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Turkish Validation and Reliability Study of the 'HANDOFF-CEX' Patient Handover Scale

Türkçe Versiyonu 'HANDOFF-CEX' Hasta Devir Teslim Ölçeğinin Geçerlilik ve Güvenilirlik Çalışması

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Öz

Giriş ve Amaç: Hastaneler, 24 saat boyunca kesintisiz sağlık hizmeti sunan kurumlardır. Sağlık hizmetlerinin sürekliliği hemşirelerin vardiyalı çalışması ile mümkündür. Hemşireler arasında nöbet değişimi sırasında bilginin etkili bir şekilde aktarılması, hemşirelik bakımının devamlılığını sağlamak için kritik öneme sahiptir.

Gereç ve Yöntemler: Bu çalışmanın amacı, hemşirelerin nöbet devir işlemlerinin kalitesini nesnel olarak değerlendirmek amacıyla Handoff CEX devir teslim ölçeğinin Türkçe versiyonunun geçerlilik ve güvenilirliğini değerlendirmektir. Dahiliye, cerrahi ve yoğun bakım ünitelerinde hemşirelere toplam 99 devir teslim anketi uygulanmıştır. Her bir devir teslim işlemi, bağımsız iki gözlemci tarafından değerlendirilmiş ve toplamda 396 devir teslim değerlendirmesi yapılmıştır. Veriler SPSS 25.0 kullanılarak analiz edilmiş; sosyodemografik bilgiler, devir teslim süreçlerinin değerlendirilmesi, memnuniyet puanları, madde analizi, açıklayıcı faktör analizi ve Cronbach alfa kullanılarak güvenilirlik testine odaklanılmıştır.

Bulgular: Handoff CEX ölçeğinin Türkçe versiyonu, nöbeti devreden hemşire için 0.925 ve nöbeti devralan hemşire için 0.914 Cronbach alfa değerleri ile yüksek güvenilirlik göstermiştir. Kapsam geçerlilik indeksi 0.96 ile doğrulanmıştır. Faktör analizi, 0.745 ile 0.935 arasında değişen yüksek faktör yüklemeleri göstermiştir. Gözlemciler arası güvenilirlik için Kappa istatistikleri düşük çıkmış olup, gözlemci eğitiminde iyileştirmelere ihtiyaç olduğunu göstermektedir.

Sonuç: Türkçeye uyarlanan Handoff CEX ölçeği, hasta devir teslim süreçlerini değerlendirmek için geçerli ve güvenilir bir ölçüm aracıdır. Ölçeğin kullanımı, hemşirelerin iletişim becerilerinin ve hasta bakım kalitesinin uzun vadede gelişimine katkıda bulunacaktır.

Anahtar kelimeler: Devir teslim, Hemşirelik, Geçerlilik, Güvenilirlik, Ölçek

Abstract

Aim; Hospitals operate continuously, providing healthcare services around the clock. The seamless delivery of health services depends on nurses working in shifts 24/7. Ensuring the effective transfer of information during shifts changes is crucial for maintaining the continuity of nursing care.

Method; This study aims to evaluate the validity and reliability of the Turkish version of the Handoff CEX Patient Handover Scale for objectively assessing the quality of nurses' handoff practices. A total of 99 handoff surveys were conducted by nurses working in internal medicine, surgical, and intensive care units. Each handoff was independently evaluated by two observers, resulting in 396 handoffs assessments. Data were analyzed using SPSS 25.0, focusing on sociodemographic information, handoff process evaluations, satisfaction scores, item analyses, explanatory factor analysis, and reliability testing through Cronbach's alpha.

Results; The Turkish version of the Handoff CEX showed high reliability with Cronbach's alpha values of 0.925 for the outgoing nurse and 0.914 for the incoming nurse. Content validity was confirmed with a CVI of 0.96. Factor analysis indicated high factor loadings, with values ranging from 0.745 to 0.935. Kappa statistics for inter-rater reliability were low, indicating a need for further refinement in observer training.

Conclusion; The Handoff CEX adapted into Turkish is a valid and reliable tool for evaluating patient handoff processes. The use of the scale will contribute to the long-term development of nurses' communication skills and the quality of patient care.

