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A Tool for Evaluation of Nurses Handover: Validity and Reliability Study of the Handover Evaluation Scale

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Abstract Nursing handover is the process of transferring patient care from one caregiver to another, such that this care is safe and of a high quality. A limited number of studies have assessed how this can be successfully accomplished. However, it has been stated that there are an insufficient number of tools available to evaluate the efficiency of the process and the arrangements for structuring the handover period. This study aimed to carry out Turkish validation of the 'Handover Evaluation Scale', developed by O'Connell, Ockerby and Hawkins. The validation of the Handover Evaluation Scale, was conducted with nurses. The size of the sample was targeted as five times the number of questions on the original scale, and 136 nurses participated. Explanatory factor and confirmatory factor analysis were used as validity methods, and test-retest, test-split techniques were used for the reliability studies. The original scale includes 17 items, six items were removed in study. The scale obtained as a result of the present study has a one-factor structure. This study provides Handover Evaluation Scale, which is a valid and reliable tool for evaluating nursing handovers in Turkey. Successful patient handover is indispensable to reduce mistakes caused by handover, providing patient safety and increasing the quality of healthcare. This evaluation of the effectiveness of the handover processes was carried out in a clinical environment in Turkey, and studies (training, counselling, etc.) to improve the delivery process can be performed using this tool, which has Turkish validity and reliability.

Keywords Nurse, Patient, Patient delivery, Handover evaluation scale

1. Introduction

In order to ensure safety and quality, nursing handover is of great importance in transferring patient care from one nurse to another [1]. Patient handover includes verbal, written, and voice recordings in terms of communication, which is performed in three shifts at the nursing room and at the nurse's desk in the morning [1-5].

The aim of patient handover, an indispensable element of patient care, is to share short and up-to-date information regarding the patient's life, as well as to increase the accuracy/validity of clinical information, in order to avoid repeated applications, ensure the applicability of information submitted on handover and provide holistic care [1-6]. Patient handover often includes provision of the patient's name, age, gender, life history, and other pertinent events in the patient's life, in a particular manner. However, the time allocated to nursing care plans at the time of handover of a patient does not exceed 1% of the total duration, and therefore no necessary updates can be made to patient care plans, as a result of the limited information delivered. Moreover, patient handover is often interpreted as a waste of time by nurses [4]. Nevertheless, it is also known that ensuring patient safety and increasing the quality of care are indispensable for successful patient handover.

A limited number of previous studies have assessed how to perform a successful handover [1, 4, 7]. Furthermore, there are no standards/procedures in Turkey, with regard to implementing an effective nursing handover. According to the Regulation on the Amendment of the Nursing Regulation, published by the Ministry of Health on 19 April 2011, nurses must submit nursing records related to care and treatment applications / observations to the departmental nurses / associates in written and verbal exchanges during shifts. Unfortunately, there is no standard as to how this process should be carried out, although there is a nursing handover structure at the national level.

A handover with the participation of health professionals with different areas of expertise and different levels of education means that both patients and nurses face more complex handover processes. Ineffective patient handovers may lead to disruptions in care, mistakes in drug dosing, surgeries on the wrong side of the body and patient deaths [8].

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On the basis of this information, the present study was designed to provide a scale for use in assessing the suitability of nursing handover in a university hospital in Turkey.

2. Methods

2.1. Aim

The aim of was to conduct Turkish validity-reliability studies of the Handover Evaluation Scale developed by O'Connell, Ockerby and Hawkins.

2.2. Sample and Population

The nurses of a university hospital participated in this study, for which the permission of the ethics committee was granted. In the scale studies, the aim was to reach a total of 85 nurses, corresponding to five times the 17 items in the Handover Evaluation Scale, considering that at least three or 5–10 people should be considered for each scale item. The total number of the participants in the sample was 136.

2.3. Data Collection Tools

A questionnaire developed by researchers and the Handover Evaluation Scale were used to determine demographic characteristics.

2.4. Handover Evaluation Scale

The Handover Evaluation Scale is a measure of a total of 17 items, with three questions being optional, and exploratory and confirmatory factor analyses were performed. The scale was initially composed of 20 questions, and when the factor analysis was performed, it was determined that the questions should be aggregated in five dimensions. The scale was subsequently reduced to four factors and 18 items because only one item was included in one dimension, and the explanatory power was low. In accordance with the DFA results, another item was removed, and there were ultimately 17 items in the scale, which consisted of four factors: knowledge quality, interaction and support, efficacy and patient participation.

