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Systematic Review

Patient Comfort Assessment Tools: A Systematic Review

Nazanin Nazari [1], Marzieh Pazokian [2*], Bahareh Mahmoudi [3]

[1] Department of Medical Surgical Nursing, School of Nursing & Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] School of Nursing-Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[3] Department of Medical Surgical Nursing, School of Nursing & Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

*** Corresponding Author:** Marzieh Pazokian, School of Nursing-Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. E-mail: Pazokian@sbmu.ac.ir

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Abstract

Introduction: Patient comfort measurement tools are recognized as a key tool in assessing the quality of healthcare services. These tools help us identify patients' needs and expectations and ultimately have a direct impact on patient experience, collaboration in treatment, and improvement of health status and quality of care. This study aims to systematically review various patient comfort measurement tools, their validity and reliability across different studies, challenges in using these tools, and solutions for improvement.

Methods: In this systematic review, articles published between 2015 and 2025 in databases including PubMed, Scopus, Web of Science, Google Scholar, and SID were reviewed. The keywords used included "patient comfort measurement tools," "patient comfort," "reliability and validity," and other related terms. Articles in English and Persian that reviewed patient comfort measurement tools were selected. Review articles, posters, letters to the editor, and qualitative studies were the exclusion criteria.

Results: The results of the review of 21 studies showed that patient comfort measurement tools include questionnaires, scales, and mixed methods designed to measure different aspects of the patient experience. The main challenges in using these tools included non-compliance with specific patient needs, problems related to the validity and reliability of the tools, lack of training for staff, and lack of active patient participation in the assessment process. Also, improvement strategies were suggested, including designing localized tools, continuous staff training, increasing patient awareness, and using modern technologies for data collection.

Conclusion: Each tool has characteristics that distinguish it from other tools. Choosing the right tool depends on various factors. Furthermore, the effective use of patient comfort measurement tools requires attention to existing challenges and implementation of appropriate solutions. Improving the quality of these tools and integrating them into clinical processes can lead to increased patient satisfaction and improved quality of health services. Active patient participation and ongoing staff training are also key factors in the success of these tools.

Keywords: Patient Comfort, Comfort Assessment, Validity and Reliability, Limitations, Improvement

Introduction

Maintaining patient comfort is an indicator for assessing the quality of care provided. Catherine Kalkaba (1991) proposed the theory of comfort. Kalkaba considers comfort to be the immediate experience that occurs in the form of relief, ease, or excellence for the patient after the physical, psycho-spiritual, environmental, and social needs are met.[1] Kalkaba developed the General Comfort Questionnaire (GCQ), an instrument to measure comfort and identify positive and negative aspects in providing patient care regardless of their health status. The use of the comfort questionnaire has been implemented in several clinical settings, such as pediatrics, psychiatry, deaf patients, immobile patients, obstetrics and postpartum, pre-anesthesia, urinary incontinence, radiotherapy, end-of-life planning (for patients and families), breast cancer patients, and caregivers of women with terminal cancer.[2]

Comfort care aims to provide safe, comfortable services to patients with the aim of achieving physical and mental comfort and minimizing discomfort and dissatisfaction.[1] The clinical application and application of this theory enriches the concept of holistic nursing and also improves the quality of nursing services. For

example, the assessment of pain and comfort by American anesthesiologists has become part of the routine practice of nursing.[2] This highlights the necessity of addressing patients' concerns clinically by medical staff. Various nursing interventions are carried out to reduce or eliminate various feelings, including discomfort in the patient, and improve their comfort status.[3]

The General Comfort Questionnaire has 48 items that refer to states of comfort (relaxation, relief, and exaltation) and the contexts in which they are experienced (physical, psycho-spiritual, environmental, and socio-cultural contexts). Responses range from 1 (strongly disagree) to 4 (strongly agree). The higher the score, the higher the level of comfort; the lower the score, the lower the level of comfort and the greater the need for intervention.[4]

There are three types of comfort, including relief, ease, and transcendence. Relief is the stage where specific comfort needs are met, such as pain or nausea. Ease is the stage where the patient is satisfied. The third type of comfort is transcendence, which occurs when the individual is above their challenges and has a sense of power and ability to overcome the challenges of the illness.[4,5]

The 4 domains in which comfort is experienced are described below:

The physical domain is related to physical concerns, bodily sensations and homeostatic mechanisms, immune function, etc. The psychological domain is related to the inner awareness of the self, self-esteem, identity, the meaning of one's life, etc. The environment refers to the external context of human experience (temperature, light, sound, smell, color, etc.), and the sociocultural context refers to interpersonal, familial, and social relationships, family traditions, and religious practices.[6]

When these four contexts of experience are juxtaposed with the three types of comfort, a 12-house network structure emerges, which is a useful tool for nurses to determine patients' needs and provide appropriate interventions. It is important to note that each cell is not unique to the individual; there is considerable overlap in comfort characteristics. cells in the network are interconnected, and comfort interventions made to one part of the network have an effect on other parts of the network.[7]

