

Original article

Development and Psychometric Evaluation of the Patient Privacy Scale

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Abstract: Background — Protecting patient privacy is a key principle in relationships between healthcare professionals. A validated and reliable instrument for assessing patient privacy during surgical procedures in the operating room (OR) is lacking.

Objective — The goal of this study is to develop a psychometric instrument for assessing patient privacy protection from the perspective of OR staff.

Methods — This is a methodological study. Initially, items were developed based on qualitative research, a comprehensive literature review, and input from experts in the field of gerontology and questionnaire development. The validity and reliability of the developed instrument were then assessed using face validity, content validity, construct validity using exploratory factor analysis (EFA), and reliability based on Cronbach's alpha, and internal consistency coefficient.

Results — A total of 27 items were generated. During development, 9 items were excluded, resulting in a preliminary version of the questionnaire containing 18 items that underwent psychometric evaluation. The content validity index (CVI) value for most items was above 0.9, and the content validity ratio (CVR) was above 0.79. Finally, the instrument, which included 18 items across four dimensions (physical, informational, psychological, and environmental), was examined using EFA. The Cronbach's alpha coefficient for this instrument was 0.91.

Conclusion — The developed Patient Privacy Questionnaire for Operating Room Staff has acceptable validity and reliability. This instrument can be used as a simple, convenient, valid, and reliable tool for assessing patient privacy protection from the perspective of OR staff.

Keywords: psychometric, patient privacy, ethics, operating room, staff.

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Introduction

One of the primary goals of the doctor-patient relationship is to protect the privacy of the [1]. In the context of receiving medical services, the patient's right to privacy refers to secrets that the patient legitimately communicated to healthcare professionals and institutions for consultation and treatment, but which could not be disclosed in an unethical manner during treatment [2]. In addition to being required by law, maintaining patient privacy is a moral duty of medical personnel and an important stepstone of the healing process [3]. The status of privacy gradually increased in the perception of citizens due to the constant improvement of laws and regulations in various countries, as well as growing awareness of individual rights. During the medical procedure, the patient's privacy has to be protected to make the most of the treatment conditions.

Confidentiality is a fundamental right of every individual and an important goal in the healthcare system [4, 5]. Therefore, maintaining privacy is a fundamental principle in the provision of medical care [6]. According to definitions, privacy is a relative concept that cannot be precisely defined, as it is influenced by various factors, including culture, values, societal norms, individual characteristics, and circumstances [7, 8].

Surgery is an anxiety-provoking experience that requires individuals to trust others and relinquish control over their body, social interactions, psychological well-being, and privacy. Patients may be primarily concerned about what will happen to them during surgery while they are unconscious and whether they will be able to maintain control over their physical, mental, and social privacy [7]. In a hospital setting, maintenance of the patient privacy and dignity must be sustained in all clinical areas [9-11]. Respect for patient privacy is essential for establishing effective and trusting relationships with them, ensuring their comfort and satisfaction, and reducing anxiety and a sense of control [9, 12-14]. However, given the emphasis on respect for patient privacy, it has been shown to be respected only moderately [15, 16]. Any violation can hinder a patient's access to desired services. Professional ethics in the medical field encompasses critical patient concerns, including safety, comfort, privacy, informed consent, and many other aspects [17]. Inadequate protection of patient privacy, or even interference with it, gradually exacerbates conflict between physician and patient [18-20].

To improve patient privacy in various settings, such as the operating room (OR), it is necessary to assess its level. This will effectively identify areas requiring intervention. There is no

adequate and comprehensive tool for assessing the level of privacy maintained for patients undergoing surgery in the OR from the perspective of staff. Therefore, to determine the area of intervention and implement the correct intervention, it is necessary to assess patient privacy in the OR using appropriate tools to obtain accurate results and achieve professional standards in this regard.

Material and Methods

This is a methodological study. It was conducted among surgical staff at two large hospitals, Mousavi and Vali-Asr, in Zanjan, Iran.

