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International Journal of General Practice Nursing

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Research on the Effectiveness of High-Quality Nursing in the Treatment of Pleural Effusion with Closed Thoracic Drainage

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Abstract: *Objective:* To explore the effectiveness of high-quality nursing applied to the treatment of pleural effusion with closed thoracic drainage. *Methods:* From March 2024, the hospital began to collect case data on the treatment of pleural effusion with closed thoracic drainage. By March 2025, a total of 72 cases were included and randomly grouped using a computer system. One group of 36 cases received routine nursing as the reference group, and another group of 36 cases received high-quality nursing as the experimental group. The drainage volume, complications, and nursing satisfaction were compared between the two groups. *Results:* The daily drainage volume, drainage time, and hospital stay in the experimental group were significantly lower than those in the reference group ($P < 0.05$). The incidence of complications in the experimental group was 11.11%, which was significantly lower than 27.78% in the reference group ($P < 0.05$). The nursing satisfaction in the experimental group was 94.44%, which was significantly higher than 66.67% in the reference group ($P < 0.05$). *Conclusion:* The application of high-quality nursing in the treatment of pleural effusion with closed thoracic drainage can significantly reduce drainage time and volume, with fewer complications and higher overall nursing satisfaction. It can be further promoted in nursing practice.

Keywords: High-quality nursing; Closed thoracic drainage; Pleural effusion

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1. Introduction

Pleural effusion is mainly characterized by the accumulation of a large amount of pathological fluid in the pleural cavity. This fluid accumulation can compress the normal space between the lungs and the chest wall, leading to a series of symptoms such as dyspnea, chest tightness, cough, and possible chest pain ^[1]. Currently, closed thoracic drainage is a commonly used method to treat pleural effusion in clinical practice. By inserting a thin tube into the chest wall, the fluid in the pleural cavity is drained out, thereby reducing the compression on the lungs and improving the patient's respiratory status ^[2]. Closed thoracic drainage has the advantages of relatively small

trauma, simple operation, and low risk of infection due to being performed in a closed environment, making it a highly safe procedure. During the treatment process, it is necessary to combine high-quality nursing interventions to effectively relieve patients' symptoms, reduce the occurrence of complications, and promote patients' quick recovery. This study conducted a comparative analysis of 72 patients with pleural effusion who underwent closed thoracic drainage treatment in the hospital in the past year to further understand the effectiveness of high-quality nursing. The details are as follows.

2. Materials and methods

2.1. General information

From March 2024, the hospital began collecting case data on the treatment of pleural effusion with closed thoracic drainage. By March 2025, a total of 72 cases were included and randomly grouped using a computer system. Among the 36 cases in the experimental group, there were 20 males and 16 females, with an age range of 35–67 years and a mean age of 51.74 ± 0.29 years. Among the 36 cases in the reference group, there were 19 males and 17 females, with an age range of 34–66 years and a mean age of 51.56 ± 0.38 years. Comparing the general information between the two groups showed strong comparability ($P > 0.05$).

2.2. Methods

The reference group received routine nursing care with specific measures ^[3]: Assisting doctors in performing precise puncture and securely placing the drainage tube, cleverly fixing it with a pin to ensure stability and prevent it from falling off. Continuously and carefully monitoring the patient's condition and drainage status, and promptly handling any abnormalities detected.

The experimental group received high-quality nursing care with the following specific measures: (1) High-quality nursing before puncture. Provide patients with a detailed introduction to the treatment process and disease-related knowledge to ensure they fully understand their condition and treatment. Offer necessary psychological support, listen, encourage, and provide positive information to help patients cope with emotional issues and enhance their confidence in overcoming the disease ^[4]. Additionally, nursing staff should guide patients to avoid violent coughing. If it is difficult to suppress, cough suppressants can be appropriately used to alleviate symptoms. (2) High-quality nursing during puncture. When performing the puncture, it is essential to ensure that the patient's body parts are appropriately exposed. Medical staff should adjust the indoor environment to maintain optimal humidity and temperature, minimizing the risk of discomfort or colds due to exposed skin. Patients should be guided to adopt a proper puncture position, avoid coughing or making large movements that could deviate the puncture needle from its intended location. Closely monitor the patient's reaction during the puncture. If abnormal symptoms such as paleness, chest pain, or palpitations occur, which may indicate an allergic reaction or other serious complications, the puncture should be immediately stopped, and emergency measures should be taken promptly ^[5]. (3) High-quality nursing after puncture. After the puncture, the patient's vital signs still need to be closely monitored. The initial drainage volume of pleural effusion should be controlled below 1000 milliliters to prevent complications such as re-expansion pulmonary edema or mediastinal swing caused by rapid fluid drainage. The subsequent daily drainage volume should be maintained between 1000 and 2000 milliliters. Meanwhile, the nature and color of the drained fluid should be carefully observed. The drainage speed should be moderately controlled to prevent complications such as re-expansion pulmonary edema or mediastinal swing

due to excessive drainage speed ^[6]. During the drainage process, patients should be kept in a semi-recumbent position. Medical staff should ensure that the drainage tube is unobstructed without twists, bends, or breaks, as these conditions could hinder normal fluid drainage or even cause drainage failure. When patients are active, the drainage tube should always be kept below the puncture site to prevent fluid backflow. If the drainage tube is higher than the puncture site, fluid may flow back into the chest cavity, increasing the risk of retrograde infection. (4) Nursing care for preventing complications. Common complications during intravenous catheter drainage treatment for pleural effusion patients include catheter blockage, catheter slipping, and infection. In this treatment and nursing stage, nursing staff should dynamically monitor the patency of the drainage tube and regularly squeeze the closed thoracic drainage tube to prevent blockage. In case of tube blockage, a 20-milliliter 0.9% sodium chloride solution should be immediately used for pulsed flushing of the catheter, and the doctor should be informed promptly for treatment. Attention should be paid to precisely controlling the flushing force and speed to ensure effective removal of blockages inside the catheter while avoiding unnecessary pain or injury to the patient ^[7]. Additionally, nursing staff should closely monitor the puncture site, regularly check the catheter's fixing belt and dressing to ensure stable fixation, and promptly take measures to address any catheter detachment. The puncture site and surrounding skin should always be kept clean and dry, and disinfection should be performed every two days to ensure the puncture site remains sterile and prevent drainage fluid from flowing backward. Effective treatment must be provided to patients who have developed infections. (5) Nutritional support. Maintain a nutritious diet, ensuring that food contains high calories to quickly provide energy and help patients maintain normal physiological functions and enhance physical strength. High-protein foods are essential as protein is crucial for repairing damaged tissue and maintaining muscle mass. Ensure adequate vitamin intake to strengthen the patient's immune system and promote wound healing. Avoid stimulating foods that may irritate the digestive system, causing discomfort or pain. Additionally, control salt intake as excessive salt can lead to hypertension and other health issues. Ensure patients receive the most suitable nutritional support for their recovery.

2.3. Observation of indicators

Observation of indicators: Observe and record the daily drainage volume, drainage time, length of hospital stay, and other indicator levels for both groups of patients. Complications: Observe and document the occurrence of complications such as catheter infection, puncture site leakage, phlebitis, and arrhythmia during the closed thoracic drainage treatment for both groups of patients. Calculate the total incidence rate for statistical analysis. Evaluation of nursing satisfaction: Develop a self-administered nursing satisfaction questionnaire that includes aspects such as nursing service quality, nursing efficiency, and nursing operations. Use the Likert 5-point rating scale for objective evaluation, with a maximum score of 5. A score of 4–5 indicates satisfaction; a score of 2–3 indicates general satisfaction; and a score of 1 indicates dissatisfaction. The total satisfaction rate is calculated as 100% minus the dissatisfaction rate.

2.4. Statistical Analysis

Analyze the recorded data using SPSS 25.0 statistical software. Express measurement data such as drainage volume as ($\pm s$) and perform a *t*-test. Represent count data such as incidence rate as [n(%)] and conduct an χ^2 test. The study is considered meaningful when the statistical analysis yields $P < 0.05$.

3. Results

3.1. Comparison of clinical indicators

The experimental group showed significantly lower levels of daily drainage volume, drainage time, and length of hospital stay compared to the reference group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparative analysis of relevant clinical indicator levels between the two groups (Mean \pm SD)

Group	Number of cases	Daily drainage volume (ml)	Drainage time (d)	Hospital stay (d)
Reference group	36	950.52 \pm 27.73	9.87 \pm 1.26	13.47 \pm 1.36
Experimental group	36	715.44 \pm 25.26	6.02 \pm 1.15	8.84 \pm 1.51
<i>t</i>	-	27.3916	6.6149	7.4315
<i>P</i>	-	<0.05	<0.05	<0.05

3.2. Complications

The incidence of complications in the experimental group was significantly lower at 11.11% compared to 27.78% in the reference group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparative analysis of complications between the two groups [n(%)]

Group	Number of cases	Catheter infection	Puncture site leakage	Phlebitis	Arrhythmia	Total incidence rate
Reference group	36	2 (5.56%)	2 (5.56%)	3 (8.33%)	3 (8.33%)	10 (27.78%)
Experimental group	36	1 (2.78%)	1 (2.78%)	1 (2.78%)	1 (2.78%)	4 (11.11%)
χ^2	-					11.1358
<i>P</i>	-					<0.05

3.3. Comparison of nursing satisfaction

The nursing satisfaction in the experimental group was significantly higher at 94.44% compared to 66.67% in the reference group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparative analysis of nursing satisfaction evaluation between the two groups [n(%)]

Group	Number of cases	Satisfied	Generally satisfied	Dissatisfied	Overall satisfaction rate
Reference group	36	14 (38.89%)	10 (27.78%)	12 (33.33%)	24 (66.67%)
Experimental group	36	19 (52.78%)	15 (41.67%)	2 (5.56%)	34 (94.44%)
χ^2	-				19.4786
<i>P</i>	-				<0.05

4. Discussion

Pleural effusion, a common clinical abdominal condition, can progressively worsen without prompt and effective treatment, potentially leading to severe complications that threaten patients' quality of life and overall health. The treatment of pleural effusion typically involves the scientific drainage of fluid from the body, with closed thoracic drainage being a widely adopted therapeutic approach that effectively reduces chest compression in patients.

However, without adequate nursing intervention during the drainage process, there exists a risk of complications that may adversely affect the drainage outcome. Therefore, it is imperative to strictly implement nursing interventions for patients undergoing drainage to ensure treatment efficacy, promote early recovery, and ultimately enhance their quality of life.

Traditional nursing intervention models often fail to provide precise care tailored to individual differences when managing patients undergoing drainage treatment for pleural effusion, resulting in suboptimal nursing outcomes that negatively impact patient recovery and prognosis ^[8]. Conversely, high-quality nursing services, grounded in the patient-centered philosophy, significantly enhance nursing standardization and professionalism by optimizing care processes. This approach better meets the specific needs of patients and ensures the smooth progression of closed thoracic drainage. Such nursing strategies comprehensively cover all aspects of closed drainage, effectively reducing the risks associated with puncture and minimizing the damage caused to patients' bodies. In the later stages of treatment, high-quality nursing also emphasizes the prevention of complications through strengthened measures such as monitoring drainage tubes, securing catheters, and maintaining skin cleanliness, thereby effectively reducing the occurrence of adverse events like infection, tube dislocation, and bleeding, and enhancing the overall safety of closed thoracic drainage ^[9]. Furthermore, this nursing model pays close attention to adjusting patients' dietary and nutritional intake plans, avoiding irritation of wounds and gastrointestinal function caused by unsuitable foods, ensuring good nutritional status during drainage, and preventing nutritional deficiencies, ultimately promoting early patient recovery.

The results of this study indicate that the experimental group had significantly lower levels of daily drainage volume, drainage time, hospital stay, and complication rates compared to the reference group. Additionally, the nursing satisfaction rate in the experimental group was significantly higher at 94.44% compared to 66.67% in the reference group. Analysis suggests that the high-quality nursing intervention strategy particularly emphasizes meticulous care before, during, and after patient treatment. The nursing phase prior to closed drainage therapy focuses on psychological care, health education, and adequate preoperative preparation, aiming to alleviate patients' negative emotions, enhance their disease knowledge, and ensure smooth treatment execution through comprehensive surgical readiness. During treatment, rigorous monitoring of vital signs such as blood pressure, respiration, and heart rate is performed, and patients are assisted in adopting appropriate positions to guarantee effective drainage and minimize the risk of complications. Any abnormal patient conditions are promptly reported to physicians for swift management, ensuring patient safety. Post-treatment nursing efforts concentrate on various aspects, including drainage management, position adjustment, and health guidance, with drainage care being particularly critical. During this process, the wound height is adjusted based on the specific length of the drainage tube, minimizing tension and preventing tube twisting or dislodging, thereby ensuring unobstructed drainage, facilitating smooth fluid removal, reducing drainage and hospital stay durations, lowering complication rates, and supporting patients' healthy recovery ^[10].