There are 3 types of comfort interventions:

1- Standard comfort interventions are related to maintaining homeostasis and include monitoring vital signs and administering medication. These interventions are implemented to help patients maintain and restore physical activity and comfort, and prevent complications.[5]

2- The second type of intervention is educational and supportive, aimed at reducing anxiety, providing reassurance and information, and instilling hope, and involves listening and suggesting a desired program for recovery through cultural sensitivity. The effectiveness of these interventions depends on their implementation at the appropriate time when the patient is ready to accept more positive or new thoughts.[4,5]

3- The third type of intervention is comfort for the soul, which patients usually do not expect but are very satisfied with when implemented, such as massage and music therapy.[4]

Research has shown that a positive patient experience can lead to increased patient satisfaction and loyalty. Especially in hospitals, where patients may be under pressure and stress, the use of comfort measurement tools can help identify the strengths and weaknesses of the services provided.[8] By collecting patient feedback, these tools can provide valuable information to managers and medical staff.

However, the use of comfort measurement tools also faces challenges. One of the main challenges is the lack of adaptation of these tools to the specific needs of different patients. Some tools may not be suitable for certain groups of patients, which can lead to inaccurate and unreliable results.[9] Therefore, there is a need to design and develop new tools that can effectively meet the needs of patients.

In addition, the validity and reliability of comfort measurement tools is another important challenge. Many existing tools may not provide accurate results due to poor design or lack of scientific validity.[10] This can lead to a decrease in the confidence of physicians and managers in the results of these tools, which, in turn, has a negative impact on the quality of services.

In addition to these challenges, the active participation of patients in the assessment process is also a key factor in the success of comfort measurement tools. Research has shown that when patients feel that their voice is heard, they are more likely to participate in the treatment process, which can lead to improved treatment outcomes.[10]

In order to improve the use of comfort measurement

tools, there is a need for continuous training of staff and increased patient awareness. Appropriate staff training can lead to more accurate and useful data collection, and patients' awareness of the importance of their feedback can help increase their participation.[12]

This systematic review aims to examine hospital patient comfort measurement tools and identify challenges and strategies for improving the use of these tools. Given the importance of patient experience in the quality of healthcare services, this study can provide guidance for researchers and healthcare managers to make the best use of comfort measurement tools.

Materials and Methods

The present study is a qualitative systematic review based on the PRISMA model, which reviews patient comfort measurement tools and examines the challenges and solutions for improving the use of these tools. It is based on articles published in domestic and foreign journals. This study was conducted in six stages.

The first stage is to formulate research questions. What are the comfort measurement tools used for patients? What are the challenges for comfort measurement tools? What are the solutions for improving the use of these tools? Also, the PICO (Population, Intervention, Comparison, Outcome) framework was used to define the research questions.

Population (Target population)

Patients in different healthcare settings (hospitals, clinics, home care centers).

Intervention

Use of comfort measurement tools to assess the physical and psychological status of patients.

Comparison

Different comfort measurement tools, traditional methods of comfort assessment, and the effects of using tools on improving patient care.

Outcome

Challenges in using these tools, their accuracy and efficiency, and practical and technological improvement strategies.

The second stage was to select keywords related to the research topic and search terms and plan to determine search strategies.

It should be noted that, based on the experts' opinions, descriptive terms and keywords were defined based on MESH. Keywords were patient comfort, comfort measurement, comfort tools, challenges, limitations, solutions, validity, and reliability.

Keywords and search combinations:

The search is performed based on combinations of related keywords. Example of search combinations in PubMed:

("Patient Comfort" OR "Comfort Assessment" OR "Comfort evaluation" "validity and reliability") AND ("Challenges" OR "Barriers" OR "Limitations") OR ("Improvement Strategies" OR "Enhancement" OR "Optimization")

In the third step, inclusion and exclusion criteria were determined by the research team members. Inclusion criteria are: Articles that have evaluated patient comfort assessment tools and examined the challenges and limitations of these tools. Articles published in the last 10 years.

Exclusion criteria included the following: articles in the form of posters, lectures, letters to the editor, and review articles, as well as articles that were not related to the research objectives, were excluded. Articles that dealt with non-clinical tools (e.g., public surveys).

The fourth stage was a systematic search of electronic databases. The Scientific Jihad Daneshgahi Database (SID), the Iranian Medical Sciences Articles Bank (IranMedex), the Iranian Scientific Information and Documents Research Center (IranDoc), the National Publications Database (Magiran), and the international databases PubMed, Web of Science, Embase, Scopus, ProQuest, and Google Scholar were searched by two researchers separately from January 1, 2015, to March 1, 2025, based on predetermined keywords and strategies. The references of the reviewed articles were also reviewed for access to other articles.

