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ORIGINAL ARTICLE

The Turkish Version of the Leading a Culture of Quality for Infection Prevention (LCQ-IP) Scale: A Validity and Reliability Study

Enfeksiyon Önlemede Kalite Kültürüne Liderlik (LCQ-IP) Ölçeğinin Türkçe Versiyonu: Geçerlik ve Güvenirlik Çalışması

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Abstract

Objective: This study aims to conduct the Turkish validity-reliability study of the "Leading a Culture of Quality for Infection Prevention (LCQ-IP)" for nurses and nurse managers.

Method: This methodological design study was conducted with nurses and nurse managers (n=210) in a university training-research hospital in Ankara between February-August 2024. The socio-demographic characteristics form and the Turkish version of the LCQ-IP scale were used to collect data. Validity (language, content, etc.) and reliability of LCQ-IP were evaluated.

Results: The content validity index was determined as 0.96. The Kaiser-Meyer-Olkin value was found to be 0.944. The items numbered 4, 15, and 16 were removed from the scale because the distribution properties disrupted the structure, and the number of items decreased from 19 to 16. Items 13 and 14 were located under the sub-dimension of "psychological safety"; item 9 was located under the sub-dimension of improvement orientation, unlike the original scale. The supportive work environment sub-dimension was removed from the Turkish version. For the confirmatory factor analysis model of the scale, the fit index values were calculated as χ^2/degrees of freedom=1.694, goodness-of-fit index=0.922, normed fit index=0.944, comparative fit index=0.976, root mean square error of approximation=0.058, and root mean square residual=0.050. The Cronbach alpha of the total scale was 0.952.

Conclusion: The LCQ-IP-TR scale is a valid and reliable instrument with 16 items and 3 sub-dimensions, showing strong psychometric qualities. Its reliability and validity make it a helpful tool for assessing and developing infection prevention and control practices, which supports high-quality patient care and ensures optimal patient safety.

Keywords: Validity, reliability, infection prevention and control, leadership, quality culture

Öz

Amaç: Bu çalışmanın amacı, "Enfeksiyon Önlemede Kalite Kültürüne Liderlik Ölçeğinin (LCQ-IP)" hemşireler için Türkçe geçerlik-güvenirlik çalışmasını belirlemektir.

Yöntem: Metodolojik tasarımlı bu araştırma, Şubat-Ağustos 2024 tarihleri arasında Ankara'da bulunan bir üniversitenin eğitim ve araştırma hastanesinde yürütülmüştür. Veri toplamada sosyo-demografik özellikler formu ve LCQ-IP ölçeğinin Türkçe versiyonu kullanılmıştır. LCQ-IP'nin geçerliliği (dil, içerik vb.) ve güvenirliği değerlendirilmiştir.

Bulgular: İçerik geçerlik indeksi 0,96 olarak belirlenmiştir. Kaiser-Meyer-Olkin değeri 0,944 olarak bulunmuştur. Dördüncü, 15. ve 16. maddeler, dağılım özelliklerinin yapıyı bozması nedeniyle ölçekten çıkarılmıştır ve madde sayısı 19'dan 16'ya düşmüştür. On üçüncü ve 14. maddeler orijinal ölçekten farklı olarak

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psikolojik güvenlik alt boyutunda, 9. madde ise iyileştirme odaklılık alt boyutunda yer almaktadır. Türkçe versiyonda destekleyici çalışma ortamı alt boyutu çıkarılmıştır. Ölçeğin doğrulayıcı faktör analizi modeli için uyum indeksi değerleri χ^2/serbestlik derecesi=1,694, uyum iyiliği indeksi=0,0922, normlanmış uyum indeksi=0,944, karşılaştırmalı uyum indeksi=0,976, yaklaşım hatasının karekök ortalama karesi=0,058 ve karekök ortalama artık kareleri=0,050 olarak hesaplanmıştır. Ölçeğin toplam Cronbach alfa değeri 0,952'dir.

Sonuç: LCQ-IP-TR ölçeği, 16 madde ve 3 alt boyuttan oluşan geçerli ve güvenilir bir araçtır ve güçlü psikometrik özellikler göstermektedir. Güvenirliği ve geçerliği, onu enfeksiyon önleme ve kontrol uygulamalarını değerlendirmek ve geliştirmek için yararlı bir araç haline getirir; bu sayede yüksek kaliteli hasta bakımı desteklenir ve hastaların sonunda güvenli olmaları sağlanır.

Anahtar Kelimeler: Geçerlik, güvenirlik, enfeksiyon önleme ve kontrolü, liderlik, kalite kültürü

Introduction

Healthcare-associated infections (HAIs), which occur in one in every 30 patients treated in hospitals (3%), are a patient safety issue (1). Every year, millions of people face complications such as prolonged hospitalization, increased mortality, and costs, due to infections caught while receiving care and treatment services in a health institution. The quality of care decreases, posing a threat to care safety (2-4). These infections affect not only the patient and their family but also other patients who benefit from healthcare services, healthcare professionals, and institutions that provide the service, they can lead to loss of labor and time, and increased costs. One of the goals (Goal 7) determined by Joint Commission International, a key organization in improving the quality of healthcare services and patient safety, is to prevent HAIs (5). As stated in this goal, nurses and nursing managers who are responsible for implementing and maintaining nursing care have important roles in preventing harm that may arise due to HAIs (6,7).