5. Conclusion

In conclusion, the application of high-quality nursing in the treatment of pleural effusion with closed thoracic drainage can significantly reduce drainage time and volume, decrease complications, and increase overall nursing satisfaction. This approach can be further promoted in nursing practice.

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Disclosure statement

The author declares no conflict of interest.

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Generation Mechanism and Optimization Path of Nurses' Willingness to Participate in China's "Internet+Nursing Service" Model: A Cross-National Comparative Study Based on Multicenter Data

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Abstract: *Background:* Under the dual pressures of a global aging population and rising burden of chronic diseases, digital healthcare services have emerged as a core strategy for healthcare system transformation. Developed countries have established three paradigms: technology-driven transformation, institutional innovation, and payment incentive breakthroughs to shift nursing services from an "institution-centered" model to a "network ecosystem." China faces more severe challenges: By 2021, the population aged 60 and above reached 264 million, with 44 million elderly individuals with partial or total functional impairments. However, the nurse-to-population ratio remains low at 3.18 per 1,000 people, exacerbating supply-demand imbalances. In response, China has piloted "Internet Plus Nursing Services", connecting nurses and patients through an "online application, offline service" model to optimize resource allocation and meet home-based nursing needs. *Aim:* This study used Boolean operators to systematically search the literature in five databases. Based on the literature base, the authors conducted a survey of nurses in a tertiary hospital in Guangzhou City on their intention to participate in Internet home nursing care, and further comprehensively analyzed the influencing mechanisms of the nurses' willingness to participate in home nursing care services in the typical countries and China in the past five years. *Results:* Findings indicate that Chinese nurses' willingness to participate is influenced by factors such as professional title, education, income, marital status, and service perception. However, domestic studies suffer from methodological limitations, including imperfect measurement tools, small sample sizes, and insufficient regional representation, with most research focusing on general nurse populations rather than region-specific groups. *Conclusion:* As direct implementers of "Internet Plus Nursing Services", nurses' participation willingness and behavior are critical to service quality and industry development. Future research should develop multidimensional measurement tools, expand cross-regional sample sizes, and explore influencing factors in context-specific ways to provide scientific evidence for policymaking and standardized development. At the policy level, China must balance "innovation encouragement" and "regulated development", reduce regional disparities in rules, and promote a transition toward a data-driven nursing ecosystem.

Keywords: Internet+Nursing services; Nurses; Willingness to participate; Generative mechanisms; Transnational

1. Background

Under the double pressure of accelerating global aging and increasing burden of chronic diseases, digital care services have become a core strategy for healthcare system transformation. OECD data show that the nursing manpower shortage in its member countries reaches 24%, while the average annual growth rate of nursing care demand for the population over 65 years old is 7.2%, and the traditional service model is facing a severe “scissors gap” dilemma ^[1]. In this context, developed countries through technological innovation and institutional restructuring to form three typical paradigms. Firstly, technology-driven change. Second, system-guaranteed innovation. For example, in terms of legal empowerment, the amendment of Japan’s Nursing Care Insurance Law included telecare in the statutory service catalog, and the insurance payment coverage rate reached 73% ^[2]. In terms of standard construction, the UK NHS issued the Digital Care Service Certification Standards, establishing a six-dimensional assessment system of service quality (safety/effectiveness/accessibility, etc.). Thirdly, a payment incentive-based breakthrough. In terms of multiple financing mechanisms, the Netherlands established a government-insurance-charity tripartite co-payment system to reduce the out-of-pocket expenses for home care services to 12% ^[3]. Under the synergistic evolution, the paradigm shift of care services from “institutional centrality” to “network ecology” has been promoted. The essence of this structural change lies in reconfiguring the interaction of “nurse-technology-patient” to form a new type of service production function linked by data flow. Based on the above international background, this paper compares the current generation mechanism of nurses’ willingness to participate in home nursing services between typical countries and China in the context of the development of China’s Internet nursing model, in order to provide a basis for optimizing the feasibility of promoting the development of China’s “Internet+Nursing Service.”

2. Approach

A complete internet-based search of five databases was conducted through Academic Search Complete, Medical Line, CINAHL, Health Source: Nursing/Academic Edition, and Google Scholar, to identify the generation mechanism and optimization path of nurses’ willingness to participate in China’s “Internet+Nursing Service” model. Keywords or free text are combined using Boolean operators (i.e., “AND” and “OR”). During the search, the keywords and terms “Internet+Nursing Service,” “Generation mechanism,” “Optimization path,” “Willingness,” and “Participate” were used in various combinations.

Then, this study used convenience sampling to recruit nurses from a tertiary general hospital in Guangdong Province to conduct a questionnaire survey on the intention to participate in door-to-door nursing care in order to further provide a scientific basis for mechanism analysis.

3. Results

3.1. Transformation of nursing service models under China’s internet healthcare ecology

As China’s aging population increases, national statistics show that by 2021, the number of people over 60 years old will have reached 264 million, accounting for 18.7% of the total population. There are 150 million people suffering from chronic diseases such as diabetes and hypertension, 85% of the elderly have varying degrees of home care needs, and the demand for home care services for 44 million elderly with disabilities or partial disabilities is increasing ^[4]. By 2050, China’s elderly population is expected to reach 487 million ^[5]. The ratio of registered nurses per 1,000 population in China is only 3.18 ^[6]. The imbalance between the supply and demand

of healthcare resources, and the hospital-centered healthcare service model can no longer meet the continuous healthcare needs of patients; therefore, home care services have become a key demand gap, and an inevitable trend in China's healthcare reform and nursing service model reform^[7-9]. "Internet + Nursing Service" combines nursing expertise and information technology to meet the diverse and multi-level health needs of patients, overcome time and space constraints, and provide home care services for special groups, such as continuing care after discharge from the hospital or seeking nursing home services for families with difficulties^[10-11]. In 2020, the National Health and Wellness Commission issued the Notice on Further Promoting the Pilot Work of "Internet + Nursing Service", and six provincial-level regions across the country were selected for the pilot program, further expanding the scope of the pilot work of "Internet + Nursing Service"^[12-13]. The scope of the pilot work is further expanded, emphasizing people's health as the center, focusing on the main contradictions and key issues in the field of nursing, innovating the nursing model, expanding the supply of services, and accurately matching the diversified and multi-level health needs of the people^[12-15].

3.2. Comparative analysis of typical countries on internet nursing service models

For "Internet + nursing services", domestic and foreign scholars have different ways and scopes to define^[16-25]. Overseas scholars usually refer to "Internet + nursing service" as home care, home nursing, home health care, etc., which has been standardized and systematized, with medical teams providing home services for patients^[26-28]. However, the development of "Internet + nursing service" in China is relatively slow, and needs to be further optimized to improve the system^[29]. China's National Health and Health Commission (NHHC) launched a pilot program of Internet + Nursing Service in 2019, and "Internet + Nursing Service" is described as "Internet + Nursing Service" in English, which can also be referred to as Internet + Home Care (IHC)^[30-31], the policy evolution reflects the shift in governance logic from "encouraging innovation" to "regulating development", but the difference in implementation rules between regions is still up to 43%^[29]. Domestic "Internet + nursing service" refers to the combination of nursing expertise and information technology, through the "online application, offline service" nursing model to connect the medical institutions registered nurses and patients, patients through the application to place an order; then, the management personnel patients place their orders through an app; then, managers use a web-based platform to send orders based on the nurse's qualifications, level of expertise, and distance; and online nurses accept them during their off-duty hours^[32]. Dedicated to meeting the diverse and multilevel health needs of patients and overcoming time and space constraints, it provides home care services for special groups, such as continuing care after hospital discharge or families with difficulties seeking nursing home care^[10-11]. IHC services are a valuable complement to traditional and transitional care, optimizing nursing talent, balancing the allocation of nursing resources, and meeting diverse patient needs^[33]. In addition, this model provides flexibility for nurses to organize the hours and content of their work, increase their income, and improve their professional competence^[33].

3.3. The current situation and optimization path of the generating mechanism of the nurses' group's willingness to participate in home care services in typical countries

First of all, the author searched domestic and foreign scholars on "Internet + nursing services", home care and other content retrieval research data in the past five years for 43,505, continue to add the search conditions for the nurses willingness to influence the factors, excluding deviations from the data is nearly 400 articles. On the basis of the above, after further exclusion of foreign scholars' research and removal of duplicated literature, only 40

pieces of research by domestic scholars on “Internet + Nursing Service” are retained.

From the direction of the study showed that some foreign scholars through a systematic search of seven electronic databases, identification, screening, and inclusion of 32 articles that met the inclusion criteria the results showed that the research methodology was mainly qualitative, and home care teamwork is closely related to the background of family nurses, but the status quo is rare in multi-methodological and ethnographic field studies, often lack of description of the background, and it is recommended that more attention is paid to the nurses’ backgrounds in the future ^[30]. Some domestic scholars used a cross-sectional survey to study the willingness and demand for nurses to provide IHC services in Chinese municipal hospitals, and the results of the study showed that nurses were willing to provide IHC services, preferred service distance was less than 5 kilometers, and a personal share of >60% was the expected remuneration for the service; binary logistic regression analyses showed that job title, education level, monthly income, and marital status were related to the willingness of nurses to provide IHC services correlated, with charge nurses 1.177 times more likely to express willingness to provide IHC services than senior nurses, nurses with a bachelor’s degree 1.167 times more likely to express willingness to provide IHC services than nurses with a college degree or less, and married nurses 1.075 times more likely to express willingness than unmarried nurses; and emphasized that nurses in municipal hospitals had a higher willingness and demand to provide IHC services, but that there are differences in willingness and need across demographic characteristics ^[30]. The results of a questionnaire survey conducted by some scholars on 80 itinerant nurses participating in the “Internet+Nursing Service” program in a tertiary hospital in Zhuhai, China, showed that 55% of the nurses believed that high costs, medical safety and nurse safety were factors that hindered the development of “Internet+Nursing Service” ^[30]. Some scholars conducted a survey of 150 nurses in three hospitals in Weifang, China, and the results of the study showed that education, marital status, nurses’ judgment of the necessity of the service, and their own subjective judgment of competence were the factors affecting nurses’ participation in Internet+Nursing Service ^[17]. Some other scholars’ research results reached similar conclusions, and the factors influencing nurses’ willingness to participate in “Internet+Nursing Service” include age, gender, education level, specialty nurses, monthly income, title, marital status, nurses’ training needs, and “Internet+Nursing Service” awareness ^[18–21]. At the same time, most of the studies on the willingness to use “Internet + nursing services” were conducted on general nurses or nursing students, which lacked strong population or geographical specificity ^[16–22].

The overall empirical results show that nurses, as direct participants and implementers of “Internet+Nursing Service”, their willingness and behavioral participation have a significant impact on the quality of nursing services and the development of the industry ^[18].

However, based on the current state of research, there are still many defects and deficiencies in the current domestic research on the willingness and influencing factors of “Internet + nursing service”, such as: lack of completeness of the measurement tool leads to insufficient integration of influencing factors of nurses’ actual individual research, certain bias in the sample size, and poor geographic spread and representativeness of the sample size, etc. ^[16]. Most of the scholars suggested that the sample size could be expanded in the future. The scholars suggested that the sample size could be expanded, cross-regional, and multi-dimensional “Internet+Nursing Service” measurement tools could be selected for research and promotion ^[16–22, 25, 30].

In order to further validate the empirical evidence, the authors conducted a survey on the willingness of nurses to come to the door by using convenience sampling of a tertiary hospital in Guangdong Province. 700 questionnaires were distributed, 518 questionnaires were retrieved, and 497 valid questionnaires remained after excluding invalid questionnaires. The results showed that a total of 25 male nurses and 472 female nurses were

surveyed (**Table 1**). It was concluded that 277 nurses thought that “Internet+Nursing Service” would distract nurses from their work, and 238 nurses thought that it would affect the work motivation of the department.

Table 1. General information on nurses ($n=497$)

Project	Classification	Examples	Constituent ratio (%)
Sex	Male	25	5.03
	Female	472	94.97
Age	≤ 30	162	32.60
	31-39	210	42.25
	40-49	92	18.51
	50-59	18	3.62
	≥ 60	0	0.00

4. Conclusion

To summarize, there are many shortcomings and deficiencies in the current research, such as: the lack of completeness of the measurement tool leads to the lack of integration of the factors affecting the actual individual study of nurses, and the lack of geographic spread and representativeness of the sample size for the sake of convenient sampling in many studies. As direct participants and implementers of “Internet + nursing services”, nurses’ willingness and behavioral participation have a significant impact on the quality of nursing services and the development of the industry. It is important to comprehensively understand the mechanism of nurses’ willingness to participate in home care services in order to continuously promote the development of China’s “Internet+Nursing Service” pilot, promote the stable development of the nursing team, and better meet the needs of the elderly with disabilities and the needs of the aging society. In the future, it is necessary to explore the “Internet+Nursing Service” willingness survey tool to concentrate on the region and expand the sample size for measurement, in order to understand the current situation of nurses’ willingness to use the tool and the influencing factors in line with local conditions, and to accumulate experience and provide scientific and practical information for the promotion of the standardized development of “Internet+Nursing Service” and the development of related policies in the region. This will accumulate experience and provide a scientific and effective practical basis for the standardized development of “Internet+Nursing Service” and the formulation of related policies in the region.