This study utilized both quantitative and qualitative approaches to develop and evaluate the validity and reliability of a survey instrument designed to protect the privacy of surgical patients. A total of 212 participants participated in the study, including surgical staff at two well-known academic medical centers. A census sampling method was used, ensuring that all eligible employees were included. Inclusion criteria required participants to be present at their workplace and willing to participate in the study. Eight individuals were excluded from the study due to refusal to participate or extended leave. Thus, the final sample consisted of 204 employees. The study was conducted in four stages described below.

Table 1. Demographic characteristics of the target groups

Participant information	Frequency (%)
Age, years	
23-35	109 (53.4)
36-45	59 (28.9)
46-65	36 (17.6)
Gender	
Male	82 (40.2)
Female	122 (59.8)
Marital status	
Single	47(23)
Married	157 (77)
Education level	
Associate's degree	35 (17.2)
Bachelor's degree	106 (52)
Master's degree	3 (1.5)
Specialist	50 (24.5)
Subspecialist	10 (4.9)
Occupational group	
Operating room technician	85 (41.7)
Anesthetic technician	59 (28.9)
Surgeon and surgical resident	50 (24.5)
Anesthesiologist	10 (4.9)
Employment type	
Formal	48 (23.5)
Contractual	20 (9.8)
Corporate	7 (3.4)
Project-based	69 (32.8)

Table 2. The results of Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test for assessing sampling adequacy in the EFA of the instrument measuring the patient privacy based on surgical staff perspective

KMO test	0.875
Bartlett's sphericity test	1170.573
Degrees of freedom	153
Significance level	0.001

Item generation

To develop the concept and generate the questionnaire items, it is necessary to consult relevant published sources that provide insight into the topic of interest. A thorough literature review allows specialists to better understand existing research findings, theories, and methodologies relevant to their field of study. Therefore, a targeted electronic search was conducted using PubMed, SCOPUS, and the Science Direct portal to generate questionnaire items. As a result, relevant articles with keywords such as 'privacy protection', 'operating room staff' and 'psychometric assessment' were identified to achieve the stated goal.

Focus group interviews

Focus group interviews were conducted to understand the factors influencing confidentiality maintenance. This research method allows for in-depth exploration and analysis of individual perspectives within a group, thereby providing valuable information about participants' beliefs, attitudes, and behaviors. The structured format of focus group interviews allows researchers to obtain detailed information and identify the underlying motivations behind privacy-related decisions. The researchers asked specific questions to gather information from experts, including general surgeons, gynecologists, OR directors, and university faculty specializing in ethics, anesthesiology, and OR science. These interviews were recorded and lasted approximately 30-40 minutes. The interviews were immediately transcribed verbatim and read several times, after which interview codes were extracted [21]. The interview results provided valuable information on the importance of maintaining confidentiality, which was used to generate the items. Furthermore, the above-mentioned procedures resulted in the generation of 34 items.

During this stage, the research team carefully reviewed the items and combined similar expressions to avoid repetition. They also ensured that all items that were not directly relevant to the research topic were excluded. The initial version of the 22-item questionnaire was subjected to a process of further item reduction.

Content validity

Content validity was assessed using focus groups and expert panels, while structural validity was tested using quantitative measures. This stage of the study helped us ensure that the instrument accurately measures what it intends to measure, that all relevant aspects of the topic are adequately covered, and that any gaps in coverage are identified and addressed. The questions were administered to 15 experts, including general surgeons, OR directors, and university faculty specializing in ethics, anesthesiology, and OR science. They assessed the content validity ratio (CVR) and content validity index (CVI) of the items. The CVR rates the necessity of the items, while the CVI assesses their relevance, simplicity, and clarity. The CVR value exceeding 0.45 was considered adequate. For the CVI, the criteria of relevance, clarity, and simplicity of the items were assessed, and CVI>0.70 was considered acceptable [22]. Based on the feedback from the experts, modifications were made to the instrument, and a pilot study questionnaire was prepared.