According to the World Health Organization, it was reported at the 2022 World Health Assembly that 7% of patients receiving acute care services in high-income countries and 15% in low- and middle-income countries develop at least one hospital-acquired infection during their hospital stay. This leads to costs that make up 4-6% of recurring health expenses, totaling $6.5-9.6 billion especially in developing countries. In the call made to the member countries at the same meeting, it was emphasized that steps should be taken for sustainable infection prevention and control (IPC) in all health facilities [operational paragraph (OP4)]; that the programs to be established should prioritize the quality of care and patient safety (OP9); that participation at the managerial level is important to maintain and improve the implementation of the programs (OP10); that policies should be established, and guidance should be provided on the use of good practice examples for IPC requirements (OP11) (8).

Main Points

- Registered nurses play a crucial role in developing a quality culture and promoting an environment that prevents hospital-acquired infections.
- The Leading a Culture of Quality in Infection Prevention-Turkish (LCQ-IP-TR) version scale is a reliable and valid tool for evaluating and enhancing quality culture in infection prevention, which is a crucial aspect of patient safety and quality healthcare delivery.
- The LCQ-IP-TR scale can be used for enhancing infection prevention and control programs, conducting cross-cultural research, supporting evidence-based practices, and ultimately improving healthcare outcomes.

In our country, infection control programs for HAIs are implemented by infection control committees, which are established in all inpatient treatment institutions by the regulation published on August 11, 2005 (9). In addition, one of the National Patient Safety (2023) goals is "Combating with HAIs" (10). In this sense, HAIs have been addressed as a national patient safety problem under the "Prevention and Control of Infections" title in the Health Quality Standards (HQS) (Version 6.1), one of the guidelines published by the Ministry of Health. These practices and regulations show that HAIs are one of the most important quality indicators that should be emphasized, with strategies for their prevention and improvement developed in our country's healthcare system (11).

Quality culture is closely tied to an infection prevention climate in IPC. This concept originated from the goal of eliminating healthcare infections worldwide. An infection prevention climate can be described as the shared understanding among healthcare professionals about IPC within their hospitals (12). With the increasing prevalence of HAI worldwide, the evolving landscape in IPC is affecting the quality of patient care (13). While every unit and healthcare professional in the hospital is responsible for combatting infections, nurses and nursing managers and leaders are expected to lead healthcare professionals. Leadership plays an important role in IPC activities, and successful leaders have been reported to be effective in adopting behaviors aimed at preventing HAI (14).

Leading quality is primarily the responsibility of managers, but quality in institutions can be achieved with the participation of all employees. Nurses are health professionals who make the most important contributions to quality studies in healthcare institutions also lead those specifically for HAIs. In this sense, they are important in developing a quality culture, and creating an infection prevention climate to prevent HAIs in our country. It is known that nurses have significant effects on the climate of infection prevention. A Turkish validity and reliability study of the "Leading a Culture of Quality for Infection Prevention (LCQ-IP)" will be conducted to determine the current situation and to provide a measurement tool that can be used in this field, adding to the country's literature.

Material and Method

Study Design and Sample

This methodological design study was conducted in a university training and research hospital between February and August 2024. The study's population consists of nurses, including manager nurses, working in units where inpatient clinics are provided. In psychometric studies of scale adaptations, the sample size recommended for factor analysis is at least five to fifteen times the total number of scale items (15,16). For this study, the sample size was set at 190 people, calculated as ten times the number of items. However, to account for potential data loss, the researchers increased the sample size by nearly 10% to 210 individuals. The study did not include participants who lacked the title of nurse or nursing manager, who worked in units providing outpatient clinic services, or who had worked in clinics or units providing inpatient services for less than six months.

Data Collection

The data collection form consists of two parts. The first part included socio-demographic characteristics of nurses. The second part consists of the "LCQ-IP" scale, which was modified through psychometric analyses performed by Pogorzelska-Maziarz et al. (17).

LCQ-IP consists of 19 items with a 5-point Likert scale, that includes actions taken to lead the quality culture of hospitals, especially regarding IPC. Here, 1 means "strongly agree" and 5 means "strongly disagree"; in the responses to item 15, only 1 is rated as "never" and 5 as "very often". Item 16 is reverse coded. The measurement tool has four sub-dimensions: "psychological safety", "Prioritization of Quality", "Supportive Work Environment", and "Improvement Orientation". The original scale sub-dimension Cronbach's α values are: 0.883 for "psychological safety", 0.840 for "Prioritization of Quality", 0.767 for "Supportive Work Environment", and 0.724 for "Improvement Orientation". In contrast, the Cronbach's α value for the total measurement tool is 0.926 (17).