Keywords: Handoff, Nursing, Validation, Reliability, Scale

1. Introduction

Hospitals operate continuously, providing healthcare services around the clock. The seamless delivery of health services relies on nurses working 24 hours a day. Ensuring the effective transfer of information during shifts changes is crucial for maintaining the continuity of nursing care [1-3]. In healthcare settings, the term 'handoff,' refers to the transfer of patient responsibility and relevant information from one nurse to another during shift changes or patient transfers, a process of critical importance [4].

The primary objective of a patient handover is to convey essential details regarding patient care, treatment, healthcare needs, and care planning [5]. Despite the various handover methods employed in clinical practice, there is no established consensus. Patient-related information can be verbally exchanged, recorded on tape, or shared through a pre-prepared handoff form during this process. This transfer may occur at the bedside, nursing desk, or in the staff room [3, 6].

Conducting patient handoffs at the bedside—often carried out through a combination of verbal and written communication—presents challenges in sharing patient information in the presence of other patients, relatives, and visitors. Furthermore, these handoffs are susceptible to interruptions, which may prolong the process and disrupt information flow. Nevertheless, bedside handoffs offer important advantages, such as enabling direct patient observation, providing access to documentation, and involving patients in discussions about their care [7]. Recording handovers on tape offers objective patient information but requires staff training [8]. Observation of 12 handoff types over five cycles among nurses revealed that in purely oral handoffs, all data was lost after three cycles, with only 31% accuracy after five cycles when note-taking was used. The addition of a typed page to oral transfers minimized data loss, emphasizing the essential nature of recording oral information to counteract the impact of memory and communication perceptions. Patient safety organizations endorse the use of current, relevant, and accurate written documents to maintain patient care quality and support oral handoff practices [6].

Handoffs are more than information transfers. They create unique situations fostering social interaction, emotional support, and education opportunities for colleagues [9]. In a quality improvement project in Australia using traditional whiteboards, nurse shift coordinators and team leaders participated in bedside handoffs alongside other nurses, facilitating critical decision-making [10, 11]. The leadership behavior of senior nurses has proven effective in driving change and increasing team performance. However, limited data on the subject mention issues such as lack of communication skills related to handoff, incomplete or incorrect information, limited opportunity to ask questions, recurring interruptions, and time constraints[9]. Inadequate communication during handoffs can lead to continuity of care and treatment interruptions, posing harm to the patient [12]. Most of the adverse events in hospitals result from communication errors among healthcare workers [13]. Given the associated risks, handoffs have been recognized as an 'international area of priority for improvement' by significant health organizations [14].

Meißner et al. (2007) reported that 53% of Italian nurses expressed dissatisfaction with handoffs, citing the absence of a dedicated room for handoffs as a factor negatively impacting the quality of information exchange [9]. Sharing information in noisy environments can lead to misunderstandings, and the lack of a structured and consistent approach is another factor affecting handoff quality [4]. In a study involving 707 healthcare professionals in Australia, half of the participants reported using a

clinical handoff tool [5]. The use of guides summarizing patient information not only enhances handoff quality but also reduces handoff duration, allowing more time for nurses to focus on patient care and education activities. A robust nursing handoff process is crucial for delivering quality nursing care in a modern healthcare environment [15]. Objective evaluation of handoff practices is necessary to establish standardized, high-quality, and evidence-based procedures. In the Turkish context, a limited number of studies have examined nurse-to-nurse handoff practices. Tuna and Dallı (2018) investigated the effectiveness of shift handovers and found that various contextual factors, such as workload and communication clarity, significantly influenced the quality of information transfer [16]. Güngör and Tosun (2023) highlighted the absence of standardized procedures in patient handoffs and noted variability in both the content and method of delivery [17]. Moreover, Sunay, Arıcıoğlu, and Yıldız (2023) explored the relationship between handoff effectiveness and the likelihood of medical errors, emphasizing that inadequate handoffs can contribute to increased error rates [18]. Although these studies provide valuable insights, none utilized a validated measurement tool to objectively assess the quality of handoff processes. This gap underscores the need for culturally adapted, psychometrically tested instruments—such as the Handoff CEX—to be integrated into Turkish nursing practice to ensure communication safety and continuity of care. Given the multidimensional nature of patient handoffs, there is a pressing need for standardized tools that can objectively evaluate handoff quality across various domains. The Handoff CEX is a structured observational instrument that assesses six critical components of handoff quality: setting (environment), organization/efficiency, communication skills, content delivery, clinical judgment, and humanistic quality/professionalism. These components collectively reflect the technical and interpersonal competencies required for safe and effective patient transitions. However, this tool had not been validated in Turkish prior to this study. Therefore, the aim of the present study is to translate the Handoff CEX into Turkish and evaluate its validity and reliability in the Turkish nursing context. By doing so, the study seeks to provide a robust measurement tool that can be used to assess and improve handoff practices in clinical settings across Turkey.