Table 3. Cronbach's alpha values for the items of the Patient Privacy Questionnaire for Operating Room Staff

Items	Cronbach's alpha
They maintain the confidentiality of patient information obtained	0.685
They collect only personal data related to the patient's illness from the patient	0.755
They collect patient information with their consent	0.716
They record and archive the patient's personal data with their consent	0.722
They maintain the required distance from the patient	0.712
They touch only necessary parts of the patient's body	0.752
They obtain the patient's permission before providing care	0.699
During certain procedures, such as catheterization, positioning, preparation, or draping of the genital area, if the patient and the healthcare provider are of different genders, the healthcare provider leaves the area	0.705
During sensitive care or procedures involving the genital area, they close the operating room door	0.602
In the recovery room, they maintain the required distance between patients	0.681
They do not discuss the patient's condition out loud	0.751
They maintain the patient's level of modesty by providing appropriate cover	0.693
They respect the patient's cultural and religious values	0.724
They refrain from imposing their beliefs, cultural, or religious values on the patient	0.689
They solicit the patient's opinion and input on certain treatment decisions, such as the choice of arm for intravenous access	0.639
They ensure adequate cleanliness and ventilation in the operating room	0.609
They refrain from creating unnecessary noise	0.680
In general, they respect the patient's privacy	0.683

Table 4. Rotated factor matrix in the EFA of privacy protection patterns in surgical patients

Components / Items	Factor 1: Informational	Factor 2: Physical	Factor 3: Psychological	Factor 4: Environmental
1	0.58	0.16	0.04	0.16
2	0.59	0.21	0.03	0.10
3	0.80	0.11	0.14	0.10
4	0.78	0.18	0.20	0.15
5	0.17	0.93	0.20	0.16
6	0.16	0.71	0.16	0.10
7	0.03	0.57	0.12	0.02
8	0.21	0.79	0.11	0.11
9	0.20	0.67	0.17	0.12
10	0.12	0.81	0.24	0.12
11	0.02	0.21	0.75	0.02
12	0.01	0.01	0.73	0.14
13	0.14	0.08	0.77	0.08
14	0.22	0.13	0.76	0.07
15	0.19	0.10	0.55	0.02
16	0.09	0.05	0.17	0.76
17	0.29	0.15	0.14	0.78
18	0.22	0.12	0.11	0.85

Construct validity

To assess the structural validity of the questionnaire, exploratory factor analysis (EFA) was conducted. This statistical method helps condense data into a more concise set of summary variables and deepen the theoretical structure of phenomena. It is particularly useful for revealing the structure of the relationships between variables and the respondent. Structural validity was tested using EFA with varimax rotation. Sample size adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) statistic (should be at least 0.06) and Bartlett's test of sphericity (should be statistically significant) [23-26]. Items with loadings of less than 0.4 on any component were considered for exclusion [27, 28].

Reliability

Cronbach's alpha coefficient

Cronbach's alpha coefficient was calculated to determine initial internal consistency. For this purpose, a pilot sample of 30 participants, consisting of operating room and anesthesiology

staff, surgeons, and anesthesiologists, completed the questionnaire.

Internal consistency coefficient

Reliability was assessed using the internal consistency reliability index. Internal consistency was measured using Cronbach's alpha coefficient (α), with values of 0.70 or higher considered satisfactory [29].

Statistical analyses

Descriptive statistics were used to review sample characteristics. All analyses were conducted using SPSS version 22 statistical software.

Ethical statement

This study was conducted in 2018-2019. It was part of dissertation research approved by the Ethics Committee of Zanjan University of Medical Sciences (approval code: IR.ZUMS.REC.1397.181).

Results

Questionnaire development

A robust methodological approach was used to develop the questionnaire following a privacy protection survey conducted among OR room staff. Results from a pre-test involving 204 participants implied the questionnaire's acceptability. Respondents found it easy to understand and were able to rate its items. Subsequent EFA analysis resulted in a final version of the questionnaire consisting of 18 items, each rated on a 5-point Likert scale (see *Appendix*). The questionnaire total score ranged from 0 to 72 pts, with higher scores reflecting a higher level of privacy protection, as perceived by OR staff.