Statistical Analysis

Analyses were performed using the free and open-source software R (version 4.4.1, https://cran.r-project.org), SPSS for Windows Version 23.0 statistical package (Chicago, IL), and AMOS-23, by an academic biostatistician. The normal distribution assumption of numerical variables was examined with the Kolmogorov-Smirnov goodness of fit test, and Q-Q plot graphics. The reliability (internal consistency, test-retest reliability) and validity (structural) of LCQ-IP (19 items) were assessed. The intraclass correlation coefficient (ICC) value was used to evaluate test-retest reliability. ICC ranges from 0.00 to 1.00, with values between 0.60 and 0.80 indicating good reliability, while values above 0.80 suggest excellent reliability. We used ICC and the Bland-Altman graphical approach to evaluate the agreement, utilizing "Bland-AltmanLeh" (18) and "ggplot2" (19) packages. Internal consistency is related to whether the measurement of a result is homogeneous. Cronbach's alpha was utilized for internal consistency, indicating high internal consistency when the value exceeds 0.894. Spearman's correlation coefficient was employed to assess test-retest reliability. Reliability coefficients were graded as follows: r≥0.81-1.0, excellent; 0.61-0.80, very good; 0.41-0.60, good; 0.21-0.40, moderate; 0.00-0.21, poor (20). Item analysis was conducted to calculate the item-total score correlation coefficient, assessing how the individual items contributed to and related with the overall scale score. After completing the item analysis, we calculated the Kaiser-Meyer-Olkin (KMO) coefficient to assess sample adequacy and determine whether the 16-item scale exhibited a factorial structure. Next, we applied the Bartlett sphericity test to evaluate if the correlation matrix was appropriate for factor analysis. Finally, we examined the determinant of the correlation matrix. According to the Tukey non-additivity test result, the conclusion was that the scale was suitable for obtaining the total score because the statistical p-value was less than 0.05. Content validity was assessed using the Davis method based on expert evaluations. As a result of expert ratings, the overall content validity index (CVI) for all items was calculated as 0.96, indicating a high level of content validity across the scale. To assess construct validity, an exploratory factor analysis (EFA) was initially conducted using the varimax rotation method to identify the underlying factor structure. Subsequently, a confirmatory factor analysis (CFA) was performed to evaluate the fit of the proposed model. Overall, model fit was evaluated using several fit indices. The chi-square statistic (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), normed fit index (NFI), Tucker-Lewis index (TLI), incremental fit index (IFI), and root mean square residual (RMR) were evaluated. The significance value was set at a two-tailed p-value of 0.05.

Ethical Considerations

Ethical approval was taken from the Hacettepe University Social Sciences and Humanities Research Ethics Board (approval no: E-66777842-300-00003204323, date: 14.11.2023) and necessary institutional permission from the hospital's Health Practice and Research Center Education Planning Board (no: E-50687469-779-233347483, date: 27.12.2023). Permission was obtained from the authors who developed the measurement tool for the Turkish validity and reliability study. Written consent of the participants was obtained.

Results

Demographic Findings of the Nurses

The median age of the nurses participating in the study was 30 years, 89.0% were female, and 73.8% had a bachelor's degree. The median of the total working experience was 3.05 years, and only 12.9% of them were working as nurse managers (Table 1).

Adaptation Phase of LCQ-IP

Translation/Back Translation, Content and Face Validity

The International Society for Pharmacoeconomics and Outcomes Research guide was used for the language equivalence study (21). For this purpose, the scale was first translated from English to Turkish by three nurse academics, each holding a PhD, who were fluent in English and specialized in fundamentals of nursing, nursing management, and obstetrics and gynecology nursing. The first Turkish document was created by the authors. The scale was then presented to a Turkish language and literature expert to assess its conformity with Turkish language structure and grammar. Then, three faculty members, all with PhD degrees, who were fluent in English and specialized in fundamentals of nursing and nursing management, translated it back into English. The retranslated English document was created by the authors. The back-translated English form was shared with the original authors, and their permission was obtained.

Then, content validity analyses of the scale were performed. For the content validity study, the items of the scale were evaluated by a total of 10 experts, which included five faculty members who work in the field of nursing and also have studies in the field of infection control nursing, and five specialist nurses working in the clinic, using the CVI developed by Waltz and Bausell (22). The experts evaluated the initial version of LCQ-IP using a CVI by rating each item from 1 to 4, wherein 1=not relevant; 2=somewhat relevant; 3=quite relevant but requires minor alteration; and 4=very relevant. In evaluating the opinions from experts, the content validity rate (CVR) for each item was calculated (varying between 1.00 and 0.85), and the CVI was determined to be 0.96 by taking the average of the calculated CVRs.

