Construction of a sensitive index system for nursing quality in the perioperative period of liver transplantation based on the Three-Dimensional Quality Structure theory

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Abstract

Objective Based on the "Three-Dimensional Quality Structure" theory, a sensitive index system of nursing quality during the perioperative period of liver transplantation patients was constructed.

Methods Through a comprehensive literature review and rigorous application of the Delphi method, a panel of 27 experts completed three rounds of effective letter consultation to obtain expert consensus opinions. The contents of indicators were determined based on this process, and the analytic hierarchy process was employed to confirm the weightage assigned to each indicator. Consequently, we established a sensitive index system of nursing quality during the perioperative period of liver transplantation patients.

Results The effective recovery rates of the questionnaires in the three rounds of expert consultation reached 96.6%, 100% and 96.4%, respectively, and the proportions of experts who gave opinions were 55%, 25% and 12%,respectively, indicating a high degree of expert authority. The expert authority coefficients were calculated to be 0.899, 0.895 and 0.909,respectively, indicating a high degree of expert authority. In the third round, Kendall's coordination coefficients for primary, secondary, and tertiary indicators were determined to be 0.340, 0.379, and 0.402 ($P < 0.001$), indicating that expert opinions tended to be consistent. Finally, We established a comprehensive sensitivity quality index system comprising 3 first-level indexes,11 s-level indexes, and 60 third-level indexes specifically designed for liver transplantation patients during the perioperative period.

Conclusion The sensitive index system of perioperative nursing quality for liver transplantation patients can provide a theoretical basis for nursing staff to construct precise individualized nursing models.

Keywords Liver transplantation, Delphi technique, Structure - process - outcome evaluation, Perioperative nursing, Nursing quality indicators

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Introduction

The fundamental treatment for end-stage liver disease is liver transplantation [1]. However, liver transplantation is a complex operation with great difficulties and high professionalism in nursing. Any adverse event occurring in any link of perioperative nursing will affect patient safety. The Chinese Expert Consensus on Perioperative Management of Liver Transplantation for Liver Failure (2021 Edition) provides reference opinions and guidance for the standardization and normalization of perioperative management of liver transplantation [2]. How to efficiently implement nursing measures, promote the improvement of nursing quality, and conduct comprehensive, scientific and effective evaluations is the problem currently faced by nursing managers. Constructing nursing quality evaluation indicators can quantitatively measure nursing quality and is an important means of effectively evaluating nursing quality and conducting nursing quality management [3–5]. However, currently, during the perioperative period of patients, there is not a complete, objective and scientific set of nursing quality sensitivity indicators in China to effectively evaluate the nursing quality of liver transplantation patients.To achieve real-time monitoring, rapid feedback, and timely optimization of the quality of clinical nursing work in liver transplantation, it is necessary to construct a complete, objective, and scientific nursing quality sensitivity indicator system. This study takes the "Three-Dimensional Quality Structure" theory as a framework, and uses literature analysis, the Delphi method and the analytic hierarchy process to construct a nursing quality sensitivity indicator system for the perioperative period of liver transplantation, so as to provide a basis for objectively evaluating the nursing quality and safety of patients.

The "Three-Dimensional Quality Structure" theory was put forward by American scholar Doabedian [6]. It divides nursing quality into structural quality, process quality and outcome quality. The structural quality is mainly used to evaluate the basic conditions for carrying out nursing work, the process quality is mainly employed to assess the process of nursing activities, and the outcome quality indicators are primarily utilized to evaluate the nursing effect. The evaluation approach that combines these three aspects can reflect the quality of nursing services in a more comprehensive manner. The nursing quality sensitive indicators constructed based on this theory have been applied to postoperative patients in fields like lung cancer [7] and esophageal cancer [8] in China, and good results have been achieved.

Method

Set up a research group

The research team has been established, with its members including specialist nurses, head nurses, department directors, directors of the Nursing Quality Control Center and researchers. Their main responsibilities involve determining research topics, formulating indicators, selecting experts, collating data and conducting analysis.