Research Question

This methodological study was guided by the following research question:

"Is the Turkish version of the Handoff-CEX scale a valid and reliable tool for evaluating patient handover competencies among nurses?"

2. Method

Aim of the Study

This study aims to assess the validity and reliability of the Turkish version of the Handoff CEX to gauge the quality of nurses' handoff practices objectively.

Type of the Study

This study was structured in a methodological design.

Place, Characteristics and Time of the Research: Its sample consisted of nurses working in internal medicine, surgical, and intensive care units during the study period of March-June.

Population and Sample of the Research: A total of 99 handoff surveys were carried out by participating nurses. Both provider and receiver nurses conducted these evaluations, and each was independently assessed by two observers. In total, 396 (provider and receiver) handoffs underwent review. This ensured a substantial number of observations, exceeding ten times the number of items on the scale (7 items), thereby meeting the recommended sample size for factor analysis of the scale [19].

Data Collection Tools

In the study, The Nurse Demographic Information Form and the HANDOFF CEX were utilized for data collection.

Nurse demographic information form

This form comprises five questions aimed at gathering sociodemographic information, including gender, age, education status, years of service, and duration of work in the clinic, from the observed nurses [20, 21].

HANDOFF CEX patient handoff evaluation scale

The scale was developed by Horwitz et al. (2013). Its validity and reliability were tested. The instrument consists of two distinct forms, specifically designed for the nurse handing over the patient and the nurse receiving the patient. The Handoff (Provider) Evaluation Form encompasses six sections: setting, organisation/efficiency, communication skills, content, clinical judgment, and professionalism (humanistic qualities/professionalism). The Handoff (Receiver) Evaluation Form includes the other five sections, excluding "Content". Each domain contains indicators aimed at generating objective evaluations, supplemented by an open-ended question allowing for additional comments. Overall, the instrument covers six domains, each rated on a 9-point scale. The form for the nurse handing over the patient includes the additional “Content” domain. Scores are interpreted as follows: 1–3 = unsatisfactory, 4–6 = satisfactory, and 7–9 = superior, thereby guiding evaluators in their assessments [21].

Data Collection

Based on expert opinions and pilot implementation feedback, the final version of the scale was applied by nurses in specific clinics during handoffs from May to June. The process was monitored by two external observer nurses—one from the hospital staff and the other from outside the hospital. They closely observed handoffs between providers and receivers during shift changes. These external observers assessed both the providing and receiving nurses. As part of the handoff process, the nurses concurrently evaluated each other. A total of 396 (99x4 evaluation) handoff reports from 99 handoffs (providers and receivers) were analyzed. The observation of each patient handoff and the completion of data collection forms took an average of 15 minutes.

Data Analysis

The evaluation of data obtained from the research was electronically conducted using the SPSS 25.0 program (Statistical Package for Social Sciences) for Windows. The sociodemographic characteristics of the study participants were analyzed using frequency, percentage, and mean values. The study focused on evaluations of handoff processes obtained by different observers, satisfaction scores, and item-level analyses. Furthermore, item loads related to the exploratory factor analysis of handoff items were determined. The normality of the data was assessed based on skewness and kurtosis values. As the data were normally distributed, independent samples t-tests were used to compare scores between provider and receiver groups in handoff evaluations, as well as for comparisons of observation and feedback times and satisfaction scores. The internal consistency of the scale was assessed using Cronbach's alpha coefficient. Additionally, inter-observer agreement was evaluated using Cohen's Kappa coefficient.

Ethical Aspect of the Study

Prior to the research, approval from Hasan Kalyonuc University Non-Interventional Research Ethics Committee (decision no: 2019/23) and institutional permission from the hospital where the research would be conducted were obtained. In addition, permission was obtained via e-mail from the author of the original scale for the validity and reliability analyses. Written and verbal consent was also obtained from the nurses who agreed to participate in the study. The study adhered to the Declaration of Helsinki on Human Rights.