The pre-final version of LCQ-IP was presented to the scale's authors, and after their approval, it was ready for a face validity study. Face validity was used to detect misinterpretations and improve the LCQ-IP items. A sample of 10 nurses from the infection control committees was invited to respond to the LCQ-IP. The nurses who voluntarily participated in this phase of the study were not added to the psychometric test. The participants were asked to evaluate items and give suggestions for clarity and comprehensibility in Turkish. This translated LCQ-IP was accepted as the final version.

Psychometric Testing of LCQ-IP

Validity

To examine the factor structure, the KMO value was found to be 0.944. According to the result of Bartlett's sphericity test, the variables and data were found suitable for factor analysis ($p<0.001$). When we examined the frequency distributions of the items, we saw that the distribution properties of items 4, 15, and 16 disrupted the structure. Therefore, we removed these items from the scale and the number of items decreased from 19 to 16 (Table 2).

After obtaining permission from the original scale authors, explanatory and confirmatory factor analyses were conducted. First, the "principal components technique", an EFA technique, was used to determine how many factors the 16 items were grouped into. As a factor rotation method, we used varimax rotation. During the factor analysis, we found factors with eigenvalues greater than 1. After this analysis, it was determined that a 3-factor structure emerged, and the explained variance was 70.80% of the total variability (Table 3). While item 14 was located under the sub-dimension of "psychological safety" (F1), item 9 was located under the sub-dimension of "improvement orientation" (F3), and item 13 was located under the sub-dimension of "psychological safety" (F1), differing from the original scale (Table 3). The scree plot graph showing the factors is given in Figure 1.

Table 1.
Demographic Characteristics of Nurses

Characteristics	**Participants (n=210)**	
	Median (25th-75th percentile)	**Min-max**
Age	30 (27-39)	22-54 year
Total working experience	3.05 (1.60-5.20)	11 month-35 year
	n	**%**
Gender		
Female	187	89.0
Male	23	11.0
Nursing education		
High school	16	7.6
Associate's degree	16	7.6
Bachelor's degree	155	73.8
Postgraduate degree	23	11.0
Position		
Nurse	183	87.1
Nurse manager	27	12.9

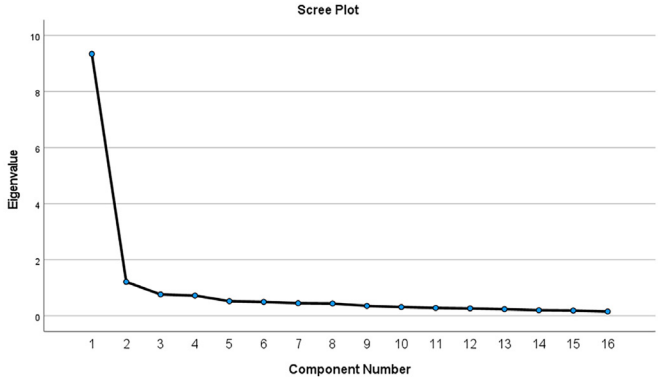

Figure 1.
Scree Plot from Explanatory Factor Analysis

Table 2.
Item Analysis Results

	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
I1	58.07	183.88	0.723	0.694	0.949
I2	58.25	184.77	0.642	0.638	0.951
I3	58.54	184.10	0.669	0.602	0.950
I4	**70.41**	**254.43**	**0.602**	**0.640**	**0.903**
I5	58.13	186.95	0.666	0.558	0.950
I6	58.23	182.09	0.785	0.739	0.948
I7	58.59	183.95	0.707	0.611	0.949
I8	58.21	181.08	0.779	0.666	0.948
I9	58.42	182.02	0.721	0.610	0.949
I10	58.26	188.94	0.619	0.471	0.951
I11	58.34	183.30	0.715	0.574	0.949
I12	58.24	182.46	0.729	0.612	0.949
I13	58.16	182.77	0.782	0.667	0.948
I14	58.04	183.45	0.756	0.669	0.948
I15	**69.34**	**239.75**	**0.242**	**0.118**	**0.944**
I16	**70.46**	**270.87**	**0.141**	**0.195**	**0.915**
I17	58.06	181.56	0.808	0.740	0.947
I18	58.47	181.44	0.734	0.667	0.949
I19	58.42	182.49	0.768	0.695	0.948

The conceptual four-factor structure (17) was fitted to the modeling data (n=210) and the fit measures were provided (Final model in Table 4, Figures 2 and 3). Considering the modification indices given in Table 4, it was concluded that the values are at an acceptable level for the fit of the measurement model. As a result, we confirmed a valid scale structure consisting of 16 items and 3 sub-dimensions.

Reliability

The internal consistency of the LCQ-IP was assessed using Cronbach's alpha and values higher than 0.60 were acceptable. The test-retest reliability was assessed after 2 weeks using intraclass correlation coefficients with 50 participants (23). The findings of the reliability analysis are presented in Table 5. The total scale demonstrated excellent internal consistency with a Cronbach's alpha of 0.952. Subscale reliability coefficients were also high, ranging from 0.792 (F3: improvement orientation) to 0.932 (F1: psychological safety). The ICC for the subscales ranged between 0.790 and 0.924, indicating strong test-retest reliability. Furthermore, the Spearman correlation coefficients (r_s) were high and statistically significant ($p<0.001$), supporting the internal consistency and structural coherence of each subscale (Table 5, Figure 4).

