Original Article

A Scale Development Study for Preventing Catheter-Associated Urinary Tract Infections of Patients with Indwelling Urinary Catheters

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Abstract
Background: The prevention of catheter-associated urinary tract infections is important in hospital infections. Catheter-associated urinary tract infections can be reduced with suitable precautions. However, no study has been found in the literature that reveals the role of patients in the prevention of urinary catheter-associated infections and a measurement tool to test this.
Aims and objectives: The aim of this study is to develop a valid, and reliable measurement tool in the Turkish version to determine the attitudes of patients with indwelling urinary catheters in preventing catheter-associated urinary tract infections.
Design: Methodological, and cross-sectional study
Methods: The sample of this study consisted of total 738 patients (400 patients for exploratory factor analysis, and 338 patients for confirmatory factor analysis).
Results: The Attitude Scale for Preventing Catheter-Associated Urinary Tract Infections of Patients with Indwelling Urinary Catheters consists of three sub-dimensions, and 31 items: Behavior (eleven item), Awareness (eleven item), and Reporting (nine item). Exploratory factor analysis yielded a three-factors tructure and confirmatory factor analysis showed a good fit for the three-factor model. The value of Cronbach's alpha was 0.882.
Conclusion: The Attitude Scale for Preventing Catheter-Associated Urinary Tract Infections of Patients with Indwelling Urinary Catheters is a valid, and reliable tool that provides psychometric properties.

Keywords: Catheter-Associated UrinaryTract Infections, Patient, Scale Development, Validity, and Reliability.

Introduction

Urinary catheterization is a common practice, and approximately 75% of hospital-acquired urinary tract infections are associated with an indwelling urinary catheter (Gould et al., 2009; Feneley, Hopley, Wells, 2015). The prevention of catheter-associated urinary tract infections (CAUTI) is important in hospital infections (Meddings, et al., 2013). Catheterassociated urinary tract infections can be reduced with suitable precautions (Aygün, 2008; Meddings et al., 2013).

There are many studies in the literature to evaluate knowledge, practice, and practices of nurses regarding the prevention of urinary tract infections associated with urinary catheters (Fink, Gilmartin, Richard et al., 2012; Jain, Dogra, Mishra et al., 2015; Kose et al., 2016; Shah, Wahab, Ullah et al., 2017; Erden, 2018; Shaver et al., 2018; Algarni, Sofar, Wazqar, 2019). However, no study has been found in the literature that reveals the role of patients in the prevention of urinary catheterassociated infections and a measurement tool to test this. In this context, it is thought that a measurement tool is needed to help us determine the attitudes of the patients on this issue. It is anticipated that the development of a valid and reliable measurement tool will contribute to the determination of the attitudes of patients who have undergone indwelling urinary. In addition, the effectiveness of the training can

be evaluated with this measurement tool after training patients to correct missing or incorrect information in preventing catheter-associated urinary tract infections. In this context, this study aims to develop a specific measurement tool related to this field and to conduct a validity and reliability study to measure the attitudes of patients who have indwelling urinary catheters to prevent catheter-associated urinary tract infections.

Materials and Methods Scale Development Methods Phase 1: Item creation: In the process of developing the scale, the literature (Fink, Gilmartin, Richard et al., 2012; Jain, Dogra, Mishra et al., 2015; Kose et al., 2016; Shah, Wahab, Ullah et al., 2017; Erden, 2018; Shaver et.al., 2018; Algarni, Sofar, Wazqar, 2019) were examined and within the scope of the theoretical structure of the scale, an item pool of 64 questions was created on the prevention of catheter-associated urinary tract infections, urinary catheter care, reporting of signs and symptoms of infection.

Phase 2: Submitting to expertopinion: In order to ensure the validity of the prepared 64-question draft scale, it was submitted to 12 expert opinions (seven nursing faculty members, three medical faculty and three clinical practice nurses) and experts were asked to evaluate the scale items in terms of scope, language compatibility, clarity and intelligibility. Based on the feed back, content validity rates were determined by a technique developed by Lawshe (1975) and therefore known as the Lawshe technique. In our study, as a result of expert opinions, was determined as the content validity rate 0.56 and the content validity index 0.87, and our scale was found to be sufficient in terms of item content validity.

Phase 3: Pilot study: After calculating the scale's content validity ratios, statistically insignificant items were removed from the items and a 38-item final form was created. In order to test the intelligibility and functionality of the items, the draft scale was applied to a group of 20 patients with similar characteristics to the sample group, and no changes were made to the draft scale in line with the results. After this stage, the draft scale, which took its final form, was shaped as 38 items and made applicable to the real study group.