Limitations of the Study

The Turkish validation and reliability study of the HANDOFF CEX was conducted in three separate clinics of a single hospital.

RESULTS

Language Validity

The language validity study of the HANDOFF CEX utilized the well-established translation-back translation technique, commonly employed for translating and adapting tools into different languages [22-24]. Initially, the scale underwent independent translation into Turkish by two language experts. In the second stage, the Turkish translation of the scale was re-translated into English by two independent language experts. After obtaining feedback from four field experts (nurses with a doctorate), it was confirmed that there were no changes in the meanings of the scale items, thus ensuring language validity.

Content Validity

To assess the content validity of a scale, it is recommended to seek opinions from at least three experts [25]. Following a comparison of the back-translated scale with the original English version, the prepared Turkish form underwent evaluation by four field experts in Turkey (two academicians from the fundamentals of nursing department and two academicians from the internal medicine department). The content validity of the scale was determined using the Davis method, where experts rated the suitability of items on a scale of (1) "not suitable", (2) "somewhat suitable", (3) "quite suitable", and (4) "very suitable". In this method, the sum of the experts' marking options (3) and (4) is divided by the total number of experts to calculate the content validity index (CVI). A value of 0.80 is accepted as the criterion instead of comparing with a statistical criterion (Davis, 1992). In our research, based on the expert opinions received, the content validity index (CVI) was calculated as 96.

Construct Validity

In this study, internal consistency analysis was employed to assess the reliability of the scale. Item analyses and Cronbach's alpha tests were conducted within the scope of reliability testing. The calculated Cronbach's alpha values were 0.925 for the outgoing nurse HANDOFF CEX scale and 0.914 for the incoming nurse HANDOFF CEX scale. The internal consistency and item analyses indicated that no items needed to be removed from the draft scale.

Pilot Study

The literature suggests conducting a pilot study with a group of approximately 20-30 individuals following expert opinions [26, 27]. In our study, a pilot application was administered to 30 nurses with characteristics similar to the sample, who agreed to participate. The pilot application indicated sufficient understandability of the scale, and the individuals involved in the pilot study were excluded from the final sample.

This study includes evaluations from two different observers regarding scale items, including observation time and feedback time. According to the first observers, the highest median scores were found in the 'content' 8 (IQR 4-7) and 'overall handoff competence' 7 (IQR 5-7) criteria. Lower median scores were observed in the 'setting' 6 (IQR 4-6) and 'organization/efficiency' 6 (IQR 4-7)

criteria. Regarding the second observer, the highest median scores of 7 (IQR 4-7) and 6 (IQR 5-8) were found in the 'setting' and 'communication skills' criteria. The score in the 'content' criterion was stated as 0 for this observer because there was no content section in the handoff form, and only the content evaluation was made on the handoff part of the scale. The 'observation time' and 'feedback time' criteria, the median times for both observers are close to each other. The quartile values (3 - 10 min) set by the second observer for 'feedback time' are lower than the quartile values (6 - 15 min) set by the first observer (Table 1).

Table 1. Distribution of observer scores in handover procedures

Handoff-CEX Scale	First Observer			Second Observer		
	Median	Quartiles	Mean±SD	Median	Quartiles	Mean±SD
Setting	6	4 -6	4.92±1.54	7	4 -7	5.42±1.88
Organization/ efficiency	6	4 -7	5.46±1.64	6	5 -7	5.99±1.84
Communication Skills	6	5 -7	5.98±1.64	6	5 -8	6.39±1.87
Content	8	4 -7	5.31±2.15	0	0	0
Clinical judgement	6	5 -7	6.12±1.68	6	4 -7	5.66±1.79
Humanistic qualities/ professionalism	6	5 -7	5.9±1.73	6	5 -7	6.05±1.92
Overall handover competence	7	5 -7	5.96±1.59	6	5 -7	5.66±1.77
Observation time	17 min	7-15 min	12.34±7.64	17 min	6 -15 min	11.07±5.05
Feedback time	17 min	6-15 min	12.16±6.96	18 min	3 -10 min	8.22±5.56

Factor loads are investigated to indicate how much a factor explains a variable. For each item, factor loadings vary from 0.745 for “Setting” to 0.935 for “Clinical Judgment.” These factor loadings suggest that each item explains a large part of the total variance, and this factor strongly influences most of the items. Specifically, the "Clinical Judgment" (0.935) and "Humanistic Quality/Professionalism" (0.932) items have the highest factor loadings, while the "Setting" item has the lowest factor loading (0.745). This implies that the "Clinical Judgment" and "Humanistic Quality/Professionalism" items are particularly strongly affected by this factor, and the "Environment" item is less, but still significantly, influenced by this factor. It is important to note that all items have high factor loadings, indicating that this factor has a strong influence on all items.