Ethical review

The study was approved by the Medical Ethics Committee of the Fifth Affiliated Hospital of Southern Medical University with the ethical review approval number 2023-HLB-K-002.

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Disclosure statement

The authors declare no conflict of interest.

Author contributions

Li Yang conceived the idea of the study and wrote the manuscript, as well as evaluated the literature. Limin Zhang and Meiqing Kuang also reviewed the literature, participated in the evaluation, and provided ideas and manuscript revisions. Li Yang and Jiali Li were the main contributors to revising the manuscript, as well as guiding the entire manuscript. All authors read and approved the final manuscript.

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Research on Emergency Nursing Strategies for Patients with Acute Myocardial Infarction

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Abstract: *Background:* Acute myocardial infarction (AMI) demands timely and effective intervention to prevent severe complications and improve patient outcomes. However, differences in emergency nursing protocols can affect the success of treatment. Therefore, evaluating the effectiveness of an optimized comprehensive emergency nursing model, which includes advanced assessment methods and individualized care strategies, is crucial for enhancing treatment protocols. *Objective:* This study aimed to assess the impact of a comprehensive emergency nursing model on patients diagnosed with acute myocardial infarction (AMI) within the cardiology department, focusing on optimizing rescue efficiency and patient outcomes. *Methods:* This retrospective study analyzed data from 90 AMI patients admitted to the hospital between January and December 2024. The study was conducted within the cardiology department of our hospital. The patients were divided into two groups: an intervention group ($n=45$) and a control group ($n=45$). The intervention group received care under the comprehensive, optimized emergency nursing model, while the control group received standard emergency care. Evaluation parameters included rescue time, clinical outcomes, and patient satisfaction with nursing care. *Results:* No significant differences in baseline characteristics were found between the two groups. However, the intervention group ($n=45$) demonstrated significantly shorter rescue times compared to the control group ($n=45$) in all measured parameters, including triage assessment time (7.49 ± 1.29 vs. 12.49 ± 2.18 minutes) and total emergency time (28.37 ± 3.14 vs. 48.64 ± 5.65 minutes), with P -values < 0.001 . Additionally, the intervention group showed significantly lower rates of clinical complications, including heart failure (4.44% vs. 17.78%) and recurrent myocardial infarction (2.22% vs. 17.78%), and higher patient satisfaction across all parameters, with P -values < 0.001 . These findings demonstrate the effectiveness of the comprehensive emergency nursing model in enhancing AMI care. *Conclusion:* The comprehensive emergency nursing model significantly improved rescue efficiency, reduced complications, and increased patient satisfaction in AMI care, demonstrating its clinical effectiveness.

Keywords: Acute myocardial infarction (AMI); Emergency nursing; Rescue time; Rescue outcomes; Nursing satisfaction

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1. Introduction

Acute myocardial infarction (AMI) is a common form of acute coronary syndrome, occurring when the blood supply to the coronary artery is interrupted, leading to myocardial ischemia, hypoxia, and tissue necrosis^[1-3]. AMI poses a severe threat to health, often resulting in heart failure, shock, and death if not treated promptly. According

to the World Health Organization (WHO), cardiovascular diseases are the leading cause of death globally, with AMI contributing significantly to mortality ^[4].

Emergency nursing plays a crucial role in AMI treatment, focusing on monitoring vital signs, managing symptoms like pain and anxiety, and early cardiac intervention ^[5-7]. Given AMI's rapid progression and the short treatment window, emergency nursing requires high timeliness and expertise. Effective interventions during early treatment can improve survival rates and reduce complications ^[8].

Emergency nursing strategies for AMI have evolved with advancements in medical technology and nursing practices. These strategies now include pharmacological treatments, surgical interventions, and comprehensive care such as psychological support, pain management, and patient education ^[9-10]. Key treatments like antiplatelet drugs, anticoagulants, thrombolysis, and coronary interventions are vital in emergency care.

Despite these advancements, challenges remain, including the high mortality rate and the need for nursing staff to quickly assess and adjust care based on the patient's condition. This study aims to explore emergency nursing strategies for AMI, evaluate their impact on patient outcomes, and provide scientific evidence for improving nursing practices to enhance survival and quality of life for AMI patients.

2. Methods

2.1. Study Design

A total of 90 AMI patients admitted to XX Hospital from January to December 2024 were selected for this study. The patients were arranged in the order of their enrollment and randomly assigned to either the experimental group or the control group, with 45 patients in each group. The control group consisted of 33 males and 12 females, with an age range of 51 to 94 years and a mean age of 73.2 ± 10.3 years. The experimental group consisted of 28 males and 17 females, with an age range of 51 to 94 years and a mean age of 73.5 ± 9.2 years.

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

The inclusion criteria were as follows: (1) aged 18 years or older; (2) diagnosed with AMI according to the "Guidelines for Diagnosis and Treatment of Myocardial Infarction"; (3) received treatment within 24 hours of hospital admission.

2.2.2. Exclusion criteria

The exclusion criteria were as follows: (1) the presence of severe complications such as heart failure malignant arrhythmia; (2) severe hepatic or renal insufficiency or other significant organ failures; (3) severe mental illness impeding cooperation with treatment and research; (4) long-term bedridden state prior to the onset of acute myocardial infarction, rendering the individual unable to live independently; (5) participation in other clinical trials ^[11].

2.3. Standard emergency care protocol for the control group

2.3.1. Standard emergency care in the control group

The control group received standard emergency care, which was implemented as follows.

Emergency reception: Upon receiving emergency notifications, the nursing team promptly arrived at the scene. Their immediate priority was to stabilize the patients' vital signs, including administering oxygen and providing basic symptomatic treatments.

Real-time monitoring and assessment: Continuous vital sign monitoring was utilized to assess the severity of the patients' conditions in real time. This assessment guided subsequent emergency interventions.

Emergency readiness and transfer: Ongoing communication with the operating room was maintained to ensure preparedness for thrombolytic therapy or other necessary emergency interventions. Once the patients' conditions were stabilized, they were transferred to the appropriate treatment department without delay.

Coordination of follow-up procedures: After stabilization, the nursing team assisted the patients' families with hospital admission procedures. Additionally, the team communicated with the relevant department's nurses to facilitate patient transfer and ensured the establishment of a green channel for efficient patient reception.

2.3.2. Emergency nursing model in intervention group

The intervention group implemented an optimized emergency nursing model with the following components.

Optimized reception: The Critical Care Unit (CCU) team was pre-notified during the ambulance's en route, ensuring preparedness for a seamless patient reception ^[12].

Enhanced assessment: The attending nurse initiated bedside oxygenation and monitored ECG and blood oxygen saturation, obtaining detailed chest pain information and conducting a thorough evaluation.

Emergency procedure optimization: The physician, nurse, and CCU leader coordinated to establish intravenous access within 5 minutes, transfer the patient to the catheterization room via the green channel within 10 minutes, and monitor results within 30 minutes.

Improved handover: Continuous vital sign monitoring and comprehensive handover after surgery ensured proper documentation and continuity of care.

Nursing process optimization: A departmental management system was established, with nursing staff adhering to duties and regular assessments, ensuring continuous improvement in nursing processes ^[13].

2.4. Observational measures

This study employed various observational measures to assess the effectiveness of the comprehensive emergency nursing model for AMI patients ^[14]. Measures included:

Rescue time measurement: Time from admission to key interventions, evaluating emergency care efficiency.

Incidence of clinical complications: Documentation of complications such as angina, arrhythmia, and heart failure.

Patient satisfaction: Evaluated using a Likert scale to assess response time, staff attitudes, professionalism, and overall satisfaction.

2.5. Statistical analysis

Data analysis was conducted using SPSS version 22.0. The data were presented as mean \pm standard deviation ($\bar{x} \pm s$) and subjected to *t*-tests. A *P*-value of < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of rescue time between two groups of patients

The intervention group showed significantly shorter times in triage assessment, ECG completion, venous blood sampling, intravenous medication, and total emergency time compared to the control group, with statistically significant differences ($P < .001$), as depicted in **Table 1**.

Table 1. Comparison of rescue time between intervention and control groups (Mean \pm s)

Grou	Triage assessment time (minutes)	ECG completion time (minutes)	Venous blood sampling time (minutes)	Intravenous medication time (minutes)	Total emergency time (minutes)
Intervention group (n=45)	7.49 \pm 1.29	9.29 \pm 1.46	6.52 \pm 0.97	5.58 \pm 1.19	28.37 \pm 3.14
Control group (n=45)	12.49 \pm 2.18	15.83 \pm 2.89	10.77 \pm 1.83	9.89 \pm 1.79	48.64 \pm 5.65
<i>t</i>	-13.24	-13.61	-13.44	-13.31	-21.03
<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001

Note: Data presented as mean \pm standard deviation (Mean \pm s). Independent sample *t* tests were used to compare rescue times between groups. *P* < .001 indicates significant differences between groups in all measured rescue times

3.2. Comparison of the incidence rate of clinical complications between the two groups of patients

The intervention group exhibited significantly lower incidence rates of complications such as angina, arrhythmia, heart failure, shock, and recurrent myocardial infarction, with statistically significant differences (*P* < .05), as depicted in **Table 2**.

Table 2. Comparison of rescue outcomes between the two groups of patients [n (%)]

Group	Angina(%)	Arrhythmia (%)	Heart failure(%)	Shock (%)	Recurrent myocardial infarction (%)
Intervention group (n=45)	2 (4.44%)	3 (6.67%)	2 (4.44%)	0 (0.00%)	1 (2.22%)
Control group (n=45)	9 (20.00%)	10 (22.22%)	8(17.78%)	6(13.33%)	8 (17.78%)
χ^2	5.074	4.406	4.05	6.428	5.948
<i>P</i>	0.024	0.036	0.044	0.011	0.015

Note: Data presented as numbers (percentages). Chi-square (χ^2) tests were performed to compare the occurrence rates of rescue outcomes between groups. Significant differences were found for angina, arrhythmia, heart failure, shock, and recurrent myocardial infarction, indicating lower occurrence rates in the intervention group compared to the control group

3.3. Comparison of patient satisfaction between the two groups of patients

The intervention group reported significantly higher scores in nursing response time, nursing attitude, professional competence, and overall satisfaction compared to the control group, with statistically significant differences (*P* < .001), as depicted in **Table 3**.

Table 3. Nursing satisfaction scores comparison between two patient groups (Mean \pm s)

Group	Nursing	Response time	Nursing attitude	Professional competence	Overall satisfaction
Intervention group (n=45)	4.23 \pm 0.69	4.58 \pm 0.69	4.52 \pm 0.49	4.64 \pm 0.25	4.55 \pm 0.39
Control group (n=45)	3.62 \pm 0.66	3.67 \pm 0.21	3.99 \pm 0.52	3.52 \pm 0.40	3.65 \pm 0.42
<i>t</i>	13.77	8.66	15.63	51.15	30.93
<i>P</i>	<0.001	<0.001	<0.001	<0.001	<0.001

Note: The table presents the comparison of nursing satisfaction scores between the intervention and control groups. Scores are presented as mean \pm standard deviation (Mean \pm s). Statistically significant differences were observed in all parameters between the two groups (*P* < .001)

4. Discussion

Acute Myocardial Infarction (AMI) is a pathological condition characterized by the sudden interruption or reduction of blood supply to the myocardium, leading to ischemia, hypoxia, and ultimately myocardial tissue necrosis ^[15]. The pathological process begins when a rupture or erosion of an atherosclerotic plaque leads to the formation of a thrombus, which obstructs the coronary artery, depriving the heart muscle of oxygen and nutrients ^[16]. This interruption in blood flow initiates a cascade of biochemical events that result in myocardial injury and, if left untreated, may lead to irreversible tissue damage, heart failure, or death ^[17–18].

Standard nursing care for AMI primarily involves monitoring vital signs, administering medications such as antiplatelet agents, anticoagulants, and pain management, and ensuring the timely delivery of oxygen. While these measures are critical for stabilizing patients, they do not address the rapid progression of the disease or prevent further myocardial damage during the critical early phase of AMI. Therefore, the adoption of acute emergency nursing strategies is paramount ^[19]. These strategies focus on minimizing the time from symptom onset to intervention, such as early thrombolysis, percutaneous coronary intervention (PCI), or coronary artery bypass grafting (CABG). The acute care model emphasizes rapid assessment, immediate intervention, and continuous monitoring, which are essential for restoring coronary blood flow and limiting myocardial injury ^[20]. This proactive approach is crucial in improving survival rates, reducing complications, and enhancing recovery outcomes in AMI patients. Therefore, acute emergency nursing strategies play a vital role in optimizing patient care and preventing long-term adverse effects.