Table 3.
Transformed Components Matrix After Explanatory Factor Analysis

Items	F1	F2	F3
I1		0.798	
I2		0.823	
I3		0.684	
I5		0.630	
I6		0.694	
I7	0.543		
I8	0.622		
I9			0.618
I10			0.754
I11			0.621
I12	0.709		
I13	0.540		
I14	757		
I17	0.816		
I18	0.739		
I19	0.635		

F1=psychological safety, F2=prioritization of quality, F3=improvement orientation

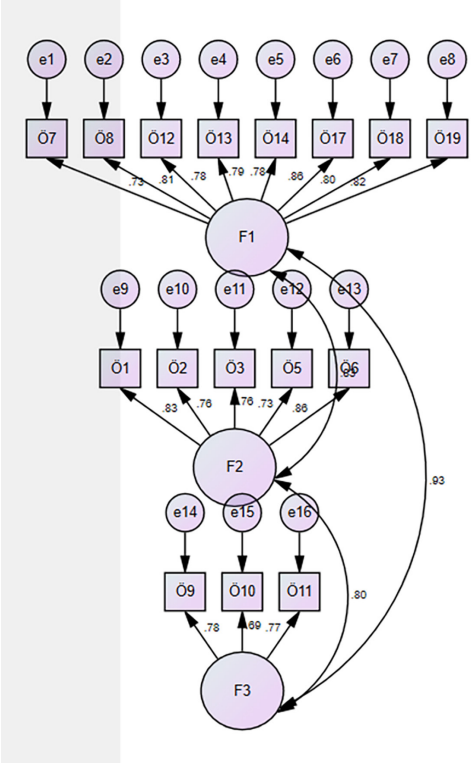

Figure 2.
Diagram of Confirmatory Factor Analysis (Initial Model)
F1=psychological safety, F2=prioritization of quality, F3=improvement orientation

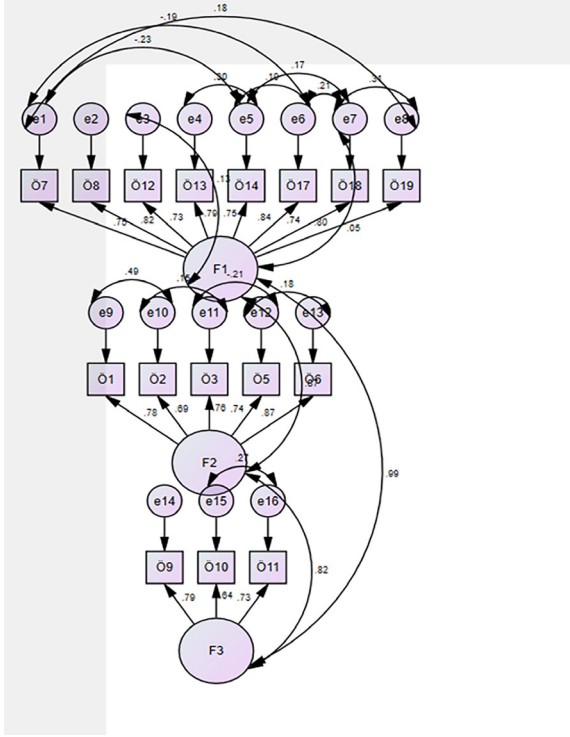

Figure 3.
Diagram of Confirmatory Factor Analysis (Final Adjusted Model)
F1=psychological safety, F2=prioritization of quality, F3=improvement orientation

Table 4.
Confirmatory Factor Analysis Results

Parameter	Abbreviation	Acceptable range	Initial model	Final-adjusted model
Chi square fit test	CMIN/df	2≤CMIN/df≤3	3.035	1.694
Comparative fit index	CFI	0.95≤CFI≤0.97	0.916	0.976
Goodness of fit index	GFI TLI≥0.95	0.85≤GFI≤0.90	0.838	0.922
Normed fit index	NFI	0.90≤NFI≤0.95	0.881	0.944
Tucker-Lewis index	TLI		0.901	0.966
Incremental fit index	IFI	0.90≤IFI≤0.95	0.917	0.976
Root mean square error of approximation	RMSEA	0.05≤RMSEA≤0.08	0.099	0.058
Root mean square residual	RMR	0.05≤RMR≤0.08	0.068	0.050

CMIN/df=chi-square minimum discrepancy/degrees of freedom, CFI=comparative fit index, GFI=goodness of fit index, TLI=Tucker-lewis index, NFI=normed fit index, IFI=incremental fit index, RMSEA=root mean square error of approximation, RMR=root mean square residual