In this study, the Kaiser-Meyer-Olkin (KMO) value and Bartlett's test were utilized to determine the applicability of a factor analysis to the handoff scale. With a KMO value of 0.906, it was established that the sample size was sufficient, and Bartlett’s test Chi-Square value was 765.55 with 21 degrees of freedom, signifying significance (respectively; $p<0.001$, $p<0.05$). Additionally, the explained variance analysis of the scale was calculated as 79.28% (Table 2).

Table 2. Factor loads of the items in the exploratory factor analysis of handoff subtitles

Handoff-CEX Scale	Factor Loads
Setting	0.745
Organization/ efficiency	0.929
Communication Skills	0.909
Content	0.860
Clinical Judgment	0.935
Humanistic qualities/ professionalism	0.932
Overall handover competence	0.908
KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy): 0.906	
Bartlett's Test of Sphericity:	$p < 0.001$
Total Variance Explained:	79.28%

The Kappa statistic is a ratio calculated from symmetric cross tables that have both rows and

columns. It determines the agreement between two observers assessing a situation or phenomenon simultaneously (inter-rater reliability coefficient). The Kappa statistical values relating to the scores of the two observers in our research are provided in this study. Accordingly, it appears that there was no significant relationship between the observers' scores, and the Kappa values are not very high (Table 3).

Table 3. Analysis of scores given by observers to Handoff-CEX criteria

Handoff-CEX Scale	Firts observer (Mean±SD)	Rate	Second observer (Mean±SD)	Rate	Cohen's Kappa Coefficient	*p*
Setting	4.92±1.54	satisfactory	5.42±1.88	satisfactory	0.039	0.360
Organization/ efficiency	5.46±1.64	satisfactory	5.99±1.84	satisfactory	0.081	0.056
Communication Skills	5.98±1.64	satisfactory	6.39±1.87	satisfactory	0.172	0.001
Clinical Judgment	6.12±1.68	satisfactory	5.66±1.79	satisfactory	0.032	0.420
Humanistic qualities/ professionalism	5.9±1.73	satisfactory	6.05±1.92	satisfactory	0.009	0.850
Overall handover competence	5.96±1.59	satisfactory	5.66±1.77	satisfactory	0.028	0.502

In this study, the HANDOFF CEX "Setting" item mean scores did not show a statistically significant difference according to the situation of receivers and providers (p=0.77). The "Organization/Efficiency" item mean scores did not show a statistically significant difference according to the situation of receivers and providers (p=0.80). The "Communication Skills" item mean scores showed a statistically significant difference according to the situation of receiving and providing handoff (t=2.45 p<0.02). The "Clinical Judgment" item scores received at the handover showed a statistically significant difference according to the situation of receiving and providing handoff (t=2.81 p=0.01). The Humanistic Quality/Professionalism scores received at the handover did not show a statistically significant difference according to the situation of receiving and providing handoff (p=0.33). The Overall Handoff Competence scores received at the handover did not show a statistically significant difference according to the situation of receiving and providing handoff (p=0.38) (Table 4) The evaluator's satisfaction score related to the assessment in the handover shows a statistically significant difference according to the situation of receiving and provider handoff (t=-2.25 p=0.01). The satisfaction of the person being evaluated related to the assessment in the handoff did not show a statistically significant difference according to the situation of receiving and providing handoff (t=-0.11, p=0.91).

DISCUSSION

This study aimed to validate and establish the reliability of the HANDOFF CEX scale adapted to Turkish culture. In the literature, there are insufficient studies that monitor and evaluate the handoff process among nurses [21, 28]. Thus, the Handoff CEX scale, which is pioneering in the literature, is significant for ensuring the sustainability of quality nursing care services.