The intervention group showed significant improvements in key outcomes compared to the control group. Rescue times were notably shorter for triage assessment (7.49 ± 1.29 vs. 12.49 ± 2.18 minutes), ECG completion (9.29 ± 1.46 vs. 15.83 ± 2.89 minutes), and total emergency time (28.37 ± 3.14 vs. 48.64 ± 5.65 minutes), with all P -values < 0.001 (**Table 1**). The intervention group also had lower rates of clinical complications, including angina, arrhythmia, and heart failure, with P -values between 0.011 and 0.044 (**Table 2**). Patient satisfaction was higher in the intervention group for nursing response time and overall satisfaction, with all P -values < 0.001 (**Table 3**). These findings highlight the model's effectiveness in improving care.

The emergency nursing strategies for acute myocardial infarction (AMI) patients have a significant impact on clinical outcomes. Optimizing these strategies effectively shortens rescue times, reduces the occurrence of clinical complications, and enhances patient satisfaction. Through preemptive preparation and rapid response, the intervention group demonstrated significantly shorter times in key stages, such as triage assessment, ECG completion, and venous blood sampling, thus maximizing the restoration of cardiac blood flow and reducing myocardial necrosis. Additionally, optimized nursing processes effectively lowered the incidence of complications like angina, arrhythmia, and heart failure, improving overall treatment outcomes. Emergency nursing not only focuses on physiological treatments but also on psychological care and the enhancement of patient relationships, thereby increasing patient satisfaction. The multidisciplinary collaborative model further contributed to the improvement of emergency care efficiency. In summary, comprehensive emergency nursing strategies have significant clinical value in improving AMI patient outcomes, reducing complications, and increasing patient satisfaction.

5. Study limitations

It is essential to acknowledge the limitations of this study that may affect the generalizability of the findings. First, the study was conducted at a single hospital, limiting the diversity of the patient population and healthcare

environment. Therefore, the results may not be applicable to other regions or countries with different healthcare systems. Second, the study focused exclusively on AMI patients in the cardiology department, which may limit the applicability of the model to other emergency conditions. Lastly, the retrospective design of the study introduces potential biases, suggesting the need for future prospective studies with larger sample sizes.

6. Clinical implications

Optimized patient outcomes through efficient rescue time: The reduction in rescue time achieved by the comprehensive emergency nursing model directly improves AMI patient survival and prognosis. By streamlining critical procedures, such as triage assessment and thrombolytic therapy, the model enhances overall emergency care delivery. The multidisciplinary approach fosters better coordination and standardized procedures, improving patient safety. Moreover, lower incidences of complications, such as heart failure and recurrent infarction, underscore the model's effectiveness in enhancing patient outcomes. The model also improves healthcare efficiency, reducing waiting times and optimizing resource utilization within emergency settings.

7. Conclusion

In conclusion, the comprehensive emergency nursing model significantly improved rescue efficiency for AMI patients through streamlined processes and team collaboration, reducing clinical complications and enhancing patient satisfaction. These findings highlight the model's effectiveness in emergency care. However, limitations such as the small sample size and single-center design suggest the need for future research with larger, multicenter studies and randomized controlled trials to confirm the model's broader applicability and effectiveness.

Disclosure statement

The authors declare no conflict of interest.

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Analysis of the Application of Comprehensive Nursing Intervention in the Clinical Treatment of Acute Mastitis in Lactating Mothers

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Abstract: *Objective:* To explore the effect of comprehensive nursing intervention on acute mastitis in lactating mothers. *Methods:* 80 patients with mastitis during lactation were divided into a control group and an observation group. The control group received routine nursing, while the observation group received comprehensive nursing. The efficacy was observed. *Results:* The psychological status and symptom recovery of the observation group were better than those of the control group, and the incidence of complications was lower than that of the control group ($P < 0.05$). *Conclusion:* Effective nursing measures for acute mastitis during lactation have a positive impact on prognosis and recovery. Comprehensive nursing intervention can promote the improvement of psychological status and reduce the incidence of complications.

Keywords: Comprehensive nursing; Lactation; Acute mastitis; Nursing effect

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1. Introduction

In recent years, with the improvement of people's daily living standards, certain changes have occurred in the living environment, making the incidence of acute mastitis significantly increase, especially during the lactation period. During this period, mothers may experience acute suppurative infection, mainly manifesting as infectious inflammatory reactions, leading to breast pain, tenderness, or touch pain. The skin temperature around the breast gradually increases, and there are hard lumps in the breast. Mastitis is a common type of acute infectious disease during lactation for mothers. The main cause is secondary infection after milk accumulation in the breast, and the most common infectious bacterium is *Staphylococcus aureus*. Due to the failure to intervene in a timely and effective manner, the breast tissue may become infected and abscessed in severe cases, which is not conducive to breastfeeding and increases physical and psychological burdens. The incidence rate is mostly concentrated in the first to third week after childbirth, and it is more common in primiparous women, causing great pain and reducing the quality of life during postpartum. For patients with acute mastitis, routine nursing intervention is generally

provided in clinical practice, which can promote patients' understanding of the disease. However, factors such as inadequate self-care ability and prevention measures after returning home make the recurrence rate high, causing a significant physical and psychological burden on patients ^[1]. In recent years, comprehensive nursing measures have gradually gained attention. This method can exert comprehensive effects when intervening in patients with acute mastitis during lactation. It provides patients with standardized and comprehensive care, including clearing milk stagnation, physical therapy, and dietary care to prevent milk stagnation from causing other lesions, quickly relieve pain, achieve short-term cure, help restore breastfeeding function, and improve prognosis. Based on this, the following text takes patients with acute mastitis during lactation as an example to analyze the effect of comprehensive nursing.

2. Materials and methods

2.1. Basic information

The study period was from January 2024 to January 2025. The subjects were all patients with acute mastitis, totaling 80 cases. They were divided into groups by the lottery method, and the data is shown in **Table 1**.

Table 1. Data of patients with acute mastitis

Group	Number of cases	Average age (years)	Average gestational week (weeks)	Breast firmness		
				Degree 1	Degree 2	Degree 3
Control group	40	28.74 ± 1.96	39.41 ± 1.25	10 (25.0)	21 (52.5)	9 (22.5)
Observation group	40	28.68 ± 1.88	39.67 ± 1.48	11 (27.5)	22 (55.0)	7 (17.5)
χ^2/t		0.1397	0.8488	0.0646	0.0503	0.3125
P		0.8892	0.3986	0.7994	0.8225	0.5761

2.2. Methods

The control group received routine nursing care. Temporarily stop feeding from the affected breast, clean the nipple and areola, and perform early massage and milk suction on the patient's nipple. The patient can slowly massage and push along the nipple direction with their fingers, increasing pressure to facilitate milk flow towards the milk duct, and use a breast pump to suction out the milk, thereby clearing the clogged mammary ducts. After milk suction, the milk should be expelled from the body as much as possible and should not accumulate too much. When there is too much milk and the newborn cannot suckle it all at once, a breast pump should be used to remove the excess milk. If there is nipple damage, breastfeeding should be stopped, milk should be regularly cleared, and antibiotic ointment should be applied to the damaged nipple until the wound heals before resuming breastfeeding. For severe infections, appropriate antibiotics should be selected based on bacterial culture and drug sensitivity results. Intravenous injection of antibiotics, preferably penicillin, may be necessary.

The observation group received comprehensive nursing care, including: (1) Specialized treatment: Breastfeeding assistance using massage and physiotherapy methods. After the birth of the newborn, the responsible nurse gently squeezes the mother's breasts to soften them, appropriately massages the breasts along the direction of the mammary ducts using a breast massager, stimulates milk flow using alternating hot and cold temperatures, or uses a breast pump. Skin care is performed using milk or lanolin cream to prevent dry and cracked breasts. Nipple shields or hydrogel pads are used to relieve discomfort caused by clothing friction.

(2) Psychological support: Nurses should observe the patient's emotional state during nursing care and provide timely psychological counseling when patients may experience psychological issues. For patients with breast hypoplasia, nurses should empathize with them and alleviate their fears about physical deformities. For patients concerned about not breastfeeding, nurses should explain that not breastfeeding will not affect the growth and development of the newborn, thereby reducing their psychological stress. Successful treatment experiences should be shared to enhance patients' confidence. For patients with family disharmony or a lack of a sense of security, nurses should provide psychological guidance along with the patients' families to improve negative emotions and enhance their sense of security. For patients who complain of significant fatigue, nurses should discuss with the patients' families to clarify their family responsibilities, reduce their role burden, and provide them with emotional support. (3) Health education: Actively educate patients about professional nursing knowledge related to their disease, emphasizing the importance of a positive attitude for breastfeeding and disease recovery. Encourage patients to choose a more reasonable feeding method, achieve breastfeeding, and help patients establish close parent-child relationships. Patiently answer questions, provide psychological counseling services, and strive to create a pleasant and harmonious nurse-patient relationship for patients. Strengthen health education for patients' families and create a comfortable rehabilitation environment. Advise patients to eat more light and nutritious foods, such as beans, lean meat, eggs, etc., which are rich in protein, contain less fat, have high dietary fiber, and are easy to digest. It is best to eat more at each meal, drink plenty of water, and eat less or avoid cold, greasy, and stimulating foods. (4) Disease nursing: For patients with acute mastitis, attention should be paid to redness, swelling, and pain in the breast area, as well as the possibility of high fever symptoms in the later stages of the disease. Therefore, it is required to be highly vigilant during the nursing process, strictly monitor the patient's body temperature, pulse, and respiration, check for an increase in white blood cells, and observe the efficacy of medication, especially for febrile patients, physical cooling methods can be adopted. For febrile patients, physical cooling with ice bags or cold towels can be given. If the patient has a high fever (body temperature exceeding 39°C) or a persistent high fever, antipyretic drugs should be given, but drugs that have no effect on breast milk should be selected. At the same time, the patient's temperature should be measured 6 times a day. (5) Pain nursing: Breast pain is an important symptom of acute mastitis. Initially, the breasts may feel swollen and painful, with the skin appearing normal or slightly red. Over time, the local lump may grow larger, the pain may intensify, and fever may occur. Nursing staff should respect the patient's pain experience, provide comfort, encouragement, and support, and help the patient increase their pain tolerance with an optimistic attitude. (6) Continued nursing: Use the internet platform as a carrier to promote disease knowledge, educate patients and their families about health knowledge through short videos, text, pictures, and other means, making it easy to find and understand disease-related knowledge and improve their awareness of disease knowledge. Create a WeChat group for mastitis, invite medical staff and patients to join the group, so that patients can use the group software to ask questions or seek help from doctors in real-time when needed. It is also convenient to share disease-related information in the group, distribute videos such as methods to prevent mastitis, and provide contact information to clarify everyone's responsibilities, so that patients can refer to and learn from it when performing self-care at home, improving self-care ability and effectiveness. To respond to patients' online inquiries, nursing staff will answer online from 20:00 to 21:00 every day, and the time will be extended in special circumstances. If there are questions that cannot be professionally answered, they will be recorded in detail, and answers will be sought from the attending doctor and the chief doctor. Patients will be replied to based on the answers of the chief and attending doctors, and the chief and attending doctors can be consulted directly for advice to satisfy the patients. A questionnaire is distributed

every month to understand patients' needs, the treatment and prevention effects of mastitis, and to inquire about whether breastfeeding habits are developed and whether there is postpartum depression. Patients are educated on the prevention of mastitis and related knowledge of home self-care, questions are answered, and the questionnaire is recorded and analyzed. This study strictly follows the 4-Cs nursing model, carries out continuous nursing for patients, and adheres to the research philosophy based on evidence to ensure the validity of the collected data. A platform is built for patients to easily access health information and support through standardized recording and communication systems, ensuring the quality of continuous nursing intervention.

2.3. Observation indicators

The effectiveness of this intervention was evaluated by observing the patients' symptoms and breast conditions, with specific criteria as follows: (1) Significant effect: The mother's milk was almost completely discharged, there was no redness, swelling, or pain on the skin, the body temperature was normal, and the breast lump subsided; (2) Effective: After the intervention, the lump decreased in size and pain reduced, but milk discharge was not smooth, and the body temperature ranged from 37.5–38°C; (3) Ineffective: The patient's milk discharge was not smooth, showing signs of redness, swelling, and pain, the lump size did not decrease or local abscesses formed.

The patients' anxiety and depression were evaluated using a psychological negative emotion scale, with higher scores indicating more severe anxiety and depression. Various breast improvement indicators were recorded, and the occurrence of complications was observed.