Constructing the nursing quality sensitivity indicator system for the perioperative period of liver transplantation

In this paper, "Three-Dimensional Quality Structure" theory, "liver transplantation", "perioperative period", "nursing", "system construction", "nursing quality sensitivity indicators", "quality evaluation/quality improvement/quality management" were used as the search terms. The search was conducted in Chinese databases (such as CNKI, Wanfang Data, and VIP Information) as well as in English databases (such as PubMed, Sciencedirect, Springer, and CINAHL). The search time limit was from the establishment of each database to February 28, 2024.

After the research group sorted, screened and discussed the literature, a draft of the nursing quality sensitivity indicator system for the perioperative period of liver transplantation patients based on the Three-Dimensional Quality Structure theory was formed. Five experts were invited to participate in the pre-mail consultation. The selection criteria for the inclusion of these experts were as follows: the age range was 40.8 ± 2.9 years old, all of them had senior professional titles, possessed a bachelor's degree or above, and had been actively engaged in liver transplantation nursing for more than ten years. After integrating the experts' opinions, a formal mail questionnaire was compiled. This questionnaire consisted of three parts: (1) The expert mail questionnaire, which used the Likert 5-level scoring method to evaluate the importance of the indicators. (2) General information about the experts, including their professional titles, ages, education levels, and years of working experience. (3) The basis for expert judgment and their familiarity with the indicator questionnaire.

Determine the expert for correspondence consultation

A total of 27 experts in China from tertiary hospitals and universities were selected.The pre-set inclusion criteria were as follows: (1) medical or nursing education experts from universities who willingly accepted letter inquiries and committed to continuous participation in the project. (2) possessing higher professional and technical titles. (3) having more than 10 years of experience in liver transplantation nursing or being spe cialist nurses in liver transplantation. (4) holding a Bach elor's degree or higher.

Implement expert letter consultation

Our study carried out three rounds of expert consultation from September to November 2023. The paper or

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Table 1 The degree of expert activeness

Round	Number of questionnaires issued	Recovery questionnaire number	Effective recovery rate (%)	Opinion submission rate (%)
Round 1	29	28	96.6	55.0
Round 2	28	28	100.0	25.0
Round 3	28	27	96.4	12.0

Table 2 Expert authority degree

Round	Judgment coefficient(Ca)	Familiarity(Cs)	Authority coefficient(Cr)
Round 1	0.893	0.900	0.899
Round 2	0.897	0.893	0.895
Round 3	0.911	0.907	0.909

electronic questionnaires were distributed by the same researcher to experts, and the interval between each round of sur vey was two weeks. Likert 5-point scoring method was also used to evaluate the importance of each item. The questionnaire was equipped with a modification column for experts to propose modification, addition and deletion. After three rounds of letter consultation, the expert opinions were basically reached. According to the expertopinions, the indicators were included to meet the criteria of the mean value of importance assignment ≥3.50 and the coefficient of variation < 0.25 [9].

After the collective review of the research team, the nursing quality sensitivity indicator system for the perioperative period of liver transplantation patients was confirmed.

Data processing
Using SPSS 22.0 statistical software, data entry, analysis, and finalization were conducted. Count data were pre sented as frequency and percentage. Measurement data were expressed as mean ±standard deviation and coeffi cient of variation. The recovery rate of questionnaires and the submission rate of opinions served as indicators for expert positivity coefficient determination. The authority coefficient (Cr) of experts was calculated using the judg ment coefficient (Ca) and familiarity coefficient (Cs). The

degree of agreement among expert opinions was assessed through the coefficient of variation and Kendall coordi nation coefficient W.

Results
Expert situation
The experts were respectively from 25 tertiary grade-A hospitals in 9 cities including Qingdao, Jinan, Heze, Shanghai, Changchun, Chongqing, Nanchang, Xi'an and Fuzhou, as well as 2 institutions of higher education. Among them, there were 14 liver transplant specialist nurses (51.9%), 8 liver transplant nursing managers (30.0%), 3 liver transplant physician experts (11.1%) and 2 liver transplant nursing education experts (7.4%). The average age of this group of experts was 42.8 ±6.2 years old. Their working years in liver transplantation were 12.2 ±4.4 years, and all of them had senior professional titles. In terms of educational background, there were 18 experts with a bachelor's degree (66.7%), 6 with a master's degree (22.2%) and 3 with a doctor's degree (11.1%).