The fifth stage was the selection of eligible research articles. Abstracts of articles were reviewed by two people (first and second authors), and screening of studies, extraction of results, and assessment of quality control of articles were independently evaluated by two researchers. Relevant articles were separated, and their full text was extracted. A total of 390 articles were found, of which 368 articles were reviewed in terms of titles and abstracts after removing duplicate articles. After reviewing the titles and abstracts of the articles, 60 articles entered the next stage, in which the full text

of the articles was reviewed and the articles were reviewed by two researchers based on the inclusion and exclusion criteria. 10 articles were presented as posters and lectures at conferences, 2 articles were in the form of letters to the editor, 3 articles were in the form of case reports, 5 were review articles, and 19 articles that were not in line with the research objectives were excluded. Finally, 21 articles were included in the study.

In the sixth step, the quality of the articles was assessed. In order to assess the quality of the articles, a checklist prepared by Joanna Briggs for assessing the quality of qualitative articles was used. This tool has ten questions that are divided into yes and no, unclear, and not used. The aim of this assessment is to assess the methodological quality of the studies and the ways to achieve and identify errors in the studies and the design, construction, and analysis of data. Thus, 5 articles were excluded from the study due to poor quality. In order to control the risk of bias, a search strategy with controlled keywords was used for each database, and studies were selected according to the inclusion and exclusion criteria. To answer the systematic review questions, the data extracted from the literature review were combined. A data extraction form was used to collect the data required to answer the systematic review questions. Data combination and analysis were performed descriptively.

All information collected from the studies was transcribed into a Word file after extraction, and the main and secondary areas were identified and coded, and the codes were compared, discussed, and interpreted.

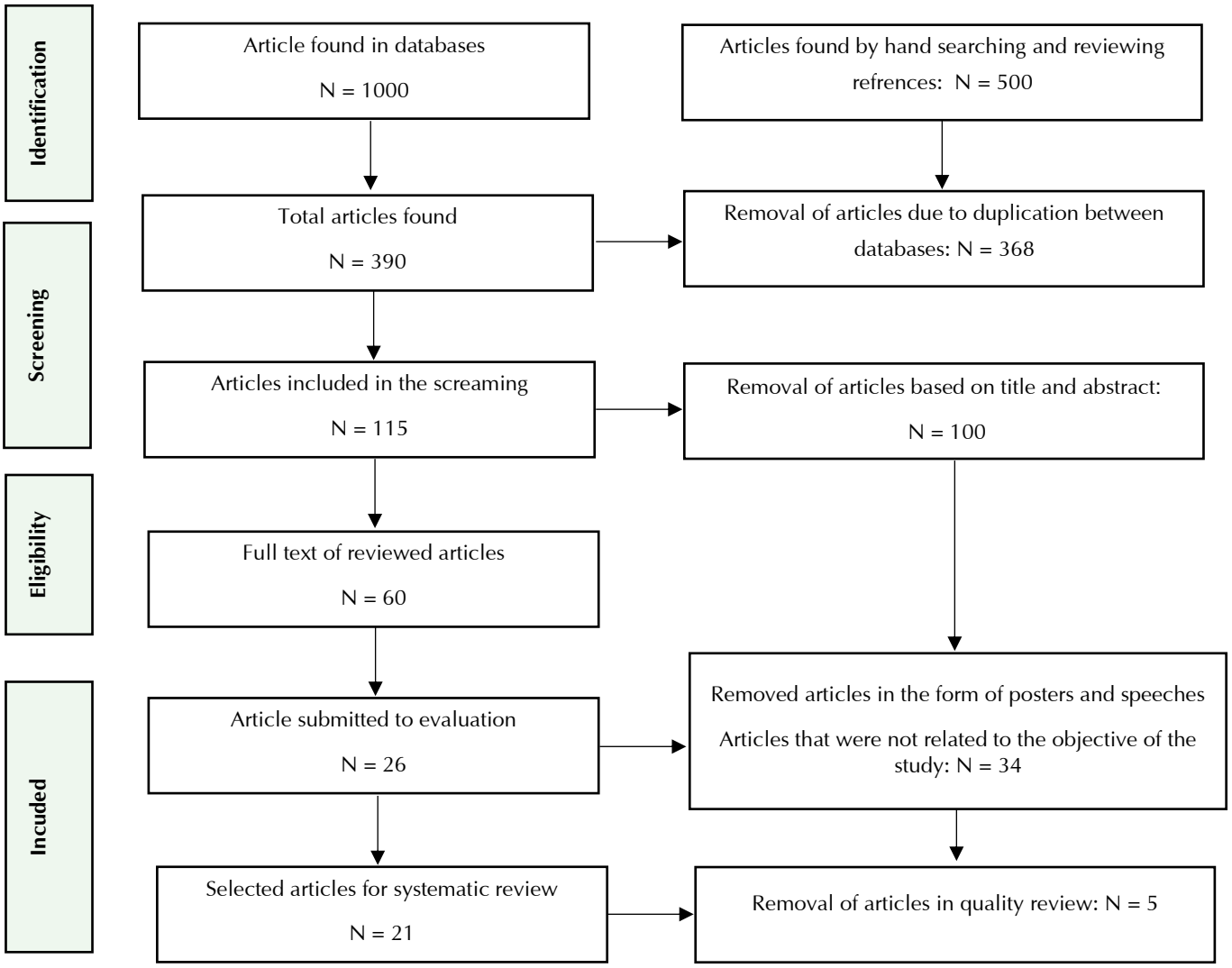

Figure1. PRISMA Flow Diagram.