2.4. Statistical analysis

Data were processed and analyzed using SPSS 23.0, with chi-square (χ^2) and *t*-tests performed. Results were expressed as (n/%) and (Mean \pm SD). A *P*-value < 0.05 was considered statistically significant.

3. Results

3.1. Evaluation of clinical treatment effect

The clinical efficacy evaluation showed that the observation group was significantly higher than the control group ($P < 0.05$).

Table 2. Comparison of clinical effectiveness rates between the control group and the observation group (n/%)

Group	Number of cases	Markedly effective	Effective	Ineffective	Total effective rate (%)
Control group	50	17 (34.00)	23 (46.00)	10 (20.00)	40 (80.00)
Observation group	50	20 (40.00)	27 (54.00)	3 (6.00)	47 (94.00)
χ^2					4.3324
<i>P</i>					0.0373

3.2. Incidence rate of complications

The incidence rate of complications in the observation group was lower than that in the control group ($P < 0.05$).

Table 3. Comparison of complication incidence rates between the control group and the observation group (n/%)

Group	Number of cases	Breast distension and pain	Nipple injury	Nipple rupture	Total incidence rate
Control Group	50	4 (8.00)	2 (4.00)	2 (4.00)	8 (16.00)
Observation Group	50	1 (2.00)	1 (2.00)	0	2 (4.00)
χ^2					4.0000
<i>P</i>					0.0455

3.3. Evaluation of psychological status

The psychological status scores of the observation group were lower than those of the control group ($P < 0.05$).

Table 4. Comparison of psychological status scores between the control group and the observation group (Mean \pm SD)

Group	Number of cases	Anxiety score		Depression score	
		Before nursing	After nursing	Before nursing	After nursing
Control Group	50	55.67 \pm 4.28	52.25 \pm 2.75	55.73 \pm 3.96	52.41 \pm 2.08
Observation Group	50	55.72 \pm 4.37	49.67 \pm 2.81	55.81 \pm 3.87	49.62 \pm 3.07
χ^2/t		0.0517	4.1502	0.0914	4.7584
<i>P</i>		0.9589	0.0001	0.9274	0.0000

3.4. Recovery effectiveness of prognosis

The rehabilitation indicators of the observation group were superior to those of the control group ($P < 0.05$).

Table 5. Comparison of rehabilitation indicators between the control group and the observation group (Mean \pm SD)

Group	Number of cases	Symptom improvement time (days)	Duration of breastfeeding (months)	Breastfeeding rate	Readmission rate
Control group	50	3.71 \pm 0.58	5.67 \pm 0.85	35 (70.00)	7 (14.00)
Observation group	50	2.88 \pm 0.41	6.82 \pm 0.91	45 (90.00)	1 (2.00)
<i>t</i>		0.1956	5.2022	6.2500	4.8913
<i>P</i>		0.8456	0.0000	0.0124	0.00269

4. Discussion

Mastitis is an acute infectious disease that often occurs 3–4 weeks after childbirth. It commonly causes redness, swelling, and pain in one breast, accompanied by the development of hard lumps. If not effectively treated, it can lead to the formation of abscesses in patients, causing significant physical suffering. In severe cases, it can directly affect the breastfeeding effectiveness and overall health of the patient. To ensure rapid recovery, clinical nursing measures are extremely important ^[2].

Traditional nursing methods provide interventions such as psychological care, dietary guidance, and pain management, while closely observing and monitoring changes in the patient's condition during treatment.

However, among women with acute mastitis, especially primiparous women, inadequate knowledge about acute mastitis and deficiencies in nursing interventions can pose hidden risks, potentially affecting the health of both mother and child ^[3–8]. Factors such as mastitis pain and poor rest due to breastfeeding can lead to emotional disturbances in patients, manifesting as negative emotions like anxiety, depression, and irritability ^[9].

To address these issues, clinical applications of comprehensive nursing interventions have been introduced. This approach emphasizes the comprehensiveness of care, ensuring that patients' needs are met. In the implementation of comprehensive nursing, emotional support can eliminate negative emotions, encouraging patients to actively cooperate with medical care. Reasonable dietary adjustments and massage techniques can promote smooth milk flow, reducing the incidence of postpartum mastitis. After receiving direct psychological support, patients gain confidence from the successful treatment cases and feedback of other patients, fostering a positive and optimistic attitude when facing this problem and improving patient compliance. Furthermore, patients are provided with health education manuals or organized health lectures to disseminate knowledge, optimizing the way mothers access health information and allowing them to choose based on their interests ^[10–14]. Additionally, acute mastitis can be complicated by many related diseases. Therefore, during treatment, close attention should be paid to the patient's quality of life, especially their body temperature. Physical cooling methods can be adopted when the temperature is below 39°C; if it exceeds this temperature and cannot be lowered normally, doctors should be notified immediately, and temperature control should be guided by the doctor's instructions, closely monitoring changes in body temperature and recording nursing details. It is also essential to ensure hygienic care of the breasts, particularly for those with damaged or painful nipples, and to adopt a small, frequent feeding approach ^[15]. Simultaneously, continuous nursing care can promptly respond to patients' questions, gradually enhancing their understanding of health knowledge and confidence in breastfeeding, effectively preventing the occurrence of breast inflammation during lactation, and improving patients' psychological state and reducing depressive symptoms.

5. Conclusion

In summary, comprehensive nursing for acute mastitis in lactating women can promote symptom improvement, prevent adverse events, and demonstrate significant nursing effectiveness.

Disclosure statement

The authors declare no conflict of interest.

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Importance of Specialized Nursing Care in Adrenal Venous Sampling

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Abstract: *Objective:* To explore the key nursing points before, during, and after adrenal venous sampling. *Methods:* A total of 147 patients with primary aldosteronism (PA) underwent adrenal venous sampling (AVS) via catheter insertion through the elbow vein (median cubital vein, basilic vein, or cephalic vein) to determine the appropriate treatment plan. *Results:* 145 patients successfully completed AVS, while 2 patients failed in right adrenal venous sampling due to adrenal vein rupture and hematoma formation. Among the 147 patients, 121 were punctured through the median cubital vein, 10 through the cephalic vein, and 16 through the basilic vein. In 3 cases where the cephalic vein was initially punctured, the guidewire could not be inserted into the vein, requiring a switch to the basilic vein for successful insertion. *Conclusion:* Preoperative reasonable arrangement of operation time and strengthening of psychological nursing care, seamless cooperation with surgeons during the operation, and prioritizing puncture of the median cubital vein or basilic vein, with a puncture needle direction favoring the basilic vein during median cubital vein puncture, can significantly reduce operation time. This effectively avoids discomfort, such as back pain, caused by prolonged surgery. Postoperative observation of the patient's condition and specialized nursing care can effectively reduce the occurrence of complications.

Keywords: Primary aldosteronism; Adrenal venous sampling; Nursing care

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1. Introduction

Primary aldosteronism (PA) is caused by the continuous secretion of excess aldosterone by the adrenal cortex, leading to a significant increase in aldosterone levels and resulting in a syndrome. Its pathological manifestations include decreased plasma renin levels and increased plasma aldosterone levels, often accompanied by hypertension and hypokalemia, making the condition more complex^[1]. Long-term exposure to high aldosterone levels in PA patients can cause related target organ damage and cardiovascular events such as atrial fibrillation, myocardial infarction, and stroke. Timely diagnosis and targeted treatment can reduce adverse events in PA patients and improve their quality of life^[2-4]. Among the various subtypes of PA, idiopathic hyperaldosteronism (IHA) and

aldosterone-producing adenoma (APA) are the most common, with fundamentally different treatment principles. IHA patients are recommended lifelong oral aldosterone receptor blockers, while APA patients prioritize unilateral dominant gland surgery. Currently, both domestic and international guidelines and expert consensus recommend adrenal venous sampling (AVS) as the gold standard for clinical diagnosis and functional classification of PA [1, 5–7]. AVS can accurately detect PA and is therefore frequently used. Combining meticulous and personalized nursing services can significantly improve the smoothness of AVS examination and has a positive mechanism for prognosis. Therefore, this study selected 147 PA patients who underwent AVS to evaluate the specific effects of nursing intervention.

2. Materials and methods

2.1. General information

A total of 147 patients with PA who were diagnosed and underwent adrenal venous sampling (AVS) at the Hypertension Department of The First Affiliated Hospital of Guangxi Medical University from July 2018 to September 2020 were selected. The general information and biochemical results of PA patients are shown in **Table 1**. An independent sample *t*-test was performed on the data of male and female groups using statistical software SPSS 22.0. The results showed that the BMI value of males was higher than that of females, which was statistically significant ($P=0.008$), while there was no statistical difference in other clinical data.

Table 1. General information and clinical data of 147 patients with PA

Project	Overall	Male	Female	<i>P</i> value
Number of cases	147	67	80	-
Age (years)	46.14 ± 10.48	46.72 ± 10.42	45.66 ± 10.5	0.547
BMI (kg/m ²)	24.15 ± 3.38	24.96 ± 3.13	23.47 ± 3.43	0.008
Systolic blood pressure (mmHg)	152.77 ± 18.91	150.57 ± 15.62	154.69 ± 21.18	0.195
Diastolic blood pressure (mmHg)	91.8 ± 14.55	90.7 ± 13.63	92.75 ± 15.25	0.402
Blood potassium (mmol/L)	3.29 ± 0.55	3.31 ± 0.50	3.45 ± 0.58	0.279
24-hour urinary potassium (mmol/L)	35.9 ± 17.73	38.4 ± 18.69	33.87 ± 16.63	0.158
Aldosterone concentration (pg/ml)	245.76 ± 191.55	250.32 ± 222.51	241.96 ± 161.1	0.795

Note: BMI: Body Mass Index; $P < 0.05$ is statistically significant

2.2. Examination method

All PA patients underwent AVS examination in the catheterization laboratory of our hospital. The procedures were performed in the morning, assisting patients to complete various examination items, keeping them in a supine position on a trolley, and then transferring them to the catheterization laboratory. Doctors followed corresponding protocols to collect adrenal venous blood, which was then sent for testing to evaluate the specific concentration of cortisol and aldosterone content. After the procedure, the venous catheter sheath was removed directly, and reasonable hemostasis and compression were applied, and then the patient was transferred back to the ward.

3. Results

Among all patients, 145 cases successfully completed the entire examination process, while 2 cases failed to collect blood during the puncture of the right adrenal vein. Among them, 61 cases were diagnosed with idiopathic aldosteronism and treated with long-term oral medication; 84 cases were diagnosed with aldosterone adenoma, showing unilateral dominant secretion and adrenal CT suggesting ipsilateral nodules or adenomas, which were transferred to urology surgery after excluding surgical contraindications. None of the 145 patients developed complications such as adrenal vein rupture and bleeding, dissection, thrombosis, infarction, etc. However, in the 2 unsuccessful cases, adrenal vein rupture and hematoma formation occurred, manifesting as significant lumbosacral pain reported by the patients. During angiography, local retention of the contrast agent was observed, and the procedure was stopped to prevent further complications. **Figure 1** shows the complications of right adrenal vein rupture and hematoma formation in AVS patients.

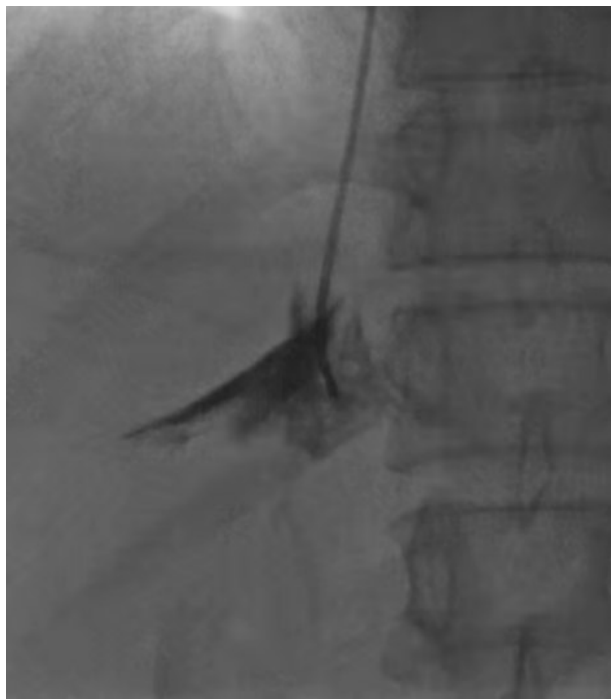


Figure 1. Complication: Hematoma formation due to rupture of the right superior adrenal vein

4. Nursing care

4.1. Preoperative care

4.1.1. Routine preoperative preparation

Assist in completing various examinations and intermittently evaluate electrolyte values. If blood magnesium or potassium levels are low, leading to decreased myocardial excitability in patients, corrections need to be made. Ensure that patients have not used diuretics or nifedipine and other similar drugs for one month prior to surgery. One day before surgery, prepare for the procedure and conduct an iodine allergy test, carefully recording the results. Demonstrate bedpan use and have patients master the relevant training points. Instruct patients to defecate before entering the catheterization laboratory.