Degree of expert activeness
The recovery rates of the three rounds of correspondence questionnaires were 96.6%, 100% and 96.4% respectively. Moreover, experts put forward constructive suggestions in each round, suggesting that the experts were highly motivated, as shown in Table 1.

Degree of expert authority
As shown in Table 2, three rounds of correspondence of expert authority coefficient (Cr) >0.80 [10]. This sug gests that the study possesses a significant level of expert authority and yields credible research findings.

Expert opinion coordination degree
The Kendall coordination coefficient W ranges from 0 to 1, and the greater the W, the better the degree of expert coordination [11]. As shown in Table 3, the significance test of the coordination coefficient of the three rounds of letter consultation in our study showed statistical signifi cance, indicating that the expert opinions were coordi nated and reliable.

Table 3 Expert opinion coordination degree and significance test

Index	Round 2				Round 3			
	Coordination coefficient(W)	χ^2	Degree of freedom(df)	P	Coordination coefficient(W)	χ^2	Degree of freedom(df)	P
Primary index	0.299	75.395	9	< 0.001	0.340	82.534	9	< 0.001
Secondary index	0.365	192.616	27	< 0.001	0.379	178.426	27	< 0.001
Three-level index	0.388	358.144	68	< 0.001	0.402	371.253	68	< 0.001

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Screening and modification of indicators
The first round of expert letter consultation revised the indicators

Index	Reason for revision
Delete pointer	
The pass rate of intraoperative hemodynamic monitoring	Led by anesthesiologist, nursing influence factors are small
The qualified rate was evaluated by cold ischemia time of donor liver	It is dominated by doctors, and the nursing influence factors are small
Increase index	
Early exercise assessment accurate rate of attainment	Nursing leadership
Implementation rate of early activity measures	Nursing leadership
Early activity implementation rate	Nursing leadership
Modified index	
Accurate compliance rate of preoperative nutritional risk assessment	Because the nutritional status of the patient is dynamic and the condition is constantly changing, only attention is paid to the failure before surgery, and the accurate compliance rate of nutritional risk assessment is changed
Accurate compliance rate of immunosuppressant dose assessment	The drugs used in liver transplantation patients are complex and varied, and immunosuppressants are only one of the drugs to be managed. Therefore, experts suggest that the "accurate compliance rate of immunosuppressive dose evaluation", "compliance rate of standardized management measures" and "compliance rate of patients' knowledge of immunosuppressive drugs" should be changed to "correct compliance rate of drug safety management evaluation", "Compliance rate of drug safety standardized management measures" and "compliance rate of drug safety management knowledge" respectively.
Standard implementation rate of immunosuppressant management measures	
Patients' knowledge of immunosuppressive drugs was known to meet the standard rate	

The second round of expert letter consultation revised the indicators
During the second round of expert letter consultation, the indicator system was optimized and improved. Three tertiary indicators were added, namely "the compliance rate of writing patient follow-up records", "the compliance rate of establishing multidisciplinary teams", and "the compliance rate of health education norms for specialized nursing knowledge". These additions aimed to measure various dimensions of nursing quality in a more comprehensive and precise manner, further strengthening the scientificity and practicability of the indicator system.

The third round of expert letter consultation revised the indicators
During the third round of expert letter consultation, particular attention was paid to the meticulous revision of the indicator "job satisfaction". It was divided into two aspects: "patient satisfaction with nursing work" and "attending physician satisfaction with nursing work". After in-depth discussions, the experts unanimously believed that evaluating nursing work from the perspectives of different groups could reflect the actual effectiveness of nursing work more objectively and comprehensively. This, in turn, provides more targeted and reliable bases for improving nursing quality and vigorously promotes the development of the entire indicator system towards a more complete and reasonable direction.