Stage 4: Validity and reliability testing Data collecting Datas of the draft scale collected between September 2020 and April 2022. Patients who were hospitalized in the internal and surgical clinics of a university and state hospital in a province in Turkey, who had a urinary catheter inserted for at least 24 hours and whose catheterization continued, who did not have a diagnosed catheter-associated urinary tract infection and who were able to take care of themselves were included in the sample. The draft scale was applied face to face to each patient within 20-30 minutes. The test-retest data of the scale were collected with 30 volunteer patients who met the sampling inclusion criteria, with a time interval of two weeks between the performance of the two tests. In their scale development studies, it is generally stated in the literature that a sample of 10 times the number of items in the scale to be validated and reliable is ideal for the study (Nunnually, 1978). The draft scale consisting of 38 items was applied to400 (>38*10=380) patients for exploratory factor analysis, and the draft scale, which decreased to 31 items after exploratory factor analysis, was administered to 338 (>31*10=310) patients for confirmatory factor analysis. The Attitude Scale for Preventing Catheter-Associated Urinary Tract Infections of Patients with Indwelling Urinary Catheters: Scale items were evaluated in a 5-point Likert type as“Never = 1”, “Rarely = 2”, “Sometimes = 3”, “Often = 4” and “Always = 5”. İt can be obtained from the Behavior Dimension and Awareness Dimension (11 items) of the scale is the lowest score that 11 and the highest score is International Journal of Caring Sciences May-August 2024 Volume 17| Issue 2| Page 657 www.internationaljournalofcaringsciences.org 55. As the score obtained from the behavioral dimensions increases, the behaviors of the patients to prevent catheter-associated urinary tract infections increase positively. As the score obtained from the awareness dimensions increases, patients' awareness of preventing catheter-associated urinary tract infections increases positively. İt can be obtained from the Reporting Dimension (9 items) is the lowest score that 9 and the highest score is 45.

As the score obtained from the reporting dimensions increases, patients' reporting the signs and symptoms of infection to health professionals to prevent catheter-associated urinary tract infections increases positively. The total score of the scale is obtained by summing the scores of all items (31 items). İt can be obtained from the scale is the lowest score that 31, and the highest score is 155. As the score obtained from the scale increases, patients' attitudes towards preventing catheter-associated urinary tract infections increase positively. Data analiysis: Statistical evaluation of the measurement tool development study SPSS 23.0 and AMOS 24 package programs was used. Patients participating in the study; Frequency and percentage values were used in categorical data. Principal Components Analysis and Varimax Rotation methods were used within the scope of exploratory factor analysis to examine the factor structure of the scale draft. For the items to be included in a factor in the research, it was necessary to have a factorload of at least 0.45, to have a high distinctiveness of the load values in the factors in which they were found, and to have at least 1 eigenvalue for each factor (Tavsancil, 2002; Kartal, Bardakci, 2018) factor analysis was performed. Item total test correlation was calculated to determine item discrimination. According to the item-total score correlation analysis, items with a correlation coefficient below 0.30 were removed from the scale. Then, item analysis based on lower and upper groups was performed with t-test for independent groups. Reliability analysis was performed by calculating test-retest reliability. For internal consistency analysis, Cronbach's α coefficient was calculated for the entire scale and its dimensions, respectively. To confirm the results of the exploratory factor analysis, confirmatory factor analysis was performed on the draft scale and model fit statistics and modification indices were examined. Suggested modifications to the model were examined by looking at the covariance between the observed and latent variables in the fit indices. Model fit criteria [(χ2 (0.0585; IFI >90] were taken. The statistical significance level was accepted at 0.05 (twotailed). Ethical considerations: Before the study was conducted, ethics committee approval (2019-12/33), and informed consent from the patients who agreed to participate in the study were obtained.

Results

According to Table 1, 54.7% of the patients are male, 45.3% are female and 68.2% are being treated in surgery clinics. 82.4% of the patients had a catheter for 3-5 days and 38.2% had a previous history of urinary catheterization. While 78.6% of the patients stated that they didnot receive any spontaneous or planned training on catheterassociated urinary tract infections, 96.4% stated that they needed training for the prevention of catheter-associated urinary tract infections and wanted to reflect on the training they received in their practices.

Constructvalidity of the scale

Results related to exploratory factor analysis: In order to determine whether the data set is suitable for factor analysis, the values of the Kaiser-Meyer-Olkin (KMO) coefficient and Barlet test were examined. At this stage, the KMO statistic of the draft scale data was found to be 0.857, and the Bartlett test statistic was B=11088.904, and this statistic was calculated to be significant at the p

Table 1. Socio-Demographic Characteristics of the Patients

Variables	Number (n)	Percent (%)
Gender		
Female	384	54.7
Male	318	45.3
Clinic Where He Received Treatment		
İnternal Clinic	479	68.2