4.1.2. Special preoperative preparation

Adrenal venous blood sampling should be scheduled between 9:00 and 10:00 AM. Inform patients and their families of the importance of the surgery time for accurate test results, ensuring that family members are available on time. Patients should change into hospital gowns and empty their bladders ahead of time. Nurses should communicate with the catheterization laboratory and relevant medical staff beforehand to ensure timely surgery. Patients are required to lie flat and rest starting from 11 PM the night before surgery until they are transferred to the operating room. On the morning of the AVS examination, a nurse will perform a puncture on the right median cubital vein. If the median cubital vein cannot be punctured, the right basilic vein or right cephalic vein will be punctured instead. After a successful puncture, the needle will be secured, and patients will be instructed to keep their right upper limb straight. Figure 2 shows the results of the elbow vein puncture.

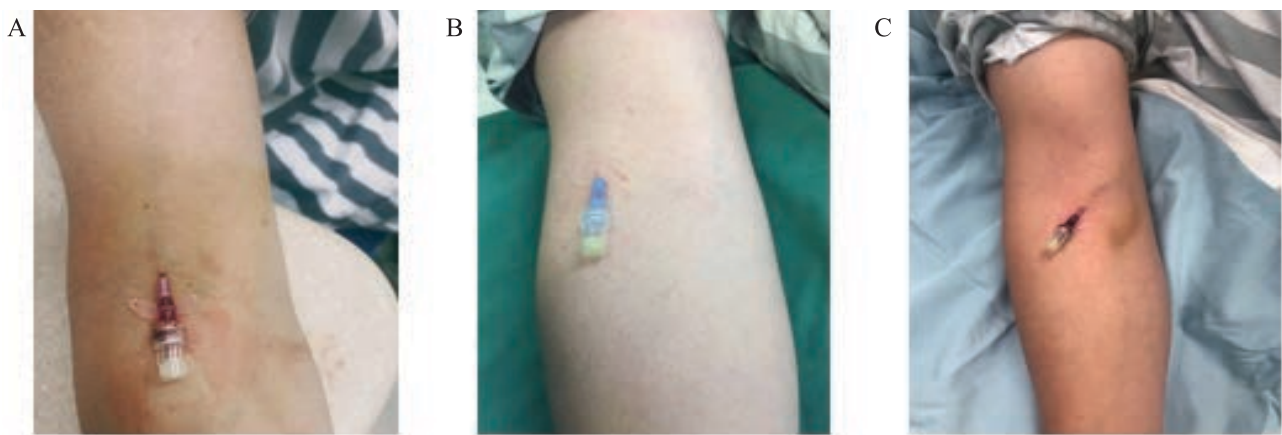


Figure 2. Indwelling needle condition for elbow blood vessel puncture. A. Median cubital vein (121 cases); B. Cephalic vein (10 cases); C. Basilic vein (16 cases)

4.1.3. Psychological care

Health education informs patients and their families about the minimally invasive, safe, and mature nature of the surgery and introduces interventional knowledge related to the surgery. Patients generally have a basic understanding of this technology, but when faced with complex and invasive procedures, their negative psychological state becomes more apparent. Therefore, it is necessary to combine knowledge education with manuals or videos explaining various knowledge points, such as the entire examination process, operating techniques, and cooperation methods, so that patients can efficiently cooperate with related operations, reasonably adjust their body positions, etc., and improve their understanding and awareness of the surgery.

4.2. Intraoperative care

4.2.1. Patient monitoring

Assist the patient to lie in a supine position, provide nasal cannula oxygen inhalation at 3L/min if necessary, closely observe vital signs, and keep records.

4.2.2. Adrenal vein blood sampling has high sensitivity and specificity

Surgeons place a catheter under the guidance of digital subtraction angiography (DSA), specifically in the inferior

vena cava, puncturing along the right median vein. Use a 5FJR5 catheter and moderately dilute the contrast agent iohexol, with a specific dose of 5 to 10 mL. After injection, observe the situation and wait for the liquid inside the catheter to slowly drip out, about 15–20 drops, to ensure that the blood is not diluted and the accuracy of the results. Then, the nurse takes at least 2 mL of blood from each part of the accurately checked test tube, detecting aldosterone and cortisol concentrations. Attention should be paid to aseptic operation during the blood collection process, and changes in the speed of blood dripping and patient movement should be monitored to avoid displacement of the catheter during the blood collection process. If necessary, it is recommended that the surgeon perform digital subtraction angiography (DSA) again to check whether the catheter has shifted position, ensuring accuracy before continuing blood collection. Abnormalities should be promptly reported to the physician and operator to stop the operation for rescue. In this study, there were 2 cases of right adrenal vein rupture and hematoma formation. The pain could be gradually relieved in 2–5 days after observation or analgesic treatment. Therefore, when the dedicated doctor injects the contrast agent, it should be pushed slowly. If the vein elasticity is relatively poor, and the course of hypertension is relatively long, the vein is relatively thin, then the pressure value during injection should be reduced to avoid rapid injection to prevent bleeding and other situations.

4.3. Postoperative care

4.3.1. Patient resting

After the patient is transferred to the ward, they are instructed to lie down for 1 hour. If there is no discomfort, they can try to sit up, then get out of bed as soon as possible. Strenuous exercise, fist clenching, and support movements are not allowed. Lifting heavy objects and bending the operative limb are prohibited, keeping it in a naturally relaxed state. Puncture the right median vein of the elbow to shorten the duration of immobilization or bed rest. For patients with complications, one case had a ruptured adrenal vein. After returning to the ward, an emergency bedside abdominal ultrasound was performed, and no hematoma was found. The patient felt moderate pain. Psychological comfort was provided, and the patient was monitored hourly for blood pressure. The pain could be relieved the next day. Another case had a ruptured adrenal vein with hematoma formation. The patient complained of severe pain and sweating. Symptomatic treatment with analgesic drugs was prescribed according to the doctor's advice, along with psychological comfort. The patient's blood pressure was measured every 30 minutes. After the pain was relieved, pain assessment and blood pressure measurement were performed every 6 hours. The patient's pain was completely relieved after 5 days. After surgery, each patient underwent pain assessment, and their blood pressure was regularly evaluated. Any abnormalities in the results need to be reported to the doctor immediately to maximize the prevention of adverse events and implement symptomatic treatment as soon as possible.

4.3.2. Patient monitoring

For patients who experience discomfort after the procedure, bedside electrocardiogram, blood pressure, and finger pulse oximetry monitoring should be conducted. Vital signs should be closely observed and recorded. If there are any abnormalities, doctors should be promptly notified. Hydration therapy should be administered, and patients should be advised to drink large amounts of water frequently, with a daily intake exceeding 1500 mL to prevent abdominal distension due to water intake. Intravenous fluid replacement can also be used to quickly clear the contrast agent from the body and prevent it from affecting renal function^[7]. A bland diet with a focus on vegetables or high-protein foods is encouraged to accelerate the excretion of the contrast agent and effectively reduce the occurrence of contrast-induced nephropathy (CIN). Patient information such as age and renal function directly

affects their tolerance to contrast agents, so it is necessary to screen for adverse factors, increase the frequency of inspections, and promptly perform additional tests and treatments if there are abnormalities in multiple renal function indicators such as a significant reduction in urine output or elevated blood urea nitrogen levels, which may indicate concurrent renal toxicity.

5. Discussion

5.1. Procedure

AVS is recognized as the gold standard for diagnosing primary aldosteronism and performing functional classification, providing strong evidence for determining treatment plans for PA patients. In this study, it was observed that patients who underwent puncture of the median cubital vein or basilic vein could successfully insert the guidewire. However, a small number of patients who underwent cephalic vein puncture were unable to advance the guidewire into the vein, requiring a switch to basilic vein puncture during the procedure, which increased the examination time^[8]. Additionally, when puncturing the median cubital vein, the direction of the puncture needle toward the basilic vein resulted in less time required for guidewire and catheter insertion compared to puncturing toward the cephalic vein. This difference was mainly due to reduced time spent on repeated adjustments of the guidewire and catheter directions. The reason for this may be that the basilic vein is relatively straight and has fewer venous valves, while the cephalic vein has a smaller and more uneven lumen, and the presence of a certain angle when it joins the axillary vein can easily cause the catheter to bend^[9-10]. To avoid repeated punctures and reduce the time required for guidewire and catheter insertion into the vena cava, priority should be given to puncturing the median cubital vein or basilic vein, followed by the cephalic vein. When puncturing the median cubital vein, the direction of the puncture needle should be biased toward the basilic vein.

5.2. Nursing

During the nursing period, nurses are required to have a clear understanding of the operational methods and key skills involved in the entire examination process, allowing them to flexibly respond to common situations. Psychological intervention should be provided before the surgery to eliminate patients' blind spots regarding relevant knowledge, enabling them to efficiently cooperate with the relevant procedures, prevent negative emotions, reduce blood pressure fluctuations, and alleviate a series of negative impacts such as nervousness, fear, and rapid heart rate. During the surgery, nurses should reasonably control the injection speed to prevent venous rupture, prevent complications such as back pain, closely monitor the patient's vital signs and abnormalities, comfort and encourage the patient, and remind them to maintain a supine position to ensure efficient completion of the surgery and shorten the operation time. After the surgery, nurses should closely observe whether any complications occur, guide patients in hydration therapy to eliminate residual contrast agents in the body and reduce the risk of kidney disease, and provide postoperative health education to patients. Rigorous specialized nursing is crucial to ensure the smooth progress of the patient's blood collection surgery, shorten the operation time, and prevent postoperative complications.

6. Conclusion

By optimizing preoperative scheduling, enhancing psychological support, and ensuring seamless intraoperative collaboration, surgical efficiency can be significantly improved. Prioritizing median cubital or basilic vein

puncture—with needle direction favoring the basilic vein—further reduces procedure time, minimizing patient discomfort (e.g., back pain). Postoperative monitoring and specialized nursing care are critical to lowering complication risks. These strategies collectively enhance patient outcomes and surgical safety.

Disclosure statement

The authors declare no conflict of interest.

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The Impact of Postpartum Urinary Incontinence on the Quality of Life, Stigma, and Postpartum Depression of Postpartum Women in Quanshan and Daqinjia Community Health Services Center

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Abstract: *Background:* This study aimed to investigate the prevalence of PPUI, factors influencing it, and its association with quality of life, stigma, and postpartum depression. PPUI is generally linked to a low quality of life and poor mental health, though related studies from China are limited. *Methods:* The study involved postpartum women within 6 months in two communities of Zhaoyuan City. A quantitative, descriptive design was used, assessing PPUI, quality of life, stigma, and postpartum depression using the ICIQ-SF, I-QOL, SIS, and EPDS scales. Data collection included personal and postpartum life information. *Results:* The prevalence of PPUI was 31.37%. Women with PPUI had significantly lower quality of life and higher stigma compared to those without PPUI, with severity linked to worse outcomes ($P < 0.001$). While the impact on postpartum depression was not statistically significant ($P = 0.59$), moderate PPUI was associated with higher depression scores ($P = 0.003$). Multivariate analysis showed that PPUI severity significantly affected quality of life, stigma, and postpartum depression (Wilk's Lambda = 0.494, $P < 0.001$). Women with moderate incontinence reported the worst quality of life, highest stigma, and more severe depression symptoms. *Conclusion:* Postpartum urinary incontinence significantly impacts quality of life and stigma, with moderate symptoms linked to increased postpartum depression. Early intervention and support from family and community are crucial for recovery. Strengthening pelvic floor training, raising public awareness, and reducing stigma are recommended. Further studies should explore the relationship between PPUI and postpartum depression and develop interventions to improve quality of life.

Keywords: Postpartum urinary incontinence (PPUI); Quality of life; Stigma; Postpartum depression; Maternal health

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1. Introduction

Historically, childbearing and childrearing were viewed as inherent social duties for women, with little regard for

the physical and psychological toll these responsibilities entail. As women's rights and health awareness grew, more began voicing the challenges of pregnancy and postpartum periods, shedding light on issues like postpartum urinary incontinence (PPUI). While societal recognition of PPUI's impact has increased, its effects on postpartum women's overall quality of life, especially psychologically and socially, remain understudied, particularly within the Chinese cultural context.

The International Continence Society (ICS) defines urinary incontinence (UI) as involuntary urine leakage, including stress (SUI), urge (UII), and mixed (MUI) types, with SUI being most common^[1]. The World Health Organization (WHO) specifies PPUI as pregnancy/childbirth-related involuntary urine loss in the postpartum period, causing physical, psychological, and emotional harm that disrupts women's daily lives. PPUI can manifest as any UI type, not limited to specific categories.