Expert letter inquiry results
Expert letter inquiry results After three rounds of expert consultation and group dis cussion, 3 first-level indicators, 11 s-level indicators and 60 third-level indicators were finally established. The ana lytic hierarchy process was used to determine the weight and combined weight of each index, as shown in Table 4.

Discussion
Scientific and reliability analysis of index construction
Through literature review and clinical research, this study constructed the nursing quality sensitivity indicator system for the perioperative period of liver transplantation by applying three rounds of Delphi method correspondence consultation based on the "Three-Dimensional Quality Structure" theory. This study has provided a solid theoretical basis for the perioperative nursing services of patients and has a relatively strong scientific basis. The effective recovery rates of the three rounds of questionnaires were 96.6%, 100.0% and 96.4% respectively, which indicates that the experts had good participation and attention. In the Delphi consultation method, it is appropriate to have 15 to 50 experts [12]. A questionnaire recovery rate of 50% is sufficient for analysis and reporting, while a recovery rate of 70% is regarded as an excellent proportion [13]. The authority coefficients of the three rounds of consultation were 0.899, 0.895 and 0.909 respectively, meaning that the experts were familiar with the content of this field and had a relatively strong judgment basis. The acceptable value of the expert authority coefficient is Cr ≥ 0.7 [14]. The Kendall coordination coefficients of the first-level, second-level and third-level indicators obtained through expert consultation were 0.340, 0.379 and 0.402 respectively. The mean of each indicator was ≥ 3.50, and the coefficient of variation was < 0.25, which means that the expert opinions tended to be unified and the reliability was good.

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Table 4 Expert letter inquiry results on the sensitive indicators of perioperative nursing quality for liver transplantation patients