Table 5.
Findings on Reliability Analysis

Factor	Cronbach's alpha	ICC (95% CI)	r_s	p-value
F1	0.932	0.836 (0.728-0.904)	0.778	<0.001
F2	0.889	0.924 (0.869-0.956)	0.755	<0.001
F3	0.792	0.790 (0.657-0.875)	0.703	<0.001
Total scale	0.952	0.889 (0.813-0.936)	0.755	<0.001

F1=psychological safety, F2=prioritization of quality, F3=improvement orientation, ICC=intraclass correlation coefficient, r_s=Spearman correlation coefficient, CI=confidence interval

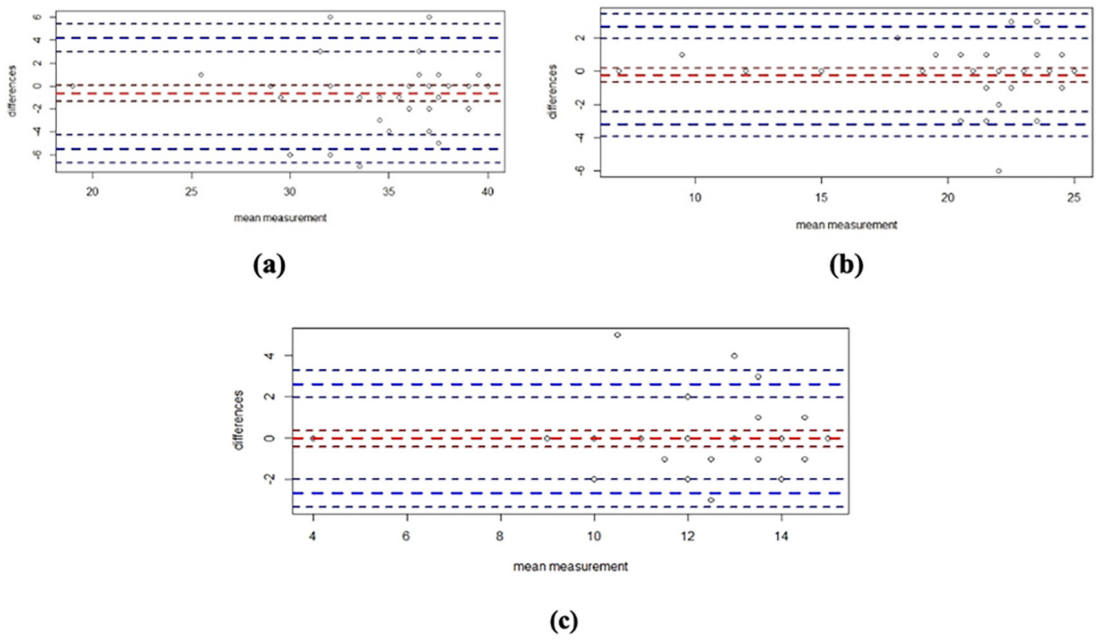

Figure 4.
a: Psychological Safety (F1), b: Prioritization of Quality (F2), c: Improvement orientation (F3)

Discussion

The culture of quality is crucial for IPC as it influences practices and varies across countries, specialties, and healthcare organizations. It enhances compliance and reduces infections, improves patient and staff safety, supports effective IPC strategies, facilitates continuous improvement, encourages staff engagement and education, and addresses organizational and cultural factors (24-26). Strong leadership support is crucial for fostering a positive IPC culture, and leadership attention positively affects continuous improvement in IPC practices (27). The LCQ-IP scale is designed to measure the culture of quality in IPC within healthcare organizations, and has been translated and validated in multiple languages, including Arabic (28), Chinese (29), and Russian (30), demonstrating good reliability and validity across different cultural contexts. Its application across different countries and healthcare environments highlights its versatility and importance in promoting patient safety and IPC practices. This study was conducted with 210 nurses to adapt the LCQ-IP scale to Turkish and to examine its psychometric properties. The Turkish version of the LCQ-IP scale (LCQ-IP-TR) consists of 16 items and 3 subdimensions (Table 3, Figure 3, Suppl 1).

The KMO index was 0.944, and the Bartlett's test of sphericity was statistically significant ($p<0.001$). These values imply that the sample size was adequate for EFA and the factor model was appropriate. The analysis supported a three-factor solution for the scale with a cumulative percentage of variance of 70.80%. This explained variance was higher than the explained variance of the original version (58.80%) (17), Russian version (69.80%) (30), and Arabic version (70.70%) (28) of the scale. Three items were deleted because of low factor loadings: these were item 4, item 15, and item 16, which leaves 16 items across three factors. Three items were located under sub-dimensions different from the original scale. These were items 13 and 14 (F1: Psychological Safety), and item 9 (F3: Improvement Orientation). Therefore, the final dimensions of the scale are as follows: Factor 1: Psychological Safety (7,8,12,13,14,17,18, and 19; factor loading=0.543-0.816); Factor 2: Prioritization of Quality (1,2,3,5, and 6; factor loading=0.630-0.823); Factor 3: Improvement Orientation (9,10, and 11; factor loading=0.618-0.754).