Existing PPUI research primarily focuses on physical symptoms and treatments, neglecting its psychological, emotional, and social impacts. A key gap exists in understanding how PPUI affects quality of life and its interplay with social stigma and postpartum depression. Globally, pregnancy-related UI prevalence ranges from 11.4% to 84.5%, linked to prior UI history, instrumental delivery, and alcohol use, while China reports a 36.4% rate^[2-3]. Pelvic floor therapy is an effective first-line treatment for alleviating symptoms and improving well-being^[4]. However, some studies only focus on prevalence and medical interventions, ignoring psychological and social consequences^[5-6]. Though Hermansen's study touched on PPUI's impact on physical and emotional well-being, their analysis lacked cultural nuance^[7]. Swenson et al. acknowledged a correlation between PPUI and postpartum depression but called for deeper exploration of mechanisms and cultural influences^[8].

PPUI imposes significant mental distress and social stigma, discouraging women from seeking care. Societal and self-stigma lead to social withdrawal and worsened mental health, with embarrassment often delaying treatment^[9-10]. Research shows women with UI experience anxiety, isolation, and hopelessness, and many avoid professional help due to shame^[11-12]. Community values and self-stigma further drive symptom concealment, hindering self-assessment and care-seeking^[13].

Studies link PPUI to postpartum depression. Research has noted a 30% higher PPUI risk in depressed women^[8]. Suar et al. found women with postnatal UI had higher Edinburgh Postnatal Depression Scale scores, highlighting PPUI's dual psychological and social harm^[14]. In China, cultural beliefs like "women are weak, but mothers are strong" pressure women to downplay issues like UI, while family focus shifts to the newborn after childbirth can exacerbate psychological strain. Hormonal changes and physical vulnerability during this period compound the impact on quality of life.

This study addresses these gaps by investigating PPUI prevalence in China, its effects on physical, psychological, and social quality of life, and its relationship with stigma and postpartum depression. By emphasizing cultural influences, it aims to inform holistic healthcare interventions for postpartum women.

2. Methods

2.1. Research design

This study employed a quantitative descriptive correlational design to examine the impact of postpartum urinary incontinence (PPUI) on postpartum women by exploring relationships between PPUI severity, quality of life, stigma, and postpartum depression. As defined by Williamson, quantitative research involves empirical, formal, and objective analysis of numerical data, making it suitable for describing patterns and correlations in this context. The descriptive approach, as outlined by the Office of Human Research Protections (OHRP), allowed non-experimental observation

of participants' health status, behaviors, and attitudes in their natural setting, focusing on three primary outcomes: postpartum quality of life scores, stigma levels due to PPUI, and postpartum depression scores.

The design phase involved defining research objectives, selecting validated instruments, and implementing systematic sampling to ensure representativeness. The researcher acted as both designer and interpreter, overseeing study procedures from conceptualization, including identifying demographic and pregnancy-related variables for subgroup comparisons (age, education, parity, mode of delivery), to data interpretation. By using a correlational framework, the study aimed to describe how PPUI influences psychosocial outcomes without intervening in participants' environments, aligning with the descriptive design's focus on naturalistic observation. This approach facilitated understanding of PPUI's multifaceted impact and informed recommendations for clinical practice and policy, enhancing awareness of postpartum health concerns.

2.2. Research participants

The study population comprised postpartum women from two community health service centers in Zhaoyuan City, Shandong Province: Quanshan Street Community Service Center and Daqinjia Health Center. Eligibility criteria included women aged 20–35 who had delivered vaginally or via cesarean section within six months of the study start, attended regular prenatal check-ups, and provided informed consent. Exclusion criteria targeted confounding factors such as preexisting medical conditions, preterm/post-term deliveries, multiple pregnancies, or severe perinatal complications, ensuring a homogenous sample to minimize bias.

Systematic sampling was used to select participants from the medical records of eligible women. Using the Raosoft sample size calculator with a 5% margin of error and 95% confidence interval, the required sample size was determined as 153 participants (87 from Quanshan, 66 from Daqinjia). This probability-based method offered simplicity and reduced sampling error compared to simple random sampling. Community health staff assisted in compiling participant lists, and systematic intervals were applied to select records, ensuring representativeness across demographic and obstetric categories. Verbal consent was obtained via telephone, followed by formal consent through an online questionnaire's "Agree" button, ensuring participants understood study procedures, risks, and their rights to withdraw.

2.3. Data collection

Data collection occurred in 2024 over approximately one month, involving validated instruments and structured procedures. Five questionnaires were used:

General information questionnaire (GIQ): Developed by the researcher, collecting demographic (age, education, residence) and obstetric (parity, delivery mode, postpartum duration) data.

International continence counselling questionnaire Short Version (ICIQ-SF): Assessed PPUI severity via frequency/volume of leakage and quality of life impact, with proven reliability (Cronbach's $\alpha \geq 0.71$) in Chinese populations^[15].

Incontinence quality of life questionnaire (I-QOL): Evaluated quality of life across behavioral, psychological, and social domains, translated into Chinese with $\alpha = 0.93$ ^[16–17].

Social influence scale (SIS): Measured stigma through social exclusion, economic discrimination, and internalized shame, adapted for Chinese UI patients with $\alpha = 0.883$ ^[18–19].

Edinburgh postnatal depression scale (EPDS): Screened for postpartum depression with 10 self-reported items, validated in mainland China ($\alpha = 0.79$)^[20].

Data collection procedures included:

Ethical approval: Secured from the Far Eastern University ethics review board and the health centers.

Participant recruitment: Community staff identified eligible women via medical records, with researchers contacting them for consent.

Online data collection: Participants completed questionnaires via WeChat or text links in supervised online meetings, ensuring anonymity and self-completion. Cameras were used to verify participation, and responses were stored on password-protected systems to maintain confidentiality.

2.4. Statistical Analysis

Data were analyzed using JASP, with descriptive and inferential statistics employed to address research objectives.

Descriptive Statistics: Frequencies and percentages characterized demographic distributions and PPUI prevalence (Tables 1 and 2). Means and standard deviations summarized scores for ICIQ-SF, I-QOL, SIS, and EPDS, while medians described PPUI severity to mitigate skew (Tables 3 and 4).

Bivariate analysis: Chi-square tests examined associations between demographic/pregnancy variables and PPUI prevalence (Table 1). Brown-Forsythe test compared mean scores on quality of life, stigma, and depression between PPUI and non-PPUI groups (Table 4).

Multivariate analysis: Analysis of variance (ANOVA) assessed differences in outcomes across subgroups (e.g., age, parity), and multivariate analysis of variance (MANOVA) explored combined effects of PPUI severity on all three dependent variables (quality of life, stigma, depression), providing a comprehensive view of relationships (Table 5).

2.5. Ethical considerations

Ethical principles of respect, beneficence, and justice guided the study, prioritizing participant welfare and rights.

Informed consent: Participants received detailed verbal and written explanations (via questionnaire preambles) about study purposes, procedures, and risks, with the right to withdraw at any time without penalty.

Confidentiality: Data were anonymized, with questionnaires coded instead of named, and stored on encrypted, password-protected systems accessible only to the researcher. Identifiable data were deleted post-analysis, and backups were secured on separate servers.

Beneficence: Potential risks (e.g., psychological discomfort from discussing health issues) were minimized by providing access to counseling resources. Benefits included increased awareness of PPUI and improved social support through study participation.

Justice: Sampling was non-discriminatory, based solely on inclusion/exclusion criteria, ensuring equitable participation. Findings were disseminated to participants and community stakeholders via brochures, social media, and health center meetings, promoting practical applications and reducing stigma.

Transparency: Participants were informed of study progress and results, with an open dissemination plan including academic publications and community engagement to ensure accountability and public benefit.

Throughout the process, ethical review boards and health center partnerships ensured compliance with international standards, safeguarding participant autonomy and data integrity while advancing understanding of postpartum women's health needs.

3. Results

A total of 168 questionnaires were collected in this study, with 153 valid responses yielding an effective response rate of 91.1%. Based on the ICIQ-SF questionnaire (score ≥ 4 indicating urinary incontinence), 48 participants were diagnosed with postpartum urinary incontinence (PPUI), resulting in a prevalence rate of 31.37%.

The analysis of demographic characteristics showed that the majority of participants (56.9%) were aged 26–30 years, while the highest PPUI prevalence (41.3%) was observed in the 31–35 age group, though this age-related difference was not statistically significant ($P=0.166$) (**Table 1**). Participants were nearly evenly distributed between urban (55.6%) and rural (44.4%) areas, with comparable PPUI prevalence rates between these groups (urban: 30.6%; rural: 32.4%; $P=0.815$). Educational attainment was high among participants, with over 90% having college-level education or higher. While the highest PPUI prevalence (44.4%) occurred in the high school education group, differences across education levels were not statistically significant ($P=0.295$).

Clinical factors revealed significant associations with PPUI prevalence. Only 2.6% of participants reported three or more deliveries, but multiparity showed a strong correlation with PPUI ($P<0.001$). The cesarean section rate was 34% in this cohort, with vaginal delivery associated with significantly higher PPUI prevalence (39.6%) compared to cesarean delivery (15.4%; $P=0.02$). Neonatal birth weight analysis showed that 87.6% of infants fell within the normal weight range (2500–4000 g), while the macrosomia group (>4000 g) demonstrated the highest PPUI prevalence (71.4%; $P=0.02$).

Regarding postpartum duration, PPUI prevalence peaked in the first month postpartum (72.2%) and showed a significant decline over time ($P<0.001$), indicating a natural improvement pattern in UI symptoms during the postpartum recovery period.

Table 1. Demographic profile and PPUI prevalence of postpartum women ($n = 153$)

Profile	Frequency (%)	PPUI prevalence		
		Prevalence (%)	χ^2	P
Age group			3.59	0.166
20–25	20(13.07)	4(20.00)		
26–30	87(56.86)	25(28.73)		
31–35	46(30.07)	19(41.30)		
Place of residence			0.055	0.815
Countryside	68(44.44)	22(32.35)		
Urban area	85(55.56)	26(30.59)		
Educational attainment			3.705	0.295
Postgraduate	12(7.84)	2(16.67)		
Undergraduate	55(35.95)	14(25.45)		
Technical college	77(50.33)	28(36.36)		
Senior high school	9(5.88)	4(44.44)		
Parity			20.823	<0.001
1 time	77(50.33)	13(16.88)		
2 times	72(47.06)	31(43.06)		
≥ 3 times	4(2.61)	4(100)		

Table 1 (Continued)

Profile	Frequency (%)	PPUI prevalence		
		Prevalence (%)	χ^2	P
Latest delivery method			9.352	0.02
Cesarean section	52(33.99)	8(15.38)		
Natural birth	101(66.01)	40(39.60)		
Birth weight of newborn			11.614	0.003
≤2500 g	5(3.27)	1(20.00)		
2500 g–4000 g	134(87.58)	37(27.61)		
≥4000 g	14(9.15)	10(71.43)		
Postnatal period			27.422	<0.001
Within 1 month	18(11.77)	13(72.22)		
1~2 months	29(18.95)	12(41.38)		
2~3 months	22(14.38)	9(40.91)		
3~4 months	22(14.38)	6(27.27)		
4~5 months	31(20.26)	6(19.35)		
5~6 months	31(20.26)	2(6.45)		

Table 2. Frequency distribution of severity level of urinary incontinence among postpartum women ($n = 153$)

Severity level	$n = 153$	%
No incontinence	71	46.41
Slight	63	41.18
Moderate	18	11.77
Severe	1	0.65
Very severe	0	0

Note: 0.00–0.99 = No incontinence, 1.00–5.99 = Slight, 6.00–12.99 = Moderate, 13.00–18.99=Severe, 19.00–21.00 = Very severe

Table 3 presents the scores for quality of life (I-QOL), social stigma (SIS), and postnatal depression (EPDS) among the study participants. The average I-QOL score was 86.02 (SD = 5.80, median = 87.50), indicating generally high quality of life ratings among postpartum women. The distribution of scores showed that most participants fell within the upper range of the quality of life scale.

The social stigma assessment yielded an average SIS score of 32.24 (SD = 4.70, median = 31.00), suggesting relatively low levels of perceived stigma among the study population. The score distribution revealed minimal variation across participants, with the majority clustering in the lower range of the stigma scale.

For postpartum depression symptoms, the average EPDS score was 4.69 (SD = 2.49, median = 4.00). According to standard EPDS interpretation guidelines, these scores predominantly fell below the threshold for clinically significant depressive symptoms. The data showed that most participants reported only mild depressive

symptoms during the postpartum period.

The results demonstrate consistent patterns across all three measures, with participants generally reporting favorable outcomes in quality of life, minimal social stigma, and mild depressive symptoms. The score distributions for each measure followed similar trends, with the majority of responses concentrated in the positive ranges of each scale.