Variables	Number (n)	Percent (%)
Surgical Clinic	223	31.8
Catheter Day		
3-5 days	578	82.4
6-10 days	79	11.2
11 and above	45	6.4
Catheter History		
Yes	268	38.2
No	434	61.8
CAUTİ Prevention Education Status		
Yes	153	21.8
No	549	78.2
The Need for CAUTİ Prevention Education		
Yes	677	96.4
No	25	3.6

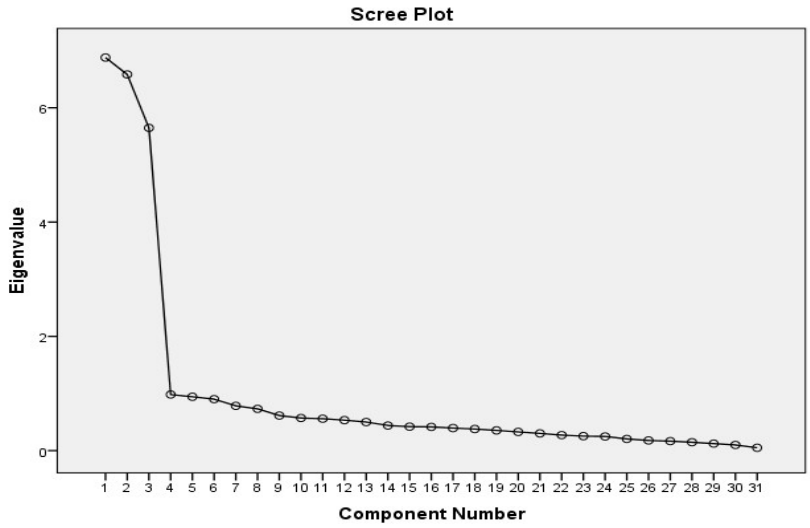

Figure 1. Screet Plot obtained as a result of EFA

Figure 1 shows the Scree Plot graph obtained as a result of the exploratory factor analysis repeated after removing the relevant items from the draft scale. When the graph is examined, it is seen that the point where the curve shows a rapid decline is the third factor. After the third factor, it is seen that the curve proceeds in a similar direction. In this context, it was concluded that the number of factors in the scales hould remain at three. As a result, a structure with 3 factors distributed in a regular structure was obtained in our scale, and items 1, 2, 3, 6,

7, 8, 9, 12, 13, 14 and, 38 were the 1st factor; Items 16, 17, 18, 19, 21, 22, 24, 26, 28, 31 and, 37 were used as the 2nd factor and 23, 25, 27, 29, 30, 32, 33, 34 and, 35 items as the 3rd factor are grouped. Looking at Table 2, it is seen that there are 3 factors with an eigen value greater than 1 and the largest of the variances explained by these factors is 61.64%. As a result of the Exploratory Factor Analysis, a 3-factor scale consisting of 31 items in total was obtained. Considering all these findings regarding the construct validity of the scale, it can be said that the scale has construct validity.

Naming the factors

After the exploratory factor analysis, the scale items determined in each factor were examined and the sub-dimensions were named. In this context; The items included in the first factor were named "Behavior" sub-dimension because they included statements about patient behavior towards catheter care. The items in the second factor were named "Awareness" because they included items related to awareness of catheter-related urinary tract infections. Finally, the items in the third factor were named "Notification" because they included items about reporting when symptoms of catheter-related urinary tract infection were observed. Following this naming, 31 items distributed among the factors were randomly ordered and renamed, and the items falling into the sub-factors and the numbers of these items were rearranged.

Item Discrimination: In this section, the correlation values between the scores obtained from the items in each sub-dimension and the scores of the sub-dimensions were calculated to determine the item-total test correlation of the draft scale. According to the item-total score correlation analysis, items with a correlation coefficient below 0.30 should be removed from the scale. There was no item with a correlation coefficient below 0.30, no items were removed from the scale. As a result of the internal consistency analysis obtained regarding the reliability of the scale, Cronbach's Alpha value was found to be α=0.882, and this value was evaluated as the scale had sufficient internal consistency.

As seen in Table 2, the item-total test correlation coefficients were between 0.309 and 0.320 for the "Behavior" sub-dimension; 0.469 to 0.604 for the “Awareness” sub-dimension; It varies between 0.319 and 0.367 for the “Notification” sub-dimension. These coefficients are the validity coefficients of all items and their consistency with the whole factor; refers to the power of the factor to serve its general purpose. İt is seen that the item-total test correlationvaluesvary between 0.309 and 0.604, and these findings show that the items that make up the scale are related and compatible with the scale at a satisfactory level.