In the study, the content validity of the scale was ensured by evaluating the opinions of 4 experts on the items with CVI. Considering the reference values suggested for the Content Validity Index [29, 30], it was seen that the Turkish form had appropriate content validity with a CVI value of 0.96 found in the study. The Cronbach's alpha coefficient (0.96), which was calculated to determine the internal consistency of HANDOFF CEX, was quite high, indicating high reliability. In this study, Cronbach's alpha values were calculated as 0.925 (provider Handoff CEX scale) and 0.914 (receiver Handoff CEX scale). Taking into consideration the language content and internal consistency [28], the Turkish version of Handoff CEX can be considered

Table 4. Findings related to the differences in scores obtained in Handoff-CEX criteria

Handoff-CEX Scale	Group	n	Mean±SD	Range	Test	*p*	*Cohen's d*
Setting	Handoff Receiver	99	5.51±1.72	satisfactory	*t*=0.29	0.77	0.046
	Handoff Provider	99	5.43±1.75	satisfactory			
Organization/ efficiency	Handoff Receiver	99	6.59±1.85	satisfactory	*t*=-0.25	0.80	-0.036
	Handoff Provider	99	6.65±1.48	satisfactory			
Communication Skills	Handoff Receiver	99	7.40±1.19	superior	*t*=2.45	0.02*	0.344
	Handoff Provider	99	6.94±1.47	satisfactory			
Clinical Judgment	Handoff Receiver	99	7.37±1.31	superior	*t*=2.81	0.01*	0.395
	Handoff Provider	99	6.75±1.79	satisfactory			
Humanistic qualities/ professionalism	Handoff Receiver	99	7.23±1.45	superior	*t*=0.98	0.33	0.138
	Handoff Provider	99	7.01±1.73	superior			
Overall handoff competence	Handoff Receiver	99	7.16±1.27	superior	*t*=0.88	0.38	0.111
	Handoff Provider	99	6.97±1.76	satisfactory			

*p < 0.05 statistical significant, t=Independent sample t-test

valid and reliable for evaluating nursing care. Therefore, it is suitable for use by Turkish nurses.

Afterward, the item loads of the Turkish handoff scale, which was subjected to factor analysis, were calculated between 0.74-0.93. In the study in which Ferrara et al. (2017) adapted Handoff-CEX into Italian, the item loads were between 0.38 and 0.91. In addition, in the factor analysis of the Turkish version of the scale, no sub-dimension was detected, as in the Italian version and the original version [20]. The scale item scores were rated between 1-9. According to this rating, scores between 1 and 3 are unsatisfactory, scores between 4 and 6 are satisfactory, and scores between 7 and 9 are considered superior. When the averages of the items in the scale were examined, it was observed that none of the item averages were between 1 and 3 points. The lowest item mean was 5.43±1.75, while the highest item mean was calculated as 7.4±1.19. According to these data, it was determined that all nurses participating in the research have sufficient and superior level handoff processes. In the original scale, the level of nurses' patient handoff processes is seen between 6-9, similarly, as sufficient and superior [21].

According to the Kappa analysis, there was no significant relationship between observers and Kappa values were low. The Kappa number varies between 0 and +1. A value of 0 indicates disagreement, and +1 denotes positive full agreement [31]. In the original version of the scale, the kappa value was medium [21]. The reason for the low Kappa values among observers in the study and the lack of a significant relationship between the

evaluation processes may be due to the observers having different work experiences and different education levels. Moreover, it is important to note that the evaluation of handoff processes involves inherently subjective elements, particularly in criteria such as communication, clinical judgment, and professionalism. These components are influenced by observers' clinical reasoning, interpersonal sensitivity, and prior professional experiences. In such contexts, even well-trained observers may interpret and score performance differently. Additionally, the use of Cohen's Kappa in evaluating inter-rater agreement has known limitations, especially in cases where the variability in responses is low or where marginal distributions are unbalanced. For this reason, low Kappa values do not necessarily indicate poor reliability but may reflect the complexity of the construct being measured. Therefore, Kappa values in this study were interpreted in conjunction with mean scores and other descriptive statistics to provide a more nuanced understanding of observer consistency.