Eighteen items of the questionnaire covered four dimensions: physical (6 items), informational (4 items), environmental (3 items), and psychological (5 items). Respondents' opinions were collected using a 5-point Likert scale: 'always' (4 pts), 'often' (3 pts), 'sometimes' (2 pts), 'rarely' (1 pt), and 'never' (0). Thus, the score ranged 0-24 pts for the physical dimension, 0-16 pts for the

informational dimension, 0-20 pts for the psychological dimension, and 0-12 pts for the environmental dimension, while the overall score for the instrument ranged 0-72 pts. Scores were categorized into three levels: weak, moderate, and high. The resulting scores for each dimension were first converted to percentages and then classified as follows: weak (less than 33.33%), moderate (33.34 – 67%), and high (more than 67%).

Study participants

A total of 204 individuals participated in the study. Of these, 122 (59.8%) were women, and 157 (77%) were married. Participant characteristics are presented in [Table 1](#).

Content validity

According to the Lawshe table, which assigns a score of 0.49 to 15 experts, items with scores above 0.49 are statistically significant. In this study, the calculated scores for most items were above 0.9, indicating high significance and acceptability.

Finally, the employee questionnaire was validated by removing question 14 due to low scores and question 15 due to overlap with question 13 and lack of expert panel approval. The CVI and CVR values were 0.90 and 0.79, respectively.

Structural validity

The EFA yielded four outputs. The first output included the KMO value, the Bartlett's statistic with its degrees of freedom and significance level. Given that the KMO value exceeded 0.8, the sample size was considered eligible for factor analysis. Furthermore, Bartlett's test of sphericity with a significance level of less than 0.001 indicated the presence of detectable relationships between the analyzed variables and the suitability of using the factor analysis method ([Table 2](#)).

The second output parameter included the initial and extracted communalities. The higher the extracted communalities, the better the extracted factors can represent the variables under study. Values above 0.3 are recommended. In this study, all extracted communalities (except items 1 and 7) were above 0.5 ([Tables 3](#) and [4](#)).

The third output consisted of the initial eigenvalues and rotated factor loadings. Considering factor loadings greater than 0.4 and eigenvalues equal to 1, a final solution was obtained with four distinct factors, 18 items, and a predictive power of 51.57% for the employee questionnaire ([Table 5](#)).

Reliability

The overall reliability of the questionnaire, assessed by Cronbach's alpha, was high (0.91). Furthermore, individual factors

also demonstrated high reliability, with Cronbach's alpha value ranging from 0.70 to 0.93. These results exceed the acceptable threshold, indicating good scale reliability of the questionnaire.

Discussion

In this study, a questionnaire (Patient Privacy Questionnaire for Operating Room Staff) was developed to assess the privacy protection in surgical patients in hospitals. The instrument was validated using face validity, content validity, and structural validity. Also, its reliability was assessed using Cronbach's alpha. Content validity results showed that the CVI and CVR values supported the questionnaire's validity. At this stage of the study, the employee questionnaire was validated by excluding question 14 due to low scores and question 15 due to duplication with question 13 and lack of expert panel approval.

The CVI for most items was above 0.9, while the CVR was above 0.79. Finally, the instrument, comprising 18 items across four dimensions (physical, informational, psychological, and environmental), was examined using EFA, which accounted for 57.51% of the variance. The EFA results showed that the first factor included six items, all of which correlated with the physical dimension. Four items were assigned to the second factor, which correlated with the informational dimension. Three items related to the environmental dimension comprised the third factor, and the fourth factor included five items, all of which correlated with the psychological dimension. This was also confirmed by a Cronbach's alpha coefficient of 0.91.