After the item analysis, the level of serving the purpose of each of the items in the scale was analyzed. In this context, to reveal the discrimination levels of each of the 31 items and item analysis based on sub-upper groups, 400 people forming the sample of the study were ranked from largest to smallest according to the total score they got from the scale. The total score averages of the participants in the lower and upper 27% group of 108 people were compared collectively with the t-test for independent groups. As a result of the t-test, it was determined that the mean of the lower and upper groups were statistically different at the p=0.000 significance level (X=Subgroup: 134.10, Upper Group: 129.67; SD= Lower group: 7.91, Upper Group: 11.86; T=11.257). According to this result, it can be said that the distinctiveness of the draft scale is high.

Table 2. Exploratory Factor Analysis, Item Analysis and Cronbach Alpha Results

Factors and İtems	Factor Load			Cumulative Variance	İtem Load	Cronbach Alpha
	1	2	3			
Factor 1 Behavior Dimension						
No 1. For whatever reason, I use disposable gloves when touching the catheter.	**.826**	-.026	.015		.320	
No 7. I always keep clean and dry my body parts close to the catheter	**.807**	-.026	.011		.308	
No 9. I wear disposable gloves while emptying the urine bag.	**.796**	-.020	.038		.318	
No 3. I try to prevent the catheter touch other places.	**.782**	.018	.040		.343	
No 2. When going from one place to another, I position the urine bag under my groin area.	**.774**	-.020	.047		.313	
No 13. I emptying to the urine bag when it is half full.	**.770**	-.022	.046		.310	
No 6. I take care that the catheter remains fixed on the inner surface of the thigh.	**.760**	-.016	.068	43.42	.317	.929
No 8. I put the urine bag on the bed/seat while sitting on the bed/seat.	**.745**	.017	.005		.311	
No 38. While lying down, I keep the urine bag below the level of my groin area and fixed to the bed with a sling.	**.738**	.018	.007		.309	
No 12. While emptying the urine from the urine bag, I empty it from the tap at the bottom of the bag.	**.721**	.041	.006		.316	
No 14. While emptying the urine, I do not contact the emptying tap under the urine bag with the collection container.	**.705**	.032	.016		.312	
Factor 2 Awareness Dimension						
No 26. I check the urine color in the connection tube of the urinary catheter or the urine bag.	-.011	**.836**	-.008		.575	
No 37. I need to use antibiotics in order not to develop a catheter-associated urinary tract infection	-.022	**.807**	.040		.569	
No 22. I check the urine bag for leakage during the day.	-.018	**.807**	-.013		.546	
No 28. I check the smell while emptying the urine into the urine bag.	-0.43	**.805**	.018		.546	
No 18. I take care to drink at least 2.5 liters of water a day if I do not have any restrictions to prevent urinary catheter-associated infection.	.026	**.795**	-.015		.558	
No 16. Catheter-associated urinary tract infections may develop in patients with a catheter.	.035	**.793**	.012	22.19	.573	.932
No 19. I understand whether or not to develop a catheter-associated urinary tract infection.	.071	**.783**	.048		.604	
No 21. I check the catheter during the day for leakage.	.026	**.767**	-.006		.540	
No 17. If I do not have any restrictions to prevent infection due to urinary catheterization, I eat foods rich in protein and vitamins.	-.067	**.751**	.065		.516	
No 31. I make sure that there are no air bubbles or folds in the catheter system.	.024	**.689**	.041		.498	
No 24. I check urine flow from the catheter to the urine bag and whether there is a blockage in the catheter.	-.017	**.685**	.024		.469	
Faktör 3 Reporting dimension						
No 30. I report to the health personnel when I have an urge to urinate frequently on the day the catheter is removed, or one day later the catheter is removed.	-.001	.045	**.842**		.358	
No 29. I report to the health personnel when there is heavy and foul-smelling urine in the urine bag.	.047	.004	**.839**		.344	

No 32. I report to the health personnel when there is pain and sensibility in the upper part and on the sides of my back	.002	.016	**.831**	61.64	.329	.936
No 35. I report to the health personnel when there is pain/burning while urinating on the day the catheter is removed or one day later the catheter is removed.	-.005	.018	**.826**		.325	
No 25.I report to the healthcare personnel when there are solid particles in the urinary catheter connection tube or the urine bag.	.030	.057	**.816**		.367	
No 23. I report to the health personnel when there is a leaking in the catheter or urine bag.	.017	.031	**.808**		.338	
No 27. I report to the healthcare personnel when there is cloudy or bloody urine in the urinary catheter connection tube or the urine bag.	.056	.039	**.789**		.355	
No 34. I report to the health personnel when I experience fever and chills.	.056	.000	**.786**		.325	
No 33. I report to the health personnel when there is a feeling of swelling, pressure or discomfort in the lower part of my abdomen.	.068	-.014	**.781**		.319	
Total Scale						**.882**
Deleted Items						
No 4. I prevent feces from smearing on the catheter while making defecation.	.058	.372	.047		.344	
No 5. If there is dirt around the area where the catheter enters the urinary tract, I clean it with soap and water.	.039	.391	-.012		.307	
No 10. I empty the urine bag when it is full.	-.025	.078	.187		.118	
No 11. The urine bag should be removed from the connection point with the catheter, turned upside down, emptied.	-.018	.014	-0.54		.009	
No 15. I put the urine bag in a position that touches the ground while lying down.	-.039	-.012	.024		.003	
No 20. Health personnel should take intermittent urine samples to determine whether an infection has developed.	.078	.045	.027		.118	
No 36. Health personnel should not take urine samples unless necessary to determine whether an infection has developed.	-.004	.032	.098		.056	