The phrase "item 4", "Senior leadership here has created an environment that enables changes to be made", in the original scale was not included in the Turkish version. In institutions, employees should have responsibilities similar to those of managers in patient safety culture and IPC (31). However, leaders are needed in the creation, development, and supervision of these processes (32). Leaders are expected to improve processes through employee involvement. Since IPC and related processes are addressed within the framework of HQS (Version 6.1) (11) and health accreditation standards (v3.0/2021) (33) in Turkey, employee involvement may be limited. Since employees cannot use their safety voices based on their own knowledge and experience about the processes, they may not view field-specific leadership as participatory.

The original scale's item 15 "the quality of work suffers because of the amount of work staff are expected to do", and item 16 "most people in this organization are so busy that they have very little time to devote to infection prevention

efforts", statements were not included in the Turkish version. IPC is a basic practice in providing health care services and nursing care within the framework of the ethical principles of "doing no harm while promoting good" to the patient. In this sense, institution managers should monitor employees' compliance with IPC principles; and the reasons for non-compliance should be investigated with qualitative and quantitative methods. Nurses and managers/nurse managers are expected to walk hand in hand on this path.

In our study, CFA was used to evaluate model fit. CFI, GFI, NFI, TLI, and IFI close to one; RMSEA and RMR less than 0.08; and a χ^2/df value less than 3 in the adjusted model indicate that all items are appropriately distributed in the 3 sub-dimensions and contribute significantly to the total score of the measurement tool (34). These results show that there is an adequate model fit between the original model and the sample data of our study, providing sufficient evidence for the construct validity of the Turkish version of the LCQ-IP scale.

The scale's overall Cronbach's alpha is 0.952, with a range of 0.792 to 0.932 for its three subscales. According to Alpar (23), a criterion of 0.60 or above indicates acceptable internal consistency. This result is higher than that of previous studies that performed the psychometric evaluation of the same instrument, and reported similar good internal consistency reliability. The Chinese version showed a high Cronbach's alpha coefficient of 0.931, indicating excellent internal consistency (29). In the Russian version of the scale (30), the scale's overall Cronbach's alpha was found to be 0.909, with a range of 0.809 to 0.921 for its four subscales. The computed Cronbach's alpha of the scale was 0.89 for the Arabic version (28). Thus, the LCQ-IP-TR exhibits excellent internal consistency.

LCQ-IP-TR's validated structure makes it an effective instrument for assessing and improving the IPC climate. Hospital and nursing management can use the LCQ-IP-TR scale to reflect on their organizational climate and make necessary adjustments to improve IPC initiatives and patient safety strategies. Emphasizing the components of the LCQ-IP scale in training programs can enhance the competency of infection preventionists and support the development of a robust IPC culture. The LCQ-IP-TR scale offers a comprehensive framework for assessing the effectiveness of IPC policies by emphasizing implementation, staff engagement, psychological safety, quality focus, continuous improvement, and outcomes. Using this scale helps researchers and managers to compare their IPC practices with the world or other healthcare institutions. Also, healthcare organizations can identify their strengths and weaknesses in infection prevention and make informed decisions to improve their policies.

Study Limitations

The current study has some limitations. First, data were collected from a single location. Second, the results of this study were based on self-reported data.

Conclusion

Studying the validity and reliability of the LCQ-IP scale is essential for ensuring accurate measurement, enhancing infection prevention programs, facilitating cross-cultural research, supporting evidence-based practices, and ultimately improving healthcare outcomes. LCQ-IP-TR scale was used as titled (LCQ-IP) with the permission of the developer(s) of the original scale.

LCQ-IP-TR is a valid and reliable tool that can be used to assess and improve quality culture in infection prevention, which is critical for patient safety and effective healthcare delivery. This scale could have significant implications for both clinical practice and future research. The future results from the LCQ-IP-TR scale can provide feedback to healthcare workers, promoting a supportive environment and encouraging ongoing improvement. The scale can be integrated into regular clinical assessments to consistently monitor and improve IPC efforts. This continuous review supports maintaining high-quality care and allows for root cause analysis of infection to solve the problem.

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Informed Consent: Written consent of the participants was obtained.

Footnotes

Author Contributions: Conception – G.H.T.Ç., S.B.A.; Design – G.H.T.Ç., S.B.A., H.A.; Data Collection and/or Processing – V.İ., D.G., C.A.; Analysis and/or Interpretation – G.H.T.Ç., S.B.A., H.A.; Literature Review – G.H.T.Ç., S.B.A.; Writing – G.H.T.Ç., S.B.A. H.A., V.İ., D.G., C.A.

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ENFEKSİYON ÖNLEME ve KONTROLÜNDE KALİTE KÜLTÜRÜNE LİDERLİK ÖLÇEĞİ

Suppl 1. (**Back-Translation:** Leadership Scale for Quality Culture in Infection Prevention and Control)

Bu ölçüm aracı hastanelerin özellikle enfeksiyonları önleme ve kontrolüyle ilgili kalite kültürüne liderlik edilmesi adına yapılan eylemleri içermektedir. Lütfen kurumunuzu düşünerek cevap veriniz.