Results

The findings from 21 studies are described in the table below.

Author	Year	Place of study	Samples	Collection tool and type of qualitative study	Title	Result
Kosar Sahin C et al	2022	Turkey	436 hemodialysis patients	Scale development study (validation and reliability) HDCS (Hemodialysis Comfort Scale)	A Scale Development Study: Hemodialysis Comfort Scale Version II[12]	The HDCS-II is a 5-point Likert-type scale consisting of 26 items and 6 factors. This scale is a reliable measurement tool that can be used to determine the comfort of patients undergoing hemodialysis treatment
Yildiz GN et al	2024	Turkey	288 patients receiving injections	Scale development study (validation and reliability) Comfort Scale for Injection VAS for Comfort	Development and Psychometric Validation of the Comfort Scale for Injection[11]	The data from this study showed that the Injection Comfort Scale is a valid and reliable measurement tool for determining the level of patient comfort during the injection procedure. It is recommended to measure the level of patient comfort during the injection at regular intervals, and new studies are planned to increase the comfort of the injection and adapt the Injection Comfort Scale to different languages and cultures.
Derya Kaya Şenol et al	2021	Turkey	260 pregnant women presenting to a prenatal screening outpatient clinic	The Prenatal Comfort Scale included 15 items and 5 subscales.	Adaptation of the Prenatal Comfort Scale into Turkish: A Validity and Reliability Study[14]	The Turkish version of the Prenatal Comfort Scale has sufficient consistency. It is a valid and reliable scale.
Tomás Vera-Catalán et al	2019	Spain	270 inpatients	Cross-sectional study Hospital Discomfort Risk [HDR] questionnaire	A New Tool to Assess Patients' Comfort During Hospitalization: The Hospital Discomfort Risk Questionnaire[15]	Healthcare nurses with better access to patients are very effective in identifying complications of hospitalization. Patients' discomfort can be routinely assessed during hospitalization using the HDR questionnaire. Nursing managers have an important role to play in this by promoting its use and increasing awareness among nursing staff.
Hulya Saray Kilic et al	2017	Turkey	180 patients who had been hip replacement surgery recruited	Post Hip Replacement Comfort Scale (PHRCS).	Development of post hip replacement comfort scale[16]	It is recommended for assessing patient comfort after hip replacement surgery and evaluating the effects of nursing interventions on patient comfort.
Rouf C E et al	2020	France .	Twenty-one patients were included in the local anesthesia group and 7 in the general anesthesia group	3 validated questionnaires to assess peri- and post-operative comfort: Glasgow Benefit Inventory, Cohen's Perceived Stress Scale and the Posttraumatic Stress Disorder Checklist Scale	Otosclerosis surgery: Assessment of patient comfort[17]	Local anesthesia in otosclerosis surgery did not increase postoperative stress or symptoms compared with general anesthesia. Audiometric results were not affected by the type of anesthesia.
Zheng Yuan et al	2024	China	210 patients with lung cancer undergoing endoscopic surgery as the participants	The postoperative comfort scale included 28 items and consisted of four dimensions (physiological, psychological, socio-cultural, and environmental).	Reliability and validity analyses of the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery and an evaluation of patient comfort[18]	The Postoperative Comfort Scale is reliable and valid and can be used to assess postoperative comfort in patients undergoing endoscopic lung cancer surgery. The patient comfort level in this assessment was moderate, suggesting that targeted interventions are needed to further improve patient comfort, especially in the physiological dimension.
Lisha Jiang et al	2023	China	200 patients	general comfort questionnaire (GCQ)	Establishment and Clinical Application of the General Comfort Scale for Postoperative Lung Cancer Patients[19]	The Postoperative Comfort Scale for Lung Cancer Patients has high clinical validity. This study identified pain and mobility (early walking or getting out of bed) as primary factors influencing postoperative comfort in lung cancer patients.
Bolin Liu et al	2021	China	1582patient	multicenter, descriptive, cross-sectional study	Development and validation of the Chinese surgical inpatient satisfaction and comfort questionnaire[20]	The Chinese Inpatient Satisfaction and Comfort Questionnaire has strong psychometric properties and can be used to assess patient satisfaction with hospital surgical inpatient services. A distinctive feature of this questionnaire is the inclusion of a subscale that assesses comfort as a dimension of patient satisfaction. Such instruments can be used to identify factors that should be addressed to improve the quality of patient care. Further research is needed to determine the role of assessment in quality improvement.
Geyrgia Alcвntara	2017	Brazil	80 chronic renal patients	quantitative, with cross-sectional design	Cultural adaptation and reliability of the	The validation of the Portuguese version of the tool represents a valuable resource that