Reliability analysis

Test-re-test reliabilityanalysis of the draft scale

In order to determine whether there is a difference between the mean scores of the scale draft, which was administered at an interval of two weeks to the patients forming the sample of the study, a "t-test in dependent groups" was applied. When the test-retest mean scores of the draft scale were compared (first application average: 137.76; second application average: 139.13), it was concluded that there was no statistically significant difference between the two measurement results ($p>0.05$). With the repeated application of the draft scale to 30 patients, the test-retest reliability coefficient was found to be r=821, and a high correlation was found at the p=0.000 significance level. The fact that there is no difference between the means and similar results after repeated measurement shows that the scale has high reliability.

Internal consistency analysis

Looking at Table 2, the Cronbach alpha value of the factors of the draft scale was determined as 0.929 for the Behavior dimension, 0.932 for the Awareness dimension, .936 for the Reporting dimension, and 0.882 for the whole scale, respectively. Accordingly, the scale general average and scale 1, 2, and 3 factors were found to be highly reliable in terms of Cronbach Alpha Coefficient value.

Findings of confirmatory factor analysis

To confirm the results of exploratory factor analysis, confirmatory factor analysis (CFA) was performed with the AMOS program on the draft scale applied to 338 patients, and model fit statistics and modification indices were examined. The proposed modifications of the model were examined by looking at the covariance between the observed and latent variables in the fit indices.

As a result of the analysis, the fit values [(χ2 (728.443, sd=429, p= .000); χ2/ sd= 1.69; RMSEA= 0.04; RMR=0.02; GFI=0.88; AGFI=0.86; CFI=0.94; RFI=0.87; IFI= 0.94] The path diagram of confirmatory factor analysis is given in Figure 2.

Table 3. Fit Statistics and Modification Indices of the Model

Fit Measures	Good Fit Values	Acceptable Fit Values	Fit Values of the Existing Model
X^2	$0.05<p\leq1$	$0.01<p\leq0.05$	
X^2 / sd	≤3	≤5	1.69
RMSEA	≤0.05	≤0.08	0.04
RMR	≤0.05	≤0.08	0.02
GFI	≥90	≥85	0.88
AGFI	≥90	≥85	0.86
CFI	≥97	≥95	0.95
RFI	>90	>85	0.87
IFI	≥95	>90	0.94