Havva Ozturk et al. (2014) conducted a study to develop a patient protection scale to determine whether nurses respect or violate patient privacy in the workplace. The scale's validity was initially tested for face validity and content validity, with the draft 30-item scale having a CVI of 0.91 and a CVR of 0.80. In this study, construct validity was assessed using EFA and the extracted five factors. Cronbach's alpha in this study was 0.93 [5]. Sevimligül and Evçili et al. (2023), seeking to develop a measurement instrument to determine healthcare workers' attitudes toward patient privacy, developed a 37-item instrument. They reported an alpha coefficient of 0.91, and, after factor analysis, produced a 5-factor instrument with a predictive power of 0.483 [30].

In this study, we developed and validated an instrument suitable for both managers and researchers. To ensure the correct approach, we utilized validity and reliability methods, as well as expert opinions. The results of the study demonstrate that the proposed instrument possesses the necessary validity and reliability for assessing staff members' attitudes toward surgical patient privacy, consistent with the social, cultural, and religious contexts of both healthcare workers and patients.

Table 5. Initial and extracted communalities in the EFA of the instrument measuring privacy protection in surgical patients

Factor	Initial eigenvalues			Eigenvalues of extracted factors without rotation			Eigenvalues of rotated factors		
	Overall	Variance, %	Cumulative, %	Overall	Variance, %	Cumulative, %	Overall	Variance, %	Cumulative, %
1	6.182	34.432	34.342	6.182	34.342	34.342	2.671	14.837	14.837
2	1.750	9.723	44.064	1.750	9.723	44.064	2.636	14.645	14.482
3	1.383	7.681	51.746	1.383	7.681	51.746	2.597	14.429	43.911
4	1.039	5.769	57.515	1.039	5.769	57.515	2.449	13.604	57.515

Conclusion

This is a valid and reliable questionnaire for assessing patient privacy from the perspective of operating room staff. The results obtained can provide authorities with reliable information on patient privacy and enable them to implement more effective measures.

Strengths and limitations of the study

One of the strengths of the questionnaire is its comprehensiveness, as it examined various dimensions of patient privacy. Another advantage of this instrument is its specificity, as no measurements were made before to assess patient privacy from the perspective of operating room staff. This study focuses exclusively on the perception of patient privacy by operating room staff and is not intended to generalize its findings to other groups. Further research in different settings and departments is recommended to evaluate the protection of patient privacy.

Ethical approval and consent to participate

All procedures performed in the study involving human participants complied with the ethical standards of the institutional and/or national research committee and with the 1967 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent was obtained from all study participants.

Availability of data and materials

Datasets are available from the corresponding authors upon reasonable request.

Conflict of interest

None declared by the authors.

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Author contributions

AM: study concept, project administration, data curation, formal analysis, methodology, project administration, writing (original draft, review, and editing); MMV: study concept, project administration, data curation, formal analysis, methodology, study supervision, writing (original draft, review, and editing); AR: formal analysis, methodology, study supervision, writing (review and editing).

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Appendix

The Patient Privacy Questionnaire for Operating Room Staff used in our study

No.	Items
1	They maintain the confidentiality of patient information obtained
2	They collect only personal data related to the patient's illness from the patient
3	They collect patient information with their consent
4	They record and archive the patient's personal data with their consent
5	They maintain the required distance from the patient
6	They touch only necessary parts of the patient's body
7	They obtain the patient's permission before providing care
8	During certain procedures, such as catheterization, positioning, preparation, or draping of the genital area, if the patient and the healthcare provider are of different genders, the healthcare provider leaves the area
9	During sensitive care or procedures involving the genital area, they close the operating room door
10	In the recovery room, they maintain the required distance between patients
11	They do not discuss the patient's condition out loud
12	They maintain the patient's level of modesty by providing appropriate cover
13	They respect the patient's cultural and religious values
14	They refrain from imposing their beliefs, cultural, or religious values on the patient
15	They solicit the patient's opinion and input on certain treatment decisions, such as the choice of arm for intravenous access
16	They ensure adequate cleanliness and ventilation in the operating room
17	They refrain from creating unnecessary noise
18	In general, they respect the patient's privacy