Alencar Melo et al			on hemodialysis	cultural adaptation and validation of the GCQ, used to measure the comfort level of patients based on self-perception	General Comfort Questionnaire for chronic renal patients in Brazil[23]	should be available to nephrology nurses. It helps to better decide to perform nursing interventions based on the level of comfort and scope, whether physical, sociocultural, environmental, or psycho-psychological. The tool was named in Portuguese: General Comfort Questionnaire — Brazilian Version.
Sara Maria Oliveira Pinto et al	2016	Portugal	141 palliative care patients from acute medical-surgical settings at a central hospital in the north of Portugal	the cultural adaptation and validation of a Portuguese version of the End of Life Comfort Planning Questionnaire	Cultural adaptation and validation of the Portuguese End of Life Spiritual Comfort Questionnaire in Palliative Care patients[21]	This instrument has good psychometric properties. It was reliable, valid, and suitable for further research, considering the spiritual comfort of palliative care patients
Betьl Tosun et al	2015	Turkey	121 patients	Immobilization Comfort Questionnaire (ICQ)	Turkish Version of Kolcaba's Immobilization Comfort Questionnaire: A Validity and Reliability Study[22]	The findings of this study indicate that the ICQ is a valid and reliable tool for assessing the comfort of patients who are immobilized due to lower limb orthopedic problems in Tьrkiye.
Joselice Almeida Gyis et al	2018	Brazil	30 subjects	General Comfort Questionnaire	Cross-cultural adaptation of the General Comfort Questionnaire to Brazilian patients with myocardial infarction[23]	The adapted version of the General Comfort Questionnaire for People with Myocardial Infarction is valid for individuals
Brigitte Gьckel et al	2015	Germany	Patients 266	prospective clinical trials Visual analog scales	Patient comfort during positron emission tomography/magnetic resonance and positron emission tomography/ computed tomography examinations: subjective assessments with visual analog scales	The most important goal should be to shorten the scan time. Patient-centered management may be the best tool to improve patient compliance.
Jennifer Telford et al	2020	Canada	350 subjects	nonverbal pain Assessment tool (NPAT) nurse-assessed patient comfort score (NAPCOMS) Richmond agitation sedation scale (RASS) visual analogue scale (VAS)	of the St. Paul's Endoscopy Comfort Scale (SPECS) for Colonoscopy[24]	The St. Paul Endoscopic Comfort Score was successfully validated and demonstrated good reliability.
Paranee Phongnopakoon et al	2023	Thailand	Five hundred breast cancer patients during adjuvant chemotherapy were recruited from three tertiary cancer centers	(PROMs BCC-20)	Development and Psychometric Validation of Patient-Reported Outcome Measures (PROMs BCC-20) for Assessing Comfort during Chemotherapy in Breast Cancer[23]	The BCC-20 has good psychometric properties and provides direct patient reports of comfort in breast cancer patients during chemotherapy. The BCC-20 PROMS should be standardized for assessing comfort and nursing care to ensure patient satisfaction and quality of care.
Malihe Rafiei et al	2016	Iran	100 postpartum women who underwent cesarean delivery in Xuzhou Maternity and Child Health Care Hospital	Critical Care Pain Observation Tool (CPOT) in patients hospitalized	Validation of critical care pain observation tool in patients hospitalized in surgical wards[26]	CPOT is a valid and reliable tool for studying pain in patients admitted to the intensive care unit.
Maleki-Ghahfarokhi A et al	2022	Iran	163 university students	cross-sectional study	Psychometric Properties of the Persian Version of the Comfort Questionnaire for Hand tools (CQH)[27]	The Persian version of the CQH is an acceptable and useful tool for assessing hand tool comfort.
A Parseliunas et al	2022	Iran	213 patients	cross-sectional study questionnaire-based SF-36 short form health survey CCS questionnaire	Adaptation and validation of the Carolinas Comfort Scale: a questionnaire-based cross-sectional study[28]	The present study showed that the CCS questionnaire is a valid and robust tool for assessing quality of life after hernia repair, which has become a criterion for evaluating outcome in this surgical field.
Ma Dolores Gonzalez-Baz et al	2023	Spain	580 patients	Comfort Questionnaire (CQ)-ICU, maintaining all types and contexts of the Kolcaba theory. The resulting factorial	Psychometric validation of the Kolcaba General Comfort Questionnaire in critically ill patients[29]	The Spanish version of the CQ-ICU is a reliable tool for assessing patients' comfort 24 hours after admission. Although it does not have the multidimensional structure derived from the Calcaba comfort model,

				structure included seven factors: psychological context, need for information, physical context, sociocultural context, emotional support, spirituality, and environmental context.		all the types and domains of Calcaba's theory are included. Therefore, this tool allows for an individual and comprehensive assessment of comfort needs.
Fei Huang et al	2021	China	116 patients	randomised controlled study	Analgesia and patient comfort after enhanced recovery after surgery in uvulopalatopharyngoplasty: a randomised controlled pilot study[29]	It significantly reduced pharyngeal pain after UPPP and improved comfort in patients with OSA. Attention should also be paid to the possible increase in postoperative complications in the ERAS group.