(**Back-Translation:** This scale measures the efforts made by hospitals to foster a quality culture, especially in infection prevention and control. Please respond with your institution in mind.)

No	**ÖLÇEK MADDELERİ** **(Back-Translation:** Scale Items)	**Kesinlikle katılmıyorum** **(Back-Translation:** Strongly Disagree)	**Biraz katılmıyorum** **(Back-Translation:** Slightly Disagree)	**Kararsızım** **(Back-Translation:** Neither Agree nor Disagree)	**Biraz katılıyorum** **(Back-Translation:** Slightly Agree)	**Kesinlikle katılıyorum** **(Back-Translation:** Strongly Agree)
1.	Kurumumuzun sağlık hizmeti ilişkili enfeksiyon önleme amaçları ve stratejik planı, açık ve net bir şekilde ifade edilmiştir. (**Back-Translation:** Our organization's healthcare-associated infection prevention goals and strategic plan are clearly stated.)					
2.	Enfeksiyon önleme ve kontrol çalışmalarımızın sonuçları düzenli olarak ölçülür ve çalışanlarla paylaşılır. (**Back-Translation:** The results of our infection prevention and control efforts are regularly measured and shared with employees.)					
3.	Yüksek kalitede hasta güvenliği ve bakımın sağlanması için bölümler arasında iyi bir bilgi akışı vardır. (**Back-Translation:** There is a good information flow between the departments to provide the high-quality patient safety and care.)					
4.	Buradaki çalışanlar, sağlık hizmeti ilişkili enfeksiyonların önlenmesi konusunda aciliyet hissi duyar. (**Back-Translation:** Employees here feel a sense of urgency about preventing healthcare-associated infections.)					
5.	Çalışanlar enfeksiyon önleme ve kontrol çalışmalarına katılmaya teşvik edilir. (**Back-Translation:** Employees are encouraged to participate in infection prevention and control activities.)					
6.	Kurumdaki iklim özgür fikir alışverişini teşvik eder. (**Back-Translation:** The climate in the organization encourages the free exchange of ideas.)					
7.	Çalışanlar, hasta bakımını iyileştirebilecek veya hasta güvenliğini etkileyebilecek bir şey gördüğünde bunu özgürce dillendirebilir. (**Back-Translation:** Employees can freely speak up when they see something that may improve the patient care or affect the patient safety.)					
8.	Sonuçları konusunda endişe duymadan fikirlerimi ifade etmede özgür hissediyorum. (**Back-Translation:** I feel free to express my ideas without worrying about the consequences.)					

9.	Hasta enfeksiyonlarıyla ilgili sorunların prosedürlerimizde veya ekipmanımızda değişikliklere yol açtığı örnekleri hatırlayabilirim. (**Back-Translation:** I can remember the examples that problems with patient infections led to changes in our procedures or equipment.)					
10.	Bu yıl kurumumuzda bir veya daha fazla sağlık hizmeti ilişkili enfeksiyon önleme girişiminin yürütüldüğünü biliyorum. (**Back-Translation:** I know that one or more healthcare-associated infection prevention initiatives are going on at our institution this year.)					
11.	Genel olarak, kurumumuzda çalışanlar birbirlerine saygılı davranırlar. (**Back-Translation:** In general, employees in our organization treat each other with respect.)					
12.	Kurumun misyonu, vizyonu ve değerleri hakkında net bir anlayışa sahibim. (**Back-Translation:** I have a clear understanding of the organization's mission, vision and values.)					
13.	İşyerimdeki çalışanlar, yaptıkları işin sonuçlarından sorumlu tutulur. (**Back-Translation:** Employees at my organization are held responsible for the results of their work.)					
14.	Bu kurumdaki çalışanlar, bir işi yapmanın doğru yoluyla ilgili soruları olduğunda birbirlerine danışmakta rahattırlar. (**Back-Translation:** Employees in this organization are comfortable consulting each other when they have questions about the right way to do a job.)					
15.	Bu kurumdaki çalışanlar, diğer çalışanların eşsiz beceri ve yeteneklerine değer verir. (**Back-Translation:** Employees in this organization value others' unique skills and talents.)					
16.	Bu kurumdaki çalışanlar, sorunları ve zor konuları gündeme getirebilirler. (**Back-Translation:** Employees in this organization can bring up the problems and difficult issues.)					

Alt Boyutlar (**Back-Translation:** Sub-dimensions)

Psikolojik Güvenlik (**Back-Translation:** Psychological Safety): 6,7,11,12,13,14,15,16

Kalitenin Önceliklendirilmesi (**Back-Translation:** Prioritization of Quality): 1,2,3,4,5

İyileştirme Odaklılık (**Back-Translation:** Improvement Orientation): 8,9,10