This study observed that nurses assessing each other tend to give higher scores compared to assessments by objective observers. Horwitz et al. (2013) found peer evaluations to be higher compared to external observers and explained this phenomenon as follows. The first reason cited is that the friendship relationships among nurses may subjectivize peer evaluations. Secondly, the combination of peers' focus on both the handoff processes and their critical assessment of these processes from a quality perspective has resulted in higher evaluations. At this point, it is noted that external observers, unlike nurses evaluating each other, are solely responsible for critically evaluating the handoff process. These significant differences suggest that clinical judgment and communication skills are influenced not only by individual competencies but also by contextual factors such as workload, interprofessional dynamics, and familiarity with patients. For instance, nurses acting as handoff receivers may exhibit more alertness and critical thinking, as they assume direct responsibility for the subsequent care, potentially leading to higher evaluation scores. Conversely, providers may underemphasize certain clinical cues during information transfer due to time constraints or routine fatigue. In terms of communication, variation in assertiveness, clarity, and the use of structured handoff protocols (such as SBAR) could contribute to inconsistent perceptions of effectiveness. These discrepancies underscore the need for standardized communication training and simulation-based exercises that enhance both the delivery and reception of clinical handoffs. The variation in "Communication Skills" suggests differences in communication styles among healthcare professionals, impacting the effectiveness of information transfer. Some professionals may possess more effective communication skills, contributing to a better understanding and application of patient care during handoff [13].

The absence of significant differences in "Setting" and "Organization/Efficiency" implies that organizational factors result in a generally similar performance during the handoff process. This does not necessarily indicate a need for improvement in specific areas; instead, the similarity in performance in certain aspects may indicate overall consistency and effectiveness in the handoff process.

Conclusion

With this study, the validity and reliability of the patient handoff scale have been established in Turkey. Analysis results have determined that the HANDOFF CEX is a valid and reliable measurement tool that can evaluate patient handoff processes in Turkey. The Handoff CEX adapted into Turkish can be used to measure nurses' communication skills and detect and correct possible communication disorders. The continuous use of the scale in health institutions will contribute to the long-term development of communication skills.

Limitations of the Study

The Turkish validation and reliability study of the HANDOFF CEX was conducted in three separate clinics of a single hospital, which may limit the generalizability of the findings to other clinical settings and institutions.

Moreover, the study relied on self-reported data from nurses, which might be subject to response bias. Nurses assessing each other could lead to higher scores due to personal relationships and subjectivity, potentially influencing the study's outcomes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this study.