Correlations of the four dimensions were evaluated, and strong correlations between the first three of were observed. Therefore, it was decided that the scale consisted of three basic dimensions; however, the items regarding patient participation remained in the scale as optional items.

2.5. Data Collection

The nurses participating in the study were provided with the necessary information regarding the purpose of the research, as well as with data collection forms. During data collection, the researchers accompanied the nurses and allowed them to ask questions. The nurses completed the data collection forms in approximately 15–20 minutes.

2.6. Procedure

Beverly O'Connell was asked for permission to adapt the Handover Evaluation Scale, via e-mail. In order to prevent any problems that may have arisen due to cultural differences, English–Turkish and Turkish-English translations were performed, and the consistency was evaluated in terms of meaning and grammar. Following translation, the scale was sent to seven specialists who were asked to make an assessment in terms of content validity. The scores given by the experts varied between 1 and 4, and, according to expert opinion of the scale, the content validity index was designated as .92. After obtaining the expert opinions, descriptive factor analysis and confirmatory factor analysis were carried out.

3. Results

3.1. Socio-Demographic Characteristics

A total of 55.1% (n=75) of the nurses were aged 30–39 years; 80.9% (n=10) were females, 64.7% (n=88) were undergraduates, 78.7% (n=107) were staff nurses, 33.1% (n=45) had 1–5 years of experience, 62.5% (n=85) had received handover training and 58.8% (n=80) were satisfied with the level of handover.

3.2. Validity

In order to determine the reliability of the Handover Evaluation Scale, t-test and test split techniques were used, while explanatory factors analysis (EFA) and confirmatory factor analysis (CFA) were used to determine the construct validity of the scale.

Explanatory Factor Analysis

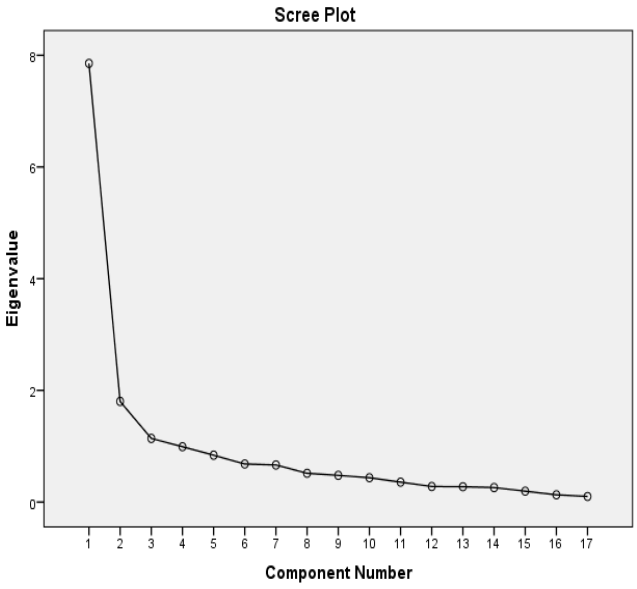

Figure 1. A scatter diagram of the eigenvalues of the factors

An EFA technique was used to statistically determine the construct validity of the scale. The Kaiser-Meyer-Olkin (KMO) and Bartlett tests were performed, primarily to determine whether the scale was appropriate for factor analysis. In this context, the results of the KMO test should

be .50 and above, and the Bartlett test for sphericity result should be statistically significant [9]; the KMO test result was .90 and the Bartlett sphericity test result was significant ($p < 0.01$). Accordingly, there was a high correlation between variables, in other words, the data set was suitable for factor analysis. The first analysis showed that three factors were higher than the eigenvalue of 1. However, when Figure 1 is observed, it can be understood that the factor with the highest eigenvalue and with the higher explained variance was predominant.

Factor analysis was repeated after the number of factors of the scale was determined. As the scale is composed of one factor, the factors were analysed using the principal component analysis without any rotation process. In the EFA, the limit value was taken as .30 for the load values in the factor involving the items. Items with a factor load value of less than .30 should be removed from an analysis, and items 6, 8, 12, 14 and 17 were removed for this reason. The EFA findings of the Handover Evaluation Scale are presented in Table 1.