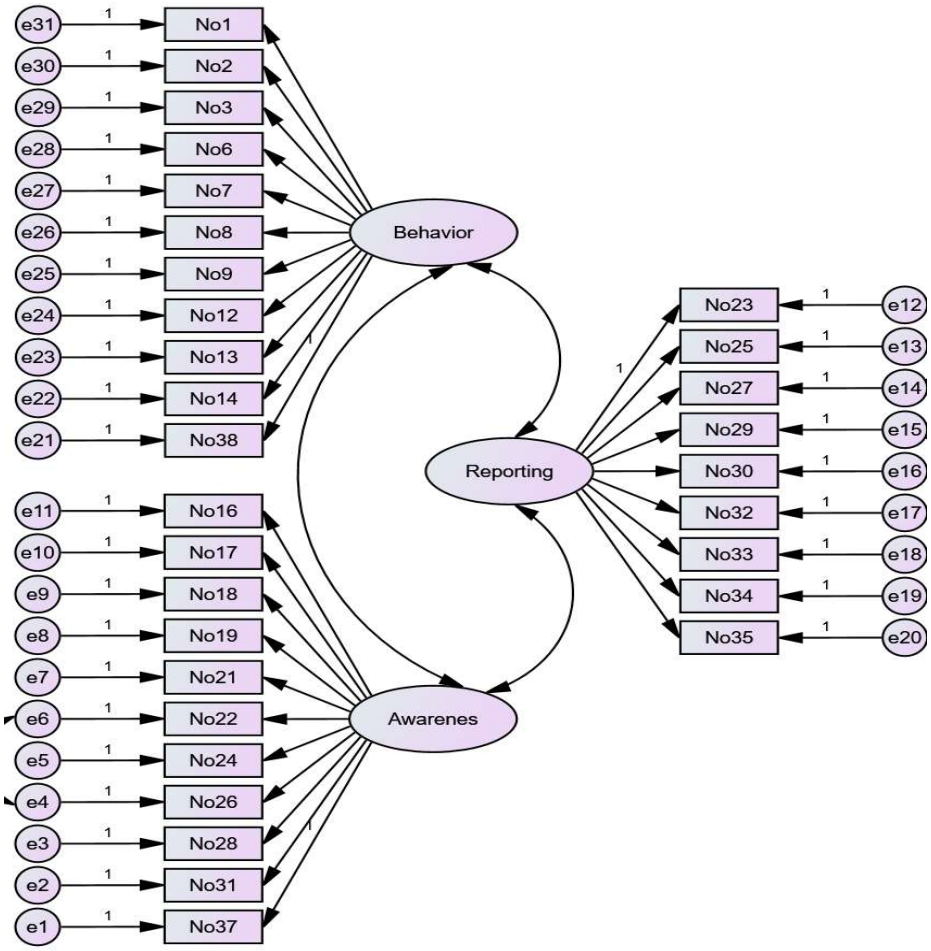

Figure 2. Path Diagram Obtained from CFA

Discussion

It examined the content validity and psychometric properties of the scale developed to prevent catheter-associated urinary tract infections of patients with ındwelling urinary catheter. The scale was developed in a five-point likert type, and consists of 31 items under three factors.

CAUTIs reported to be the most common healthcare-associated infections worldwide (Mong, Ramoo, Ponnampalavanar et al., 2022). Nurses are healthcare professionals who have a primary role in the placement and maintenance of urinary catheters, as well as in management of urinary catheterization and the prevention of catheter-associated urinary infections. When the all process from the decision to apply urinary catheters to the termination is carried out with evidence-based intervention and approaches set forth in guidelines, CAUTI can be prevent to a large extent. (Algarni, Sofar, Wazqar, 2019; Mong, Ramoo, Ponnampalavanar et al., 2022). In the literature, there are different study results within the scope of nurses' knowledge and practices for control of urinary catheterization-associated infections. While some studies emphasized that nurses' knowledge and practice in this area were insufficient (Jain, Dogra, Mishra, et al., 2015; Shah, Wahab, Ullah et al.,2017; Algarni, Sofar, Wazqar, 2019), in one study, it was stated that he had knowledge, positive attitudes and good practices (Mong, Ramoo, Ponnampalavanar et al., 2022). However, there is no information available in the literature about the attitudes, knowledge and practices of patients with urinary catheters

towards catheter management. In this context, we anticipate that our study will provide a new perspective in this field, evaluate the attitude of patients to preventing catheter-associated urinary tract infections, and raise awareness in the development of inadequate knowledge and practices after wards.

In the scale development study, the general factor about the scale construct validity, how many dimensions it has, and what the items that makeup these dimensions determined by exploratory factor analysis. A structure was created by naming the sub-dimensions determined by as a result of factor analysis. Accordingly, it determined that the sample size to which the data related to the draft scale belonged was sufficient for factor analysis. Then, in order to the items to included in a factor, it was sought that items had a factor load of at least 0.30, that the loadvalues of factors in which they included were not close to each other in different factors, and that their distinctiveness was high (Karagoz, 2016:885; Buyukozturk, 2002: 118-119, Secer, 2015: 87).

In addition, in our study, factor analysis performed according to the condition that each factor's eigen values hould be at least 1 (Buyukozturk, 2002:118-119). According to the factor loading classification, factor loads above 0.71 are excellent, factor loads of 0.63 are very good, 0.55 good, 0.45 good/acceptable and 0.32 weak (Buyukozturk, 2002:118-119). The analysis done so that the factor loads were at least 0.45 and there were at least three items in a factor, and ourscale included a total of 31 items. The factor number of the measurement tool found to be three. It stated that it is sufficient for the variance explained for multidimensional scales to be greaterthan 30% (Buyukozturk, 2002).

In our study, the three dimensions explained 61.64% of the total variability according to EFA. In this respect, it can be say that the rate of variance calculated in our study is at a sufficient level. Accordingly, the data obtained from the draft scale were suitable for factor analysis. It is necessary to benefit from the comments and opinions of the experts in the field in naming the sub-dimensions that emerge as a result of the factor analysis (Bryant, Yarnold, 1995). In this context, the sub-dimensions of scale entidled as "Behavior, Awareness and Notification" in accordance with the research-based theoretical structure and in line with expert opinions.