Pointer code	Importance assignment	Coefficient of variation	Weight	Combined weight
I- 1 Structural index	4.70±0.46	0.098	0.1958	-
II- 1 The ratio of human resources to the standard	4.63±0.49	0.106	0.0187	0.0037
III-1 Nurse-patient ratio reached the standard rate	4.70±0.47	0.100	0.0052	0.0000
III-2 The ratio of nurse energy level composition to standard rate	4.74±0.45	0.095	0.0073	0.0000
III-3 The proportion of educational level composition of nurses reached the standard	4.67±0.48	0.103	0.0036	0.0000
III-4 The proportion of specialist nurses is up to the standard	4.63±0.49	0.106	0.0026	0.0000
II-2 Medical resource allocation up to standard rate	4.85±0.36	0.074	0.0474	0.0093
III-5 Multidisciplinary teams are set up to meet standards	4.67±0.48	0.1027	0.0068	0.0001
III-6 Instrument and equipment intact up to standard rate	5.00±0.00	0.0000	0.0135	0.0001
III-7The rate of good condition of medicines and articles up to standard	5.00±0.00	0.0000	0.0135	0.0001
III-8 Emergency supplies intact and up to standard rate	5.00±0.00	0.0000	0.0135	0.0001
II-3 Training and assessment of standard attainment rate	4.67±0.48	0.1028	0.0271	0.0053
III-9 Implementation rate of general theory and operational training measures	4.63±0.49	0.1058	0.0038	0.0000
III-10 The standard attainment rate of general knowledge and operation assessment	4.78±0.42	0.0877	0.0089	0.0000
III-11 The implementation rate of theoretical and operational training measures	4.78±0.42	0.0877	0.0089	0.0000
III-12 Expert knowledge and operation assessment of the standard rate	4.70±0.40	0.0851	0.0054	0.0000
II-4 Environmental monitoring compliance rate	4.74±0.45	0.0949	0.0358	0.0070
III-13 Hand hygiene monitoring compliance rate	4.70±0.47	0.1000	0.0059	0.0000
III-14 Airborne bacterial culture was monitored to achieve the standard rate	4.70±0.47	0.1000	0.0059	0.0000
III-15 The standard rate of bacterial culture monitoring on the surface of articles	4.81±0.40	0.0831	0.0100	0.0001
III-16 Acceptance rate of ward wall culture	4.85±0.36	0.0742	0.0142	0.0001
II-5 System and standard compliance rate	4.89±0.32	0.0654	0.0668	0.0131
III-17 Specialty nursing quality management system up to standard rate	4.78±0.42	0.0879	0.0095	0.0001
III-18 The rate of meeting the standard of quality assessment of specialized nursing	4.81±0.40	0.0831	0.0141	0.0002
III-19 Specialty nursing quality operation process compliance rate	4.85±0.36	0.0742	0.0218	0.0003
III-20 Expert nursing quality emergency plan drill up to standard rate	4.63±0.49	0.1058	0.0072	0.0001
III-21 The standard rate of health education of specialized nursing knowledge	4.81±0.40	0.0831	0.0141	0.0002
I-2 Process index	4.74±0.45	0.0949	0.3108	-
II-1 Nursing assessment compliance rate	4.78±0.42	0.0879	0.1214	0.0377
III-22 Accurate compliance rate of drug safety management assessment	4.89±0.32	0.0654	0.0273	0.0010
III-23 Accurate compliance rate of nutritional risk assessment	4.89±0.32	0.0654	0.0273	0.0010
III-24 Early exercise assessment accurate rate of attainment	4.85±0.36	0.0742	0.0175	0.0007
III-25 The index of liver transplantation function was evaluated accurately	4.70±0.47	0.1000	0.0108	0.0004
III-26 Sedation and analgesia were evaluated for accurate rate of compliance	4.85±0.36	0.0742	0.0175	0.0007
III-27 Liquid management assessment of accurate compliance rate	4.78±0.42	0.0879	0.0132	0.0005
III-28 Accurate compliance rate of complication assessment	4.63±0.49	0.1058	0.0077	0.0003
II-2 The standard rate of specialized nursing	4.67±0.48	0.1028	0.0607	0.0189
III-29 Implementation rate of drug standard management measures	4.85±0.36	0.0742	0.0081	0.0002
III-30 The implementation rate of nutritional feeding management measures	4.85±0.36	0.0742	0.0081	0.0002
III-31 Implementation rate of early activity measures	4.89±0.32	0.0654	0.0117	0.0002
III-32 The standard rate of monitoring and management of liver transplantation function	4.63±0.49	0.1058	0.0036	0.0001
III-33 Sedation and analgesia management measures achieved the standard rate	4.92±0.27	0.0549	0.0139	0.0139
III-34 Liquid management measures implementation rate	4.74±0.45	0.0949	0.0064	0.0001
III-35 Complication observation and treatment measures achieved the standard rate	4.63±0.49	0.1058	0.0036	0.0001
III-36 Professional knowledge health education measures implementation rate	4.70±0.47	0.1000	0.0053	0.0001
II-3 The rate of achievement of specialty indicators	4.74±0.45	0.0949	0.0858	0.0267
III-37 Compliance rate of drug errors	5.00±0.00	0.0000	0.0188	0.0005
III-38 Blood drug concentration monitoring results up to standard rate	4.67±0.48	0.0010	0.0048	0.0001
III-39 BMI index normal compliance rate	4.89±0.32	0.0654	0.0139	0.0004
III-40 The standard rate of early postoperative activity execution	4.85±0.36	0.0742	0.0108	0.0003
III-41 Laboratory indicators normal standard rate	4.81±0.40	0.0831	0.0087	0.0002
III-42 The rate of patients with pain reached the standard	4.85±0.36	0.0742	0.0108	0.0003

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Table 4 (continued)