Table 1. Factor Load Values As a Result of Factor Analysis on Handover Evaluation Scale

Item	Factor Load Values
	Factor-1
Item 11	.896
Item 3	.869
Item 2	.868
Item 4	.851
Item 7	.849
Item 9	.845
Item 15	.793
Item 13	.788
Item 5	.787
Item 10	.779
Item 1	.737
Item 16	,507

As a result of the exploratory factor analysis, it was concluded that the scale had 12 items and one factor, and this factor accounted for 46.21% of the total variance for the scale. Büyüköztürk stated that the variance explained by one-factor scales is at least 30%. The present findings indicate that the factor analysis resulted in a one-factor structure, but the scale had a high level of validity [10].

Confirmatory Factor Analysis

CFA was also applied to determine the construct validity of the Handover Evaluation Scale, with 12 items, which were obtained after removing five items on the basis of the EFA results. CFA aims to assess the extent to which a factorial model composed of factors of many observable variables (latent variables) conforms to actual data. The model under investigation can define a construct using the data of an empirical study or can be based on a particular theory, and a number of fit indices are to evaluate the validity of the model [13]. Among these, the most commonly used are Chi-Square goodness of fit ($\chi 2$), root mean square error of approximation (RMSEA), comparative FIT index (CFI), non-normed fit index (NNFI), normed fit index (NFI), and goodness of fit index (GFI). Levels between $X2/d<3$, $0<RMSEA<0.05$, $0.97 \leq NNFI \leq 1$, $0.97 \leq CFI \leq 1$, $0.95 \leq GFI \leq 1$ and $0.95 \leq NFI \leq 1$ point to a perfect fit, while levels of $4<X2/d<5$, $0.05<RMSEA<0.08$, $0.95 \leq NNFI \leq 0.97$, $0.95 \leq CFI \leq 0.97$, $0.90 \leq GFI \leq 0.95$ and $0.90 \leq NFI \leq 0.95$ point to an acceptable fit [11, 13].

CFA was applied to the one-factor construct of the scale with 12 items. In the first application, items with a statistically insignificant t value were examined, and Item 16 was accordingly removed. The resulting path diagram for the remaining 11 items is shown in Figure 2.

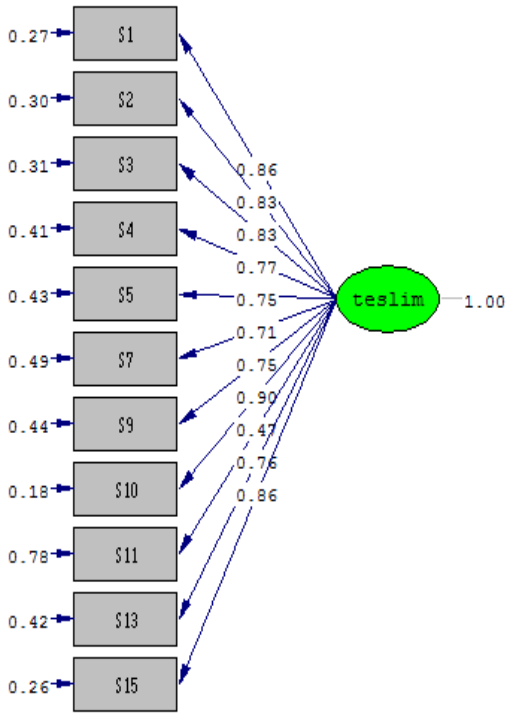

Figure 2. A Scale Path Diagram

Figure 2 shows that the final scale was composed of 11 items and one factor (Table 2). The fit indices were $\chi 2 = 114.58$, $X2/sd = 2.60$, $RMSEA = 0.078$, $CFI = 0.97$, $NNFI = 0.96$, $NFI = 0.96$ and $GFI = 0.87$. When the coefficients showing the relationship between the observed variables and the factors of the model showing the factorial structure of the scale were examined, it was concluded that it was at a sufficient level of fit.

Given the fitness statistics calculated with CFA, it was decided that previously determined one-factor structure of the model was consistent with the data collected. The regression values and t-values of the items are given in Table 3.

Table 3 shows that the obtained regression coefficients and t values were are significant and the model is confirmed.