Discussion

This study aims to identify patient comfort measure ment tools and to examine the challenges and strategies for improving the use of these tools. A study conducted by Cansu Kosar Sahin[2] and colleagues shows that the comfort measurement tool is a suitable scale for dialysis patients. This scale has six dimensions. Cronbach's alpha coefficient for the 26-item scale was 0.79. The alpha values for the six dimensions in the scale are as follows: 0.83 for physical relief, 0.71 for physical comfort, 0.87 for psychological comfort, 0.85 for psychological excellence, 0.82 for environmental excellence, and 0.61 for sociocultural comfort.

The Hemodialysis Comfort Scale Version II was also tested by analyzing the items based on the difference between the mean scores of the groups to determine how satisfactory the scale is in discriminating between individuals in terms of comfort in patients undergoing hemodialysis treatment. Accordingly, for all test items, a significant difference was obtained in the mean scores of the high and low groups of items (P<0.05). It was observed that this scale has a discriminatory power to measure comfort in patients undergoing hemodialysis treatment, which was shown between the high and low scores obtained from the scale.

Hemodialysis Comfort Scale Version II

After reviewing the comfort theory, new questions were developed by the researchers for the comfort of patients undergoing hemodialysis treatment, and a set of items consisting of 87 items was created. The items in the old scale were also revised and included in the new set of questions. The set of items was the result of a literature review, including the general comfort scale developed by Kolcaba,[30] comfort scales developed for specific areas.[31] The Hemodialysis Comfort Scale (for blind peer review) and qualitative studies in which patients receiving hemodialysis treatment express their quality of life.[31] To calculate the content validity index, the draft scale items were sent to 11 experts, and they were asked to rate the items for relevance, simplicity, and clarity using a 4-point Likert-type rating scale (1 = irrelevant, 2 = needs a lot of modification, 3 = relevant but needs a small modification, and 4 = relevant). The experts were also asked to write their suggestions near the topic, if necessary. Modifications were made. Accordingly, items with 3 or 4 points were considered eligible. Items with 2 points were considered to be usable in the scale. While items with 1 point were grouped as inappropriate. After the final form of the draft version was obtained, item analysis (item-total correlation, Cronbach's alpha coefficient) and factor analysis were repeated alternately until the expected values were obtained. As a result, a scale consisting of 26 items and six sub-dimensions was obtained.

A study conducted by Güzel Nur Yildiz[11] and colleagues successfully developed and validated the Comfort for Injection Scale (CSFI), an instrument specifically designed to assess patient comfort during injection procedures. The CSFI consists of 10 items grouped into two subscales: “Comfort during the injection process” and “Environmental comfort.” Exploratory factor analysis (EFA) revealed a two-factor structure that explained 66% of the total variance, while confirmatory factor analysis (CFA) showed good model fit indices, confirming the construct validity of the scale. The scale showed high reliability, with a Cronbach’s alpha value of 0.899 for the total scale, 0.887 for the “Comfort during the injection process” subscale, and 0.836 for the “Environmental comfort” subscale. Criterion validity was established through a positive correlation between the CSFI and the visual analogue scale (VAS), indicating concurrent validity. Discriminant validity analysis showed that the CSFI could effectively discriminate between patients with high and low levels of injection comfort. These findings suggest that the CSFI is a valid, reliable, and multidimensional instrument for

measuring injection-related comfort in clinical settings.

The findings are consistent with previous research on nursing interventions and comfort theory. While the visual analog scale (VAS) is commonly used to measure comfort in injection procedures, it primarily provides a unidimensional assessment that is usually limited to the intensity of comfort or discomfort. The VAS lacks the ability to capture the multifaceted nature of comfort as described in the Kelkaba comfort theory, which includes physical, psycho-emotional, socio-cultural, and environmental dimensions. The Comfort Scale for Injection (CSFI), on the other hand, was specifically designed to encompass these multiple dimensions and provide a more comprehensive assessment of patient comfort during the injection process. This integration of Kalkaba's theoretical framework into the development of the CSFI represents an important step towards operationalizing nursing theories in clinical practice. Scales developed in one language and culture must be adapted to other languages and cultures.[33]

In this study by Derya Kaya Şenol et al.,[14] the PCS was adapted from Japanese language and culture to Turkish, and the Turkish version of the scale had good psychometric properties. The primary characteristics of a good measurement tool are its validity and reliability.[34]

According to the results of the study by Tomás Vera-Catalán et al.,[15] the HDR questionnaire can be useful for identifying hospitalized patients at risk of discomfort, but further prospective studies need to externally confirm these results. Maintaining and increasing the comfort level of patients undergoing hip replacement surgery is important. This study analyzed the reliability and validity of the PHRCS, which was developed to assess the impact of nursing care on patient comfort during the postoperative period. The Cronbach's alpha coefficient was 0.758. The test-retest results showed a positive and significant correlation between the scores of the scales, indicating the reliability of the scale. There were 26 items in the final scale.

