
Total	14	0.814

DISCUSSION

Scale Validity and Reliability

This study aimed to develop a Likert-type scale to measure patient safety culture in nurses' medication administration practices and to evaluate the scale's validity and reliability by performing necessary analyses. The 45-item item pool created by the researchers was examined in line with expert opinions and 9 items were removed. The expert opinion was then taken in terms of language and meaning. After EFA was performed to determine the factor structure, items that could not be placed on any factor and cross-loaded were removed from the scale. After the analysis, a scale structure consisting of 3 subscales and 14 items was obtained, which accounted for 46,943% of the total variance. It has been reported in the literature that the total variance limits should be between 40% and 60%.[25] It has been reported that factor loadings of items obtained as a result of EFA above 0.45 are sufficient.[17] The factor loadings of the scale developed in this study were in the range of 0.602-0.783. It can be concluded that the factor load values were high and sufficient.

After EFA, the scale structure was subjected to CFA with an independent sample. CFA revealed that the scale model consisting of 3 subscales and 14 items was compatible, and the scale structure created by EFA was valid for another sample. The factor loadings of all items were high and significant after CFA. In addition, the AVE values of the factors were higher than 0.50. These findings confirmed the construct validity of the 14-Item scale with 3 subscales.[17]

In medication administration, item analysis was performed within the scope of item-total correlation of items included in the patient safety culture scale. The correlation coefficient should be greater than 0.30, and the correlation coefficients of all the items in the present study were found to be higher than the lower limit.[25] As a result of the item analysis based on the lower and upper groups, which is a different item analysis, it was determined that the overall scale and all items were distinctive.

The reliability analyses of the scale were performed in terms of stability and internal consistency. To determine the stability of the scale with the test-retest reliability, it was determined that the scores determined by applying the scale and its subscales in the same sample with an interval of 15 days were similar, and the stability coefficients were greater than 0.70. It can be asserted that the assessment results of the scale developed with these findings were invariant, stable, and reliable. The internal consistency of the scale was examined by calculating the Cronbach's α coefficients of the overall scale and its subscales. As a result of the calculations, it was determined that the Cronbach's α coefficients of the overall scale and its subscales were greater than 0.70. Turkmen et al.[29], reported that the Cronbach's α internal reliability coefficient of the "Patient Safety Culture Scale" they developed in this area was 0.97 for the overall scale and ranged between 0.83 and 0.92 for its subscales. Likewise, Baykal et al.[30], and Sexton et al.[31], reported that the item-total score correlation values of the patient safety attitude scale, of which a Turkish validity and reliability study was conducted, ranged between 0.35 and 0.58, and the Cronbach's α value was 0.93. The Cronbach's α values for the subscales of the related scale were 0.85 for job satisfaction, 0.86 for teamwork, 0.83 for safety climate, 0.77 for management mentality, 0.74 for defining stress, and 0.72 for working conditions.

Contributions to the Nursing field

It is known that patients in many countries and healthcare institutions are harmed due to medical mistakes and malpractices.[32,33] Adopting safety practices for patients is essential to prevent deaths and other adverse events caused by medical mistakes. Ensuring patient safety is important for enhancing the quality of nursing care as well as providing the basis for the delivery of high-quality care. In order to achieve sufficient patient safety practices, first, the perception of a patient safety culture must be established among healthcare professionals.[34]

Medication mistakes, one of the subdimensions of patient safety, include misadministration that threatens patients' lives. It is important to administer drugs by nurses in many countries and health institutions

by paying attention to patient safety principles. In the literature, many studies have reported that a great majority of nurses make medication mistakes.[35,36] Therefore, assessment tools are designed to assess knowledge levels or improve safe drug administration. However, to ensure drug safety, it is not sufficient to identify and correct mistakes at the stage of application. The research findings and remedial studies are insufficient in terms of defining culture and planning remedial activities in this field. Individual and institutional culture should be established to prevent mistakes in drug administration. Developing a safety culture for drug administration will contribute to the development of nurses' perceptions of their practices, the determination and improvement of the importance they attach to their work, and the maintenance of safe practices principles and patient safety.

Therefore, to prevent medication mistakes and ensure patient safety, a safety culture for drug administration should be established among nurses. Evaluation of the safety culture for drug administration in institutions will contribute to the preparation of education plans for the personnel of the institution, to create a joint decision-making mechanism, and to enhance the quality of patient care.

When the literature was reviewed, it was observed that there were scales evaluating the patient safety culture, but these scales did not make separate measurements for the subdimensions of patient safety. This is valid for drug administration. The scale developed in the present study consists of items that mention all stages of drug administration. It is considered an adequate tool in terms of evaluating patient safety culture in nurses' medication administration because it includes all stages. The use of this scale can help eliminate medication mistakes.

Study Limitations

One of the important limitations of our study is that the scale developed specifically was designed for nurses. It does not include members of other professions who play a role in medication administration and delivery of health care services. The second limitation is that it contains limited data on nurses working in a certain geographical area in Turkey. It cannot be generalized to all nurses.

CONCLUSION

In this study, a scale was developed to determine the importance that nurses attach to patient safety during drug administration. The final version of the scale comprises 14 items under 3 subscales. The subscales were chosen as "importance, caution, dedication" in order to help define the culture. According to the results, the "Patient Safety Culture Scale in Medication Administration" has strong validity and reliability in the assessment.

The use of this scale in the field will contribute to the definition of drug-administration culture at the institutional level in the relevant institutions. Thus, it will allow the planning of remedial development activities to ensure the development of a safe drug-administration culture, which is the first step in preventing malpractise. Validity and reliability studies of the developed scale in other languages may also contribute to the definition of intercultural differences.

MAIN POINTS

- Medication administration mistakes are the most common medical mistakes that threaten patient safety.
- The use of this scale in the field will contribute to the definition of drug-administration culture at the institutional level in the relevant institutions.
- This will allow the planning of remedial development activities to ensure the development of a safe drug-administration culture, which is the first step in preventing malpractise.

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ETHICS

Ethics Committee Approval: This study was approved by the Adıyaman University Social and Human Sciences Ethics Committee (approval number: 125, date: 29.07.2021).

Informed Consent: It wasn't obtained.

Authorship Contributions

Surgical and Medical Practices: A.T.Ö., Y.Ç., Concept: A.T.Ö., Y.Ç., Design: A.T.Ö., Y.Ç., Data Collection and/or Processing: A.T.Ö., Y.Ç., Analysis and/or Interpretation: A.T.Ö., Y.Ç., Literature Search: A.T.Ö., Y.Ç., Writing: A.T.Ö., Y.Ç.

DISCLOSURES

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