Table 2. Handover Scale Items

Q1	I have the opportunity to discuss difficult clinical situations I have experienced
Q2	I am able to check the patient during handover
Q3	I am provided with sufficient information about patients
Q4	I have the opportunity to debrief with other colleagues when I have had a difficult shift
Q5	I have the opportunity to discuss workload issues
Q7	The way in which information is provided to me is easy to follow.
Q9	I am able to clarify information that has been provided to me
Q10	Patient information is provided in a timely fashion
Q11	I have the opportunity to ask questions about things I do not understand
Q13	The information that I receive is up to date
Q15	I am able to keep my mind focused on the information being given to me

Table 3. The Regression and t Values of the Confirmatory Factor Analysis

Items	Regression Values	t Values
Item 1	0.86	12.33
Item 2	0.83	11.84
Item 3	0.83	11.78
Item 4	0.77	10.47
Item 5	0.75	10.17
Item 7	0.71	9.40
Item 9	0,75	10,06
Item 10	0.90	13.52
Item 11	0.47	5.68
Item 13	0.76	10.41
Item 15	0.86	12.47

3.3. Reliability

In the reliability study, the Cronbach's alpha coefficient of the scale increased to .94, with the removal of certain items in the Turkish version. The scale was also analysed using the test splitting technique; a minimum of 100 and a maximum of 400 participants are recommended for Spearman-Brown and Guttman analysis methods [11]. The size of the study sample met the pre-condition for these analysis methods, with the Spearman-Brown coefficient being r = 90, and the Guttman coefficient being r = 88.

A paired t-test was carried out approximately 30 days later, in order to assess the time-invariance of the Handover Evaluation Scale. When the pre-test and post-test results were examined, no significant difference between the results was observed, which demonstrates the reliability of the respondents (Table 5).

4. Discussion

This study aimed to adapt the Handover Evaluation Scale developed by O'Connell, Ockerby and Hawkins to Turkish. The EFA and CFA validity results showed that the scale consists of 11 factors in a one-factor structure, and it is considered that the scale is of a sufficiently strong structure to enable evaluation of the handovers. First, EFA was applied to the scale and three factors greater than an eigenvalue of 1 were found. However, it was understood that one factor that had a higher eigenvalue and a higher explained variance than the other factors was dominant.

After the number of factors was determined, another factor analysis was conducted and two items in both the patient participation and efficiency dimensions, as well as one item in the quality of knowledge dimension, were removed because these three items were below the factor load value of .30. During the study period, the nurses verbally stated that the items regarding the dimension of patient participation were not relevant to them, and that they did not include patients in the handovers. In this scale, the items in this dimension are optional, and it is believed that in analysing the scale in other cultures, the analysis should be performed by taking preliminary information about patient participation before including it in the analysis process. O'Connell, Ockerby and Hawkins also considered the items in this dimension as problematic for their own sample, and used the items in this dimension as optional. However, the item 'I am able to check the patient during handover' has a high factor load and is included in the scale in this study. This can be attributed to the fact that nurses maintain their observations of the patients until the end of handovers [12].

Table 4. Results of the BCQ Test Splitting

	X ± SD	Inter-Partial Correlation	Cronbach alpha	Spearman- Brown	Guttman
First Part	32.19 ± 7.67	.82	.92	.90	.88
Second Part	27.51 ± 5,84		.87		
Toplam	59.70 ± 12.90		.94		

Table 5. Test- Re-test Reliability of Handover Evaluation Scale

	n	X ± SD	Min	Max	Med.	t test for Paired Groups	
						t	p
Patient Handover Evaluation Scale (pre-test)	66	61.88±10.59	14.00	77.00	63.00	-0.439	0.662
Patient Handover Evaluation Scale (post-tes)	66	62.56±9.62	22.00	77.00	65.00		

In the CFA analysis, a further item that was included in the interaction and support dimension of the scale, and which had an insignificant t value, was removed, thus achieving the final form of the scale. As a result, a total of six items, two in the patient participation dimension, two in the efficiency dimension, one in the interaction-support dimension and one in the quality of knowledge dimension, were removed from the scale. There were no inverse coded items. The increase in scores indicates that the assessments were positive.

5. Conclusions

Patient handover, an indispensable part of patient care, is an important nursing function that must be effectively carried out in order to provide holistic care [1, 6]. In our country, although there are some regulations regarding the administration of hospital services in the framework of the Ministry of Health's quality applications, there are no arrangements for patient handover from one nurse to another [13]. It is thought that this condition has created/will create a lack of effectiveness and quality in patient handover. However, irrespective of whether patient standards are being developed for nurses, the lack of an evaluation tool for the effective administration of the procedure is also a major drawback. Therefore, it is believed that the Turkish adaptation of the Handover Evaluation Scale will fill a significant gap.

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