In our study, Confirmatory Factor Analysis performed in addition to EFA to obtain further evidence of factorial construct validity. For this purpose, a theoretical model was created, tested based on EFA, and as a result of the analysis, it is see that the model-data fit was high (Bryant &Yarnold, 1995; Wang & Wang, 2012). CFA, $\chi 2$/sdratio, RMSEA and RMR values good agreement; It is understood that the GFI, AGFI, CFI, RFI and IFI values show an acceptable fit (Tabachnick, Fidell, 2007; Ozdamar, 2016:185; Kartal, Bardakcı, 2018: 70). CFA showed that all items had high R^2values and all t values were significant at the $p < 0.001$ level, indicating whether the factor loadings were statistically significant. In the validity studies, analysis of the items calculated to evaluate the constructvalidity of drafts cale. Item-total score correlation is the correlation coefficient between the scores obtained from eachitem of the people in the sample in a measurementtool and the total scoresobtained from all items of scale. Item-total score correlation reveals whether each item in the measurement tool similar behaviors compared to the all scale (Buyukozturk, 2013; Kartal, Bardakcı, 2019: 41). The item-total score correlation with high scores indicates that the items measure similar behaviors and that the internal consistency of the test is high. (Karagoz, 2016:947). In this context, the item-total score correlation was require to be positive and greater than 0.30. It stated that if the correlation coefficient is below 0.30, it will be necessary to remove these items from the scale, since it is say that they cannot distinguish individuals well (Buyukozturk, 2013; Ozdamar, 2016: 53; Karagoz, 2016:947). None of items were not remove from the scale since there was no item with a correlation coefficient below the value of 0.30 in the item analysis conducted in our study.

As a result of item analysis based on item-total score correlation, item analysis based on lower and upper groups applied in order to select items with high discrimination in the scale items and to calculate the discrimination power of items with this analysis, and thus the discrimination power of the items is obtained

(Kartal, Bardakcı, 2018). In this context, as a result of the internal consistency analysis obtained regarding the reliability of the scale in our study, it was determined that the scale had sufficient internal consistency. In study analiysis of test-retest reliabilty was performed to show that the scale did not change over time. In order to say that the scale is invariant over time, the correlation between the two measurements must show a positive and high level of relationship (Cronbach, 2004). In this context, our analysis showed that this test has test-retest reliability and is invariant over time (r =0.821, p=0.000).
There are various techniques and formulas for statistically determining internal consistency. However, if the number of item options in the scale is three or more, the value of alpha used. This coefficient is a measure of internal consistency, that is, homogeneity. The significance of the Cronbach's alpha reliability coefficient, which shows internal consistency in the literature, is as follows: If the Cronbach'salpha coefficient is $0.00 < \alpha < 0.40$, the scale is not reliably. If Cronbach's alpha coefficient is $0.40 < \alpha < 0.60$, the scale has low reliability. If Cronbach's alpha coefficient is $0.60 < \alpha < 0.80$, it is a very reliable scale. When the Cronbach's alpha coefficient is $0.80 < \alpha < 1.00$, the scale is highly reliably (Cronbach, 2004; Kartal, Bardakcı, 2019). In this context, the Cronbach's alpha coefficient of the scale calculated as $\alpha = 0.882$. The General Average of the Scale and of itssub-dimensions found to be highly reliably in terms of the Cronbach Alpha Coefficient.

İt examined the total, and sub-dimension mean scores obtained from the scale according to the score ranges that take from the scale. İt observed that the general positive attitudes of the patients towards preventing catheter-associated urinary tract infections were at a high level. It can be say that they exhibit positive behavior and awareness about the prevention of infection, and they report the signs and symptoms of infection they experience to health professionals at a high level. In the literature, a research result that we can associate with these findings could not be reached and could not discussed in this context. However, it anticipated that these results obtained from the study will provide important information input to the literature and will create significant awareness in health care professionals to put the patient in the center in preventing catheter-associated urinary tract infections. This measurement tool, developed based on the training needs of patients with indwelling urinary catheters to prevent urinary catheter-associated urinary tract infections, is thought to be important step in the control of catheter-associated infections.

Limitations of the study: In this research, sufficient sample size was reached for exploratory and confirmatory factor analysis. However, due to Covid-19 pandemic conditions, it took long time to complete the sample size.

Conclusion: The Attitude Scale for Preventing Catheter-Associated Urinary Tract Infections of Patients with Indwelling Urinary Catheters, developed within the scope of this research, is a measurement tool that can be used in accordance with its purpose and provides psychometric properties.

References

Algarni, S.,S, Sofar, S.,S.,S, Wazqar, D.Y. (2019). Nurses' knowledge and practıces toward preventıon of catheter-associated urınary tract ınfectıon At Kıng Abdulazız Unıversıty Hospıtal. *Journal of Health, Medicine and Nursing*. 4(1), 50-73.

Aygun, P. (2008). Prevention of catheter-associated urinary infections. Istanbul University Cerrahpaşa Faculty of Medicine Continuing Medical Education Activities. Hospital Infections Prevention and Control Symposium Series.