Pointer code	Importance assignment	Coefficient of variation	Weight	Combined weight
III-43 Effective blood volume of patients reached the standard rate	4.67±0.48	0.1028	0.0048	0.0001
III-44 The incidence of complications reached the standard rate	4.74±0.45	0.0949	0.0072	0.0002
III-45 Patient expertise knows the compliance rate	4.70±0.47	0.1000	0.0061	0.0002
II-4 Nursing follow-up management compliance rate	4.63±0.49	0.1058	0.0429	0.0133
III-46 The effectiveness of patients' follow-up content reached the standard rate	4.89±0.32	0.0654	0.0170	0.0002
III-47 Compliance rate of patients with follow-up	4.67±0.48	0.1028	0.0060	0.0001
III-48 Follow-up frequency of patients reached the standard rate	4.70±0.47	0.1000	0.0100	0.0001
III-49 Patient follow-up record writing standard rate	4.70±0.47	0.1000	0.0100	0.0001
I-3 Outcome index	4.89±0.32	0.0654	0.4934	-
II-1 Patients know, believe and achieve the standard rate	4.70±0.47	0.1000	0.1645	0.0812
III-50 Patients with knowledge of drug safety management know the rate of compliance	4.85±0.36	0.0742	0.0363	0.0029
III-51 Patients' nutritional support knowledge knew the rate of compliance	4.85±0.36	0.0742	0.0363	0.0029
III-52 The patients' rehabilitation exercise knowledge knew the standard attainment rate	4.85±0.36	0.0742	0.0363	0.0029
III-53 Patients with knowledge of liver transplantation were aware of the compliance rate	4.59±0.50	0.1089	0.0116	0.0009
III-54 The rate of compliance is known by the identification of patient complications	4.78±0.42	0.0879	0.0206	0.0017
III-55 The rate of compliance is known by the calculation of patients' 24-hour access	4.59±0.50	0.1089	0.0116	0.0009
III-56 The compliance rate of patients to medical and nursing orders after liver transplantation was up to the standard	4.59±0.50	0.1089	0.0116	0.0009
II-2 Nursing outcome achieved standard rate	4.85±0.36	0.0742	0.3289	0.1622
III-57 Patients' satisfaction with nursing work	5.00±0.00	0.0000	0.1233	0.0200
III-58 Patients and their families were satisfied with the treatment effect	5.00±0.00	0.0000	0.1233	0.0200
III-59 Supervisor's satisfaction with nursing work	4.74±0.45	0.0949	0.0411	0.0067
III-60 Nursing adverse events occurred up to standard rate	4.74±0.45	0.0949	0.0411	0.0067

Index construction can be comprehensive and targeted environment field

In the structural indicators, considering that the nursing of liver transplant patients is characterized by strong specialized operations, complex management, strict environmental requirements and frequent emergencies, an evaluation indicator system is established from five dimensions: human resource allocation ratio, medical resource allocation, training and assessment, environmental monitoring, and systems and norms. Among all the second-level indicators, the compliance rate of systems and norms has the highest weight, reaching 0.0668. Comprehensive systems and norms are undoubtedly the foundation and guarantee for improving the quality of perioperative nursing care for liver transplant patients [15]. In clinical practice, it is advisable to formulate a standardized work manual for liver transplant wards, and continuously promote its update and revision, effectively implement relevant systems and processes, accurately locate problem links, and lay a solid foundation for nursing management. In terms of the third-level indicators, the intact and compliance rates of instruments, drugs, goods and emergency supplies were all rated 5 points by all experts, which fully demonstrates the high degree of consensus among experts on the importance of these three indicators. After all, perfect hardware facilities are a key prerequisite for ensuring the quality and safety of

nursing care [16]. In addition, only by continuously optimizing the human resource structure, strengthening the standardization of operational skills and continuously monitoring the operating environment can the ward nursing quality work be promoted to a new height, which is also precisely in line with the requirements of the expert consensus on the evaluation criteria for human organ donation and transplantation technology in the grade hospital evaluation [17].

Process indicators are not only the core elements of nursing quality but also the crucial hubs for monitoring outcome indicators [18]. Based on the key aspects and difficulties in the ward management of liver transplant patients, four second-level rating indicators, namely nursing assessment, specialized nursing, specialized indicators, and nursing follow-up, have been established. The 28 third-level evaluation indicators it encompasses can comprehensively reflect the quality level of the nursing process, and this result is basically in line with the research findings of Lu Fangyan [19]. Among the second-level indicators, the top three are nursing assessment, specialized nursing, and specialized indicators, which precisely demonstrate the key points of nursing work in liver transplant wards and are highly consistent with the nursing work content stipulated in the "Technical Operation Specification for Liver Transplant Nursing" [20]. As for the third-level indicators, those with relatively high