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References

1. Do J, Shin S: Development of nursing handoff competency scale: a methodological study. *BMC nursing* 2024, 23(1):272.
2. Vanderzwan KJ, Kilroy S, Daniels A, O'Rourke J: Nurse-to-nurse handoff with distractors and interruptions: An integrative review. *Nurse Education in Practice* 2023, 67:103550.
3. Le A, Lee MA, Wilson J: Nursing handoff education: An integrative literature review. *Nurse Education in Practice* 2023, 68:103570.
4. Calleja P, Adonteng-Kissi B, Romero B: Transition support for new graduate nurses to rural and remote practice: A scoping review. *Nurse education today* 2019, 76:8-20.
5. Manias E, Geddes F, Watson B, Jones D, Della P: Perspectives of clinical handover processes: A multi-site survey across different health professionals. *Journal of clinical nursing* 2016, 25(1-2):80-91.
6. O'Connell B, Penney W: Challenging the handover ritual: recommendations for research and practice. *Collegian* 2001, 8(3):14-18.
7. Ismuntania K, Nursalam FR, Nurlela Mufida I, Maulina Iriyanti Z, Muzaffar SD, Fitri Apriani AS: Bedside Handover using Patient Family Centered Care on Patient Safety and Patient Satisfaction: A Systematic Review. *Journal of Positive Psychology and Wellbeing* 2023:534-546.
8. Pothier D, Monteiro P, Mooktiar M, Shaw A: Pilot study to show the loss of important data in nursing handover. *British Journal of Nursing* 2005, 14(20):1090-1093.
9. Meißner A, Hasselhorn HM, Estryn-Behar M, Nézet O, Pokorski J, Gould D: Nurses' perception of shift handovers in Europe–results from the European Nurses' Early Exit Study. *Journal of advanced nursing* 2007, 57(5):535-542.
10. Chaboyer W, Wallen K, Wallis M, McMurray AM: Whiteboards: one tool to improve patient flow. *Medical Journal of Australia* 2009, 190(S11):S137-S140.
11. Cronn S, Trevino C, Jansen K: Use of Theory in Quality Innovations: Shift Change Protocol in the Emergency Department. *Journal of Nursing Care Quality* 2023, 38(2):114-119.
12. Methangkool E, Tollinche L, Sparling J, Agarwala AV: Communication: is there a standard handover technique to transfer patient care? *International anesthesiology clinics* 2019, 57(3):35-47.
13. Umberfield E, Ghaferi AA, Krein SL, Manojlovich M: Using incident reports to assess communication failures and patient outcomes. *The Joint Commission Journal on Quality and Patient Safety* 2019, 45(6):406-413.
14. Desmedt M, Ulenaers D, Grosemans J, Hellings J, Bergs J: Clinical handover and handoff in healthcare: a systematic review of systematic reviews. *International Journal for Quality in Health Care* 2021, 33(1):mzaa170.
15. Ernst KM, McComb SA, Ley C: Nurse-to-nurse shift handoffs on medical–surgical units: A process within the flow of nursing care. *Journal of clinical nursing* 2018, 27(5-6):e1189-e1201.
16. Tuna R, Dallı B: Hemşirelerin Nöbet Devir Teslim Etkinliği ve İlişkili Değişkenler. *Acıbadem Üniversitesi Sağlık Bilimleri Dergisi* 2018(4):432-437.
17. Güngör S, Tosun B: Hemşirelerin hasta devir teslim süreci. *Uluborlu Mesleki Bilimler Dergisi* 2023, 6(2):118-126.
18. Sunay M, Arıcıoğlu C, Yıldız GK: Hemşirelerin hasta devir teslim etkinliğinin tıbbi hatalara eğilim düzeylerine etkisi. *Yüksek İhtisas Üniversitesi Sağlık Bilimleri Dergisi* 2023, 4(3):76-83.
19. Bujang MA, Omar ED, Baharum NA: A review on sample size determination for Cronbach's alpha test: a simple guide for researchers. *The Malaysian journal of medical sciences: MJMS* 2018, 25(6):85.
20. Ferrara P, Terzoni S, Davì S, Bisesti A, Destrebecq A: A tool for assessing the quality of nursing handovers: a validation study. *British Journal of Nursing* 2017, 26(15):882-888.
21. Horwitz LI, Dombroski J, Murphy TE, Farnan JM, Johnson JK, Arora VM: Validation of a handoff assessment tool: the Handoff CEX. *Journal of clinical nursing* 2013, 22(9-10):1477-1486.
22. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL: Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Frontiers in public health* 2018, 6:149.
23. Streiner DL, Norman GR, Cairney J: Health measurement scales: a practical guide to their development and use: Oxford university press; 2024.
24. Son J: Back translation as a documentation tool. *Translation & Interpreting: The International Journal of Translation and Interpreting Research* 2018, 10(2):89-100.
25. Morgado FF, Meireles JF, Neves CM, Amaral A, Ferreira ME: Scale development: ten main limitations and recommendations to improve future research practices. *Psicologia: Reflexão e Crítica* 2017, 30.
26. Arafat S, Chowdhury HR, Qusar M, Hafez M: Cross cultural adaptation and psychometric validation of research instruments: A methodological review. *Journal of Behavioral Health* 2016, 5(3):129-136.
27. Gjersing L, Caplehorn JR, Clausen T: Cross-cultural adaptation of research instruments: language, setting, time and statistical considerations. *BMC medical research methodology* 2010, 10:1-10.
28. Baluyot A, McNeill C, Wiers S: Improving Communication From Hospital to Skilled Nursing Facility Through Standardized Hand-Off: A Quality Improvement Project. *Patient Safety* 2022, 4(4):18-25.
29. Almanasreh E, Moles R, Chen TF: Evaluation of methods used for estimating content validity. *Research in social and administrative pharmacy* 2019, 15(2):214-221.
30. Davis LL: Instrument review: Getting the most from a panel of experts. *Applied nursing research* 1992, 5(4):194-197.
31. de Raadt A, Warrens MJ, Bosker RJ, Kiers HA: A comparison of reliability coefficients for ordinal rating scales. *Journal of Classification* 2021:1-25.