Bryant, F. B., Yarnold, P. R. (1995). Principal-components analysis and exploratory and confirmatory factor analysis.

Buyukozturk, S. (2013). Handbook of Data Analysis for the Social Sciences (18th Edition). Ankara: Pegem Academy. Turkish.

Buyukozturk, S. (2002). Data Analysis Handbook for Social Sciences, 2nd Edition, Pegem Publishing, Ankara. Turkish.

Cronbach, L.J, Shavelson, R.J. (2004). My current thoughts on coefficient alpha and success or procedures. *Educational and Psychological Measurement.* 64(3), 391-418.

Erden, S., Arslan, S., Gezer, D., Cömert, G. (2018). Practices of general surgery clinic nurses to prevent catheter-related urinary tract infections: an observation study. Van Medical Journal. 25(3), 274-281.

Feneley, R.,C, Hopley, I.,B, Wells, P.,N.(2015). Urinary catheters: history, current status,

adverse events, and research agenda. *Journal of Medical Engineering& Technology.*39(8), 459-470.

Fink, R., Gilmartin, H., Richard, A., Capezuti, E., Boltz, M., Wald, H. (2012). Indwelling urinary catheter management and catheter-associated urinary tract infection prevention practices in nurses ımproving care for health system elders hospitals. *American Journal of İnfection Control.* 40(8): 715-720.

Gould, C.,V, Umscheid, C.,A, Agarwal, R.,K, Kuntz, G, Pegues, D.,A. (2009). Guideline for prevention of catheter-associated urinary tract infections 2009 Infect Control Hosp Epidemiol. 31(4), 319–26. http://www.ncbi.nlm.nih.gov/pubmed/20156062

Jain, M., Dogra, V., Mishra, B, Thakur, A.,Loomba, P.,S. (2015). Knowledge, and attitude of doctors and nurses regarding indication for catheterization and prevention of catheter-associated urinary tract infection in a tertiary care hospital. *Indian journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine.* 19(2), 76.

Karagoz, Y.(2016). SPSS 23 and AMOS 23 Applied statistical analysis. *Nobel Academic Publishing*. ISBN: 978-605-320-547-0. Turkish.

Kartal, M., & Bardakcı, S. (2019). Attitude scales. *Academician Bookstore.*

Kartal, M., & Bardakcı, S. (2018). Reliability and validity analyzes with SPSS and AMOS applied examples. *Academician Bookstore.*

Kose, Y., Leblebici, Y., Akdere, S.,S, Cakmakci, H, Otunctemur, S., Egici, M.,T, Bektemur, G. (2016). Knowledge of nurses working in a public hospital about the prevention of catheter-related urinary tract infections. *Sisli Etfal Hospital Medical Bulletin.*50(1), 70. doı: 10. 5350/Semb.20151216103044. Turkish.

Meddings, J., Rogers, M.,A, Krein, S.,L, Fakih, M.,G, Olmsted, R.,N, Saint, S.(2014). Reducing unnecessary urinary catheter use and other strategies to prevent catheter-associated urinary tract infection: an integrative review. *BMJ Quality &Safety*. *23*(4), 277-289. doi:10.1136/bmjqs-2012-001774.

Mong, I., Ramoo, V., Ponnampalavanar, S., Chong, M. C., WanNawawi, W. N. F. (2022). Knowledge, attitude and practice in relation to catheter-associated urinary tract infection (CAUTI) prevention: A cross-sectional study. *Journal of clinical nursing*, *31*(1-2), 209-219.

Nunnually, J.,C. (1978).Psyhometrictheory New York, NY: McGraw-Hill.

Ozdamar, K. (2016). Scale and Test Development Structural Equation Modeling in Education, Health and Behavioral Sciences. *April Bookstore.* ISBNÇ:978-975-6428-92-4. Turkish.

Secer, I. (2015). Psychological test development and adaptation process SPSS and lirsel applications. *Moment Publishing*. ISBN: 978-605-170-014-4. Turkish.

Shah, M., Wahab, F., Ullah, F., Gul, U., Aziz, A., Ullah, Z. (2017).Infection control in the use of urethral catheter: Knowledge and practices of nurses. *American Journal of Advanced Drug Delivery*.5(1):1-8.

Shaver, B., Eyerly-Webb, S.,A, Gibney, Z., Silverman, L., Pineda, C.,Solomon, R.J. (2018).Trauma and intensive care nursing knowledge and attitude of foley catheter insertion and maintenance. *Journal of Trauma Nursing*. 25(1), 66-72.

Tabachnick, B. G., &Fidell, L. S. (2007). *Experimental design susing ANOVA* (Vol. 724). Belmont, CA: Thomson/Brooks/Cole.

Tavsancil, E. (2002). Measuring attitudes and data analysis with spss. *Nobel Publishing*, Ankara. Turkish.