In the study by Hulya Saray Kilic et al.,[16] the mean patient comfort score was 3.64 ± 0.43 (from 1 to 5). Therefore, this tool is recommended for assessing patient comfort after hip replacement surgery and investigating the effects of nursing interventions on patient comfort.

In a study conducted by Zheng Yuan et al.,[18] in the internal consistency test, the Cronbach's α coefficient of the entire scale was 0.851, with the individual coefficients of the four dimensions being 0.971, 0.944, 0.924, and 0.948 (all > 0.80), respectively, indicating that the results of internal consistency were high and 3 had good results of internal consistency. Meanwhile, the total split-half reliability coefficient of the scale was 0.875, and the separate coefficients of the four dimensions were 0.866–0.951 (all > 0.80), indicating homogeneity between items and good internal consistency.[35] The S-CVI was 0.99, and the I-CVI was 0.875-1, indicating good content validity of the scale.[36] In addition, confirmatory factor analysis was conducted to confirm the validity of the model[37] with good construct validity. Overall, the postoperative comfort scale for lung cancer patients undergoing endoscopic surgery showed good reliability. In the present study, patients with secondary education and married status had a higher degree of comfort than those with other degrees and single status. These results were inconsistent with the results reported by Zhou et al.,[38] which could be explained by a significant difference in the sample distribution of the two factors. Also, the scores of retired patients were higher than those of unemployed or employed individuals. This can be attributed to the fact that most retirees are older, have less social pressure, and have relatively good social security. Meanwhile, similar to the findings of this study, it was reported[39] that some major complications such as heart, lung, and kidney can lead to increased morbidity and mortality following pneumonectomy, while patients without complications have a disease status that may facilitate rapid postoperative recovery. In addition, in terms of socio-cultural dimension, patients who receive health education have a better understanding of post operative precautions, which results in relatively good compliance and better cooperation with medical staff to promote smooth recovery after surgery. The present study concluded that gender, age, surgical methods, medical payment methods, monthly family income, and number of surgeries did not affect patient comfort, which contradicts the results of Zhou et al.[38] According to this study, there was a significant difference in physiological comfort of patients of different genders 24 hours after surgery. Also, different family economic statuses also affected postoperative physiological comfort among patients 24 hours after surgery. It can be concluded that patients with higher economic status may have higher social status and therefore more

psychological needs, which leads to a feeling of obvious discomfort in them. According to Kolcaba[40] and İbrahimoğlu,[41] patients' comfort may increase with age. However, this finding should be investigated in future research based on a larger sample size.

In a study by Lisha Jiang et al.,[19] it was concluded that the postoperative comfort scale for patients with lung cancer has high clinical validity. The comfort instrument used in this study consists of 3 dimensions and 10 items and is easy to use and evaluate in clinical applications. The Cronbach's α coefficient of the comfort scale is 0.801, and the scale content validity index (SCVI/ave) is 0.97. The characteristic roots of factors 1 and 2 assessing the structural validity of the scale are 3.257 and 1.352, respectively, which are both greater than 1, with cumulative variance contribution rates of 32.57% and 13.52%. The general comfort instrument in this study has been further revised to ensure its suitability for the national conditions and cultural background of China.[42] One of the problems of using the GCQ scale to assess patient comfort was the large number of questionnaire items, which reduced the willingness of patients to complete it. Despite the efforts mentioned in the study to accurately translate the GCQ scale into Chinese, patients often expressed confusion about the questions during use, possibly due to cultural differences. As a result, this study formulated a postoperative comfort assessment scale specifically for patients with lung cancer.

In this study, Bolin Liu et al.[20] developed and validated a multidimensional Chinese surgical inpatient satisfaction and comfort questionnaire that assesses patient satisfaction with inpatient services in public hospitals in China. The results support the validity and reliability of the instrument, which can be used in future studies aimed at assessing and enhancing patient satisfaction with hospital surgical services.