weights include early mobilization, sedation and cough suppression, drug safety management, and nutritional risk. Research shows [21] that timely exercise training after liver transplantation plays a significant role in accelerating the recovery process of patients. Domestic research by Zheng CX [22] and other scholars also incorporated the implementation rate of early mobilization into the sensitivity indicator system of perioperative nursing quality for liver transplantation, which coincides with the results of this study. Appropriate postoperative sedation and analgesia measures [23] and a reasonable nutritional feeding plan [24] are important links in promoting patients to start activities as early as possible and achieve rapid recovery. In addition, improper drug management and fluid management are also common causes of postoperative complications and abnormal liver function, which is corroborated by the research conclusions of Tian M [25] and Carrier [26]. Therefore, how to construct a closed-loop management system for each key point through the cycle mode of assessment, nursing, monitoring, tracking, and then assessment is an important issue that requires continuous attention and efforts to solve in future ward work.

Outcome indicators, as the ultimate criteria for measuring the improvement degree of nursing quality [27], cover two key indicators: the attainment rate of patients' knowledge, attitude and practice and the attainment rate of patients' nursing outcomes. These two indicators deeply reflect the core tenet held by the sensitive indicator system of nursing quality in liver transplant wards, that is, to fully promote the continuous optimization of nursing work quality and effectively ensure the safety of patients. It is worth noting that the tertiary indicators established under them show a high degree of consistency with the sensitive indicators set in the process indicators, and this internal relevance further strengthens the scientific and systematic nature of the entire indicator system.In addition, satisfaction occupies a pivotal position among the influencing factors of the entire nursing effect [28]. In view of this, this study incorporates three important indicators, namely, patients' satisfaction with nursing work, patients' and their families' satisfaction with treatment effects, and the satisfaction of attending physicians with nursing work, into the comprehensive evaluation system of nursing quality. Through such comprehensive and detailed indicator settings, not only can the actual effectiveness of nursing work in various dimensions be more accurately reflected, but also clear and powerful direction guidance can be provided for the subsequent nursing quality improvement work, thus promoting the nursing work in liver transplant wards to move towards a more professional, efficient and humanized direction, and laying a solid foundation for the rehabilitation and health protection of patients.

Conclusion

Based on the three-dimensional quality structure theory and combined with the Delphi method, this study has successfully constructed a sensitivity index system for perioperative nursing quality of liver transplant patients. This system has laid a solid theoretical foundation for nursing staff to create a precise and individualized perioperative nursing model, effectively promoting nursing practice to move in a more scientific and efficient direction. However, due to the limitations of the researchers in terms of knowledge reserve and time and energy, the effectiveness and practicality of the currently constructed index system still need to be further optimized and adjusted during the clinical application process. Subsequently, it is necessary to continuously and deeply refine and improve the various contents of the index system to make it more in line with the actual clinical needs, thereby steadily promoting the continuous improvement of the perioperative nursing quality of liver transplant patients and providing more reliable and high-quality nursing protection for the health and well-being of patients.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-025-12676-y.

Supplementary Material 1.

Declarations

Ethics approval and consent to participate
This study was submitted to the Ethics Committee of the Affiliated Hospital of Qingdao University and was verbally agreed by the Ethics Committee of the Affiliated Hospital of Qingdao University. The Ethics Committee believes that the anonymous correspondence method used in this study protects the identity of the respondents and does not involve the privacy of the respondents. At the same time, before the expert letter consultation, the respondents were informed of the research purpose and obtained their oral consent. All respondents agreed to provide data anonymously. In addition, this study does not involve human participation, human data, human tissue or case report, nor does it involve human privacy. This study does not include any studies involving humans or animals. The Ethics Committee of the Affiliated Hospital of Qingdao University considers that the construction of

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nursing sensitive indicators in this study conforms to the regulations of the Ethics Committee of the institution on exemption from ethical review and has been exempted. And the Ethics Committee of the Affiliated Hospital of Qingdao University approved this procedure of verbal informed consent for this study.

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