EFA showed that the assessment was carried out with a 9-factor structure. The 9 factors were categorized into 7 dimensions based on the content of the items. They showed strong internal consistency (α = 0.83-0.96). The multidimensional structure and individual dimensions of this instrument are similar to previously validated measures of patient satisfaction. Specifically, they are framed within a framework that includes domains such as overall care process, perceived health status and improvement, and psychological well-being.[43-45] These findings and the satisfaction fit indices obtained by CFA support the robustness of the construct developed in this study. A distinctive feature of the questionnaire developed in this study is the inclusion of a subscale that assesses comfort as a dimension of patient satisfaction.[46] Patient comfort, which is a dynamic personal experience, enhances patient satisfaction and well-being. Surgical interventions are associated with a wide range of distressing emotions, such as fear, anxiety, and hospitalization, which may affect patients' overall functioning. One major concern about measuring patient satisfaction is that the instrument may fail to assess participants' emotions. Past studies have shown that such tests overestimate participants' overall satisfaction levels, obtain inaccurate data, and are inadequate measures of dissatisfaction.[46-48]

Unlike questionnaires developed in Western countries,[49] "Cost" was included as a single-item factor when conducting the EFA. This item was included in the environmental and logistical dimensions of this study, as the instrument does not have single-item dimensions. Nevertheless, this finding highlights the prevalence of the fee-for-service payment method in China. Several items belonging to the dimensions of medical and nursing care were also related to the information transfer and communication between caregivers and the patient. These findings underscore the prevailing cultural norms in China, such that healthcare professionals often feel more comfortable communicating with family members than with the patient themselves. Similarly, the lack of a subscale assessing religious care[50] was also consistent with such cultural differences.

Contrary to previous findings,[44,45,49,51] there were no age or gender differences in satisfaction and convenience in this study. Furthermore, LOS did not appear to affect scores on the 7 domains in the current questionnaire. Although patient characteristics such as age, health status, income, and preferences for participation and information have been shown to influence patient satisfaction, their contribution to the overall assessment of quality of care remains unclear.

In a study by Betül Tosun et al.,[22] a moderate positive correlation was found between ICQ scores and VAS comfort scores. A moderate negative correlation was found between ICQ and VAS pain measures in a criterion validity analysis. Cronbach's α values of 0.75 and 0.82 were found for the first and second measures, respectively. ICQ is a valid and reliable instrument for

assessing the comfort of patients in Turkey who are immobile due to orthopedic problems of the lower extremities.

Joselice Almeida Góis et al.[23] stated that the General Comfort Questionnaire for Patients with Myocardial Infarction was appropriate for the target audience.

Jennifer Telford et al.[24] used the Nurse-Assessed Patient Comfort Score (NAPCOMS), Nonverbal Pain Assessment Tool (NPAT), and Richmond Sedation Scale (RASS) to be completed by the observer. Patients also completed a patient satisfaction questionnaire that included a visual analog scale (VAS) to measure their overall perceived pain during the procedure. The study included 350 participants. The SPECS demonstrated excellent inter-rater reliability among all three raters with an intraclass coefficient (ICC) of 0.81 (95% CI, 0.78-0.84), while the GS demonstrated good reliability with an ICC of 0.77 (95% CI, 0.73-0.80). The SPECS showed moderate agreement with patient-reported VAS ratings.

Another instrument used in the study by Paranee Phongnopakoon et al.[25] is the PROMS BCC-20, which provides good psychometric properties and direct patient reports of breast cancer patients' comfort during chemotherapy. The CFA consists of 20 items with five factors: 1) social functioning, four items; 2) digestive functioning, three items; 3) emotional functioning, six items; 4) environmental functioning, three items, and 5) sleep quality, four items. Maximum likelihood with bootstrapping indicated a good model fit (SRMR = 0.045, RMSEA = 0.040, CFI = 0.947, and TLI = 0.935). Cronbach's alpha of 0.86 indicated strong internal consistency reliability. Pearson's correlation coefficient indicated acceptable criterion validity.

In another study, Ma Dolores Gonzalez-Baz et al.[27] concluded that the CQ-ICU is a valid tool for assessing comfort in a population of patients admitted to the intensive care unit within 24 hours of admission. Although it does not have the multidimensional structure of the Kalkaba comfort model, it does include all the types and areas of Kalkaba's theory.

Challenges and Issues in Designing Comfort Assessment Tools

Despite the positive impact of comfort assessment tools in improving the patient experience, the design and use of these tools face challenges. In a study, they pointed out the problems and challenges associated with the design of patient-centered questionnaires for assessing comfort.[9] This research emphasizes the need for accurate adaptation of comfort assessment tools to the specific needs of patients and treatment conditions. They also suggest that for these tools to be more successful, the cultural, social, and psychological characteristics of the patient should be considered.[9]

Conclusion

Comfort assessment tools are very important for assessing patient comfort in various medical and therapeutic settings and can be effective in improving the quality of care and patient experience. By providing accurate information about the patient's comfort status, these tools allow healthcare professionals to take measures to reduce patient discomfort and improve the quality of services. However, the development and use of these tools require careful attention to the cultural, social, and individual characteristics of patients in order to be effectively used in different medical settings.

The findings show that each tool has specific strengths and limitations. The selection of the appropriate tool depends on the type of patient, the treatment setting, and the purpose of the study. This systematic review can help researchers and health professionals in selecting the appropriate tool to measure patient comfort.

Conflict of Interest

The authors declare no conflicts of interest.

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