Table 3. Descriptive statistics for I-QOL, SIS, and EPDS scores among postpartum women ($n = 153$)

Variable	M	SD	Median	Verbal interpretation
I-QOL score	86.02	5.80	87.50	High
SIS Score	32.24	4.70	31.00	Low
EPDS score	4.69	2.49	4.00	Low

Note: In I-QOL scale: Below 40 = Very low quality of life, with severe impact from incontinence; 40–59 = Low quality of life, with significant impact from incontinence on daily life, 60–79 = Moderate quality of life, with some noticeable impact from incontinence, 80–100 = High quality of life, with minimal impact from incontinence; In SIS scale: 24.00–47.00 = Low social impact, 47.01–71.00 = Moderate social impact, 71.01–96 = High social impact; In EPDS scale: 0–9 = Low likelihood of depression, 9.01–12 = Mild symptoms of depression, 12.01–19.00 = Moderate likelihood of depression, 19.01–30.00 = High likelihood of depression

Table 4 presents the comparative analysis of I-QOL, SIS, and EPDS scores between the PPUI group and the healthy control group. The results showed statistically significant differences between groups for quality of life and social stigma measures, while no significant difference was found for postpartum depression scores.

The quality of life assessment revealed significantly lower I-QOL scores in the PPUI group ($M = 6.23$, $SD = 2.72$) compared to the healthy group ($M = 0.97$, $SD = 1.41$), with a large effect size ($t = 12.66$, $P < .001$, Cohen's $d = 2.43$). This substantial difference indicates markedly reduced quality of life among women experiencing PPUI.

For social stigma, the PPUI group reported higher SIS scores ($M = 34.79$, $SD = 6.48$) than the healthy group ($M = 31.08$, $SD = 3.00$), demonstrating a statistically significant difference with a large effect size ($t = 3.79$, $P < .001$, Cohen's $d = 1.75$). These results suggest greater perceived stigma among women with PPUI.

The analysis of postpartum depression symptoms showed no statistically significant difference between groups ($t = 0.54$, $P = 0.59$, Cohen's $d = 0.094$). The PPUI group's mean EPDS score was 4.85 ($SD = 2.67$), while the healthy group's was 4.62 ($SD = 2.42$), indicating similar levels of depressive symptoms regardless of PPUI status. The minimal effect size suggests PPUI has a limited direct association with postpartum depression scores in this sample.

Table 4. Comparison of quality of life, stigma, and postpartum depression between postpartum women with and without urinary incontinence ($n = 153$)

Variable	With		Without		Welch t (df)	P	Cohen's d	Remark
	M	SD	M	SD				
I-QOL score	6.23	2.72	0.97	1.41	12.66 (58.91)	<.001	2.43	Reject H_0
SIS score	34.79	6.48	31.08	3.00	3.79 (56.41)	<.001	1.75	Reject H_0
EPDS score	4.85	2.67	4.62	2.42	0.54 (151)	0.59	0.094	Do not reject H_0

Note: Brown-Forsythe test is significant ($P < .05$), suggesting a violation of the equal variance assumption, hence, Welch t correction was used; $P < .05$, $P < .01$, $P < .001$

The multivariate analysis of variance (MANOVA) results (**Table 5**) demonstrated a significant association between postpartum urinary incontinence (PPUI) severity and quality of life, stigma, and postpartum depression (Wilk's Lambda = 0.494, $F(6,294) = 20.74$, $P < 0.001$).

For quality of life (I-QOL), **Figure 1** displays progressively lower scores with increasing UI severity: no UI group ($M = 89.13$, $SD = 3.05$), slight UI group ($M = 85.43$, $SD = 4.45$), and moderate UI group ($M = 76.45$, $SD = 6.65$). The between-group differences were statistically significant ($P < 0.001$), showing a clear inverse relationship between symptom severity and quality of life.

Regarding social stigma (SIS), **Figure 1** illustrates significantly higher scores with greater UI severity: no UI ($M = 30.32$, $SD = 2.77$), slight UI ($M = 31.19$, $SD = 4.21$), and moderate UI ($M = 39.50$, $SD = 5.11$). These between-group differences were statistically significant ($P < 0.001$).

For postpartum depression (EPDS), while no significant difference emerged between no UI and slight UI groups ($P = 0.084$), the moderate UI group showed significantly higher scores ($M = 6.22$, $SD = 2.88$) compared to other groups ($P = 0.003$). The EPDS results revealed more nuanced differences, with the most pronounced contrast appearing between the no UI and moderate UI groups.

The analysis consistently showed that women with moderate UI reported the poorest quality of life, highest stigma levels, and most severe depressive symptoms compared to no UI and slight UI groups. The I-QOL and SIS measures demonstrated significant differences across all severity levels, while EPDS differences were primarily evident between the no UI and moderate UI groups.

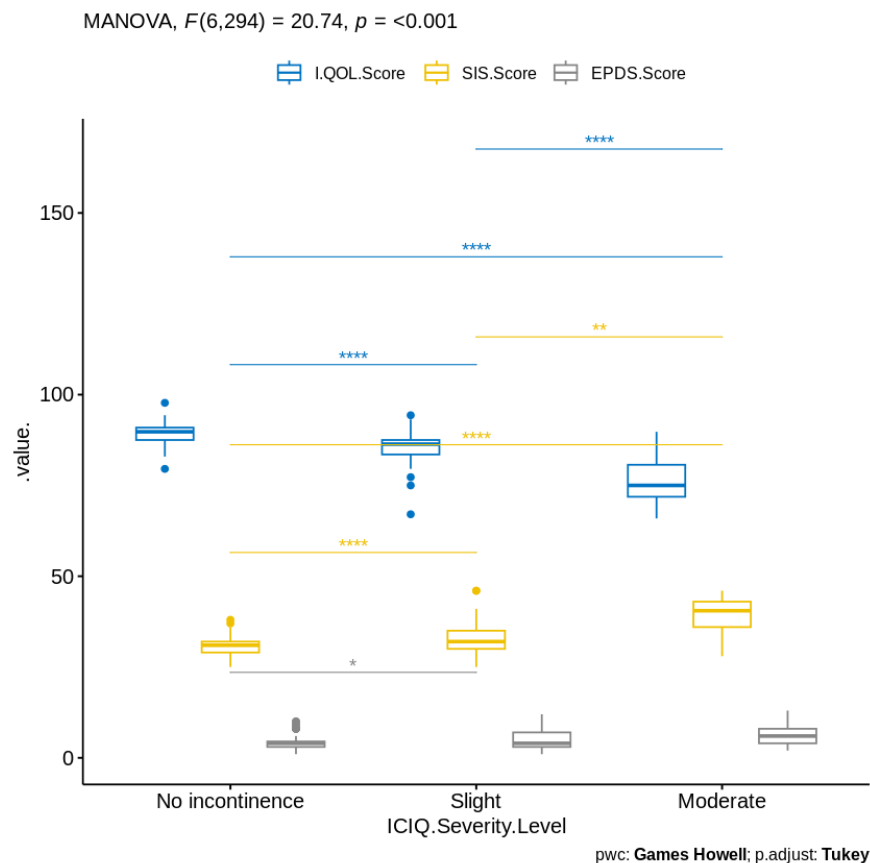


Figure 1. Comparison of quality of life, stigma, and depression scores across different postpartum urinary incontinence severity levels

Table 5. Multivariate analysis of variance of urinary incontinence predicting quality of life, stigma, and postpartum depression experienced by postpartum women ($n = 153$)

Variable	No UI ($n = 71$)		Slight UI ($n = 63$)		(3) Moderate UI ($n = 18$)		ANOVA		Tukey's HSD pairwise comparison		
	M	SD	M	SD	M	SD	P	P ^r	1 vs. 2	1 vs. 3	2 vs. 3
I-QOL Score	89.13	3.05	85.43	4.45	76.45	6.65	<.001	<.001	<.001	<.001	<.001
SIS Score	30.32	2.77	31.19	4.21	39.50	5.11	<.001	<.001	.012	<.001	<.001
EPDS Score	4.07	2.04	4.97	2.66	6.22	2.88	.002	.006	.084	.003	0.131
MANOVA		Wilk's Lambda = 0.494, $F(6,294) = 20.74$, $P < .001$									

Note: $P < 0.05$, $P < 0.01$, $P < .001$. UI is urinary incontinence. ANOVA P is for one-way univariate ANOVA, ANOVA P^r is for one-way univariate Welch's ANOVA

4. Discussion

This study's findings collectively provide a comprehensive understanding of postpartum urinary incontinence (PPUI) and its impact on postpartum women's health and well-being.

Regarding the prevalence of PPUI, the results indicate that it is predominantly influenced by labor-related factors. Multiparity, vaginal delivery, a newborn weight exceeding 4000 grams, and earlier postpartum periods are associated with higher PPUI rates, consistent with previous research ^[22–23]. The cumulative damage to pelvic floor muscles during multiple pregnancies or births likely contributes to this increased risk. Moreover, the decline in PPUI prevalence and severity over time aligns with the notion of symptom remission during the recovery process, which may be attributed to the repair of pelvic floor tissues and the gradual restoration of muscle function ^[24]. In contrast, demographic factors such as age, residence, and education level did not show significant associations with PPUI. The high education level of the sample, which might imply greater health awareness, did not reduce the risk of PPUI, emphasizing that biological factors related to childbirth play a dominant role. These insights are crucial for developing targeted screening and intervention strategies, especially for women with multiple births, vaginal deliveries, or macrosomic infants.

In terms of the severity of PPUI, most postpartum women experience mild to moderate symptoms, in line with prior studies indicating that early-stage symptoms are often mild and may improve naturally ^[25]. Slight incontinence, typically resulting from short-term pelvic floor dysfunction, can often resolve through natural recovery or early interventions like rehabilitation exercises, highlighting the importance of accessible clinical interventions to facilitate pelvic floor recovery ^[26]. However, moderate incontinence, affecting 11.77% of the sample, poses significant risks to quality of life and mental health, consistent with research linking moderate and severe incontinence to stigma and postpartum depression ^[10–11]. Such cases require personalized care that integrates psychological support and medical interventions to mitigate the negative impacts on mental health. The low number of severe incontinence cases may be due to the relatively high health awareness of the study sample, as many participants had higher education, and better access to postpartum care, which may have reduced the risk of severe PPUI. Nevertheless, severe cases still demand long-term, comprehensive management, including professional rehabilitation or surgical treatment, to achieve substantial symptom improvement.

The assessment of quality of life (I-QOL), social stigma (SIS), and postpartum depression (EPDS) reveals complex relationships. Overall, most postpartum women reported a high quality of life (I-QOL), which aligns with

previous research^[27]. However, this may mask underlying psychological distress, as some women might cope with symptoms through avoidance or social adaptation rather than seeking support. Social and familial support likely play a role in alleviating distress, emphasizing their importance in postpartum care. The low SIS scores suggest limited social stigma associated with PPUI, consistent with Jones, possibly due to increased societal understanding of postpartum health^[28]. However, cultural factors may influence this result, as traditional norms that prioritize newborn care and privacy may lead women to underreport symptoms or manage them silently, potentially underestimating the true impact of stigma. The overall mild depressive symptoms indicated by the EPDS scores are consistent with other studies, but they highlight the need for targeted interventions for at-risk individuals, given that postpartum depression is influenced by multiple factors, including physical recovery, social support, and psychological state^[29–30].

Comparing the PPUI group with the healthy group, significant differences were observed in I-QOL and SIS scores, but not in EPDS scores. The substantial decrease in I-QOL scores and increase in SIS scores among the PPUI group, as reported in previous research, highlight the negative impact of PPUI on daily life and the amplification of social stigma^[31–32]. The large effect size for quality of life underscores the need for early clinical interventions, such as physical therapy and psychological support, to mitigate these effects. The elevated stigma scores suggest that societal attitudes and misconceptions about PPUI may exacerbate women's psychological burden, necessitating targeted health education to reduce stigma and encourage help-seeking. The lack of a significant association between PPUI and postpartum depression indicates that while PPUI affects well-being, other factors, such as social support, economic status, and pre-existing mental health, play a more significant role in postpartum depression^[33]. This finding reflects the multifactorial nature of postpartum depression, where biological, psychosocial, and environmental factors interact.

This study has several limitations. The sample, sourced from Quanshan and Daqinjie community health centers, may lack generalizability to broader populations and regions, while financial and logistical constraints restricted sample size, potentially reducing result representativeness. The one-month data collection period also precluded long-term impact assessment. Additionally, relying on self-reported questionnaires introduced response bias, and the study did not account for confounding variables such as social support, income, cultural attitudes, and psychological factors, which may have influenced the associations between postpartum urinary incontinence (PPUI), quality of life, stigma, and postpartum depression. Future research should address these aspects.

In conclusion, this study provides valuable insights into PPUI, its associated factors, and its impact on postpartum women's physical and mental health. The findings emphasize the importance of targeted screening, early intervention, and personalized care, especially for women at higher risk or with moderate to severe symptoms. Future research should continue to explore the complex interplay between PPUI and various factors to develop more effective strategies for improving the health and well-being of postpartum women.

5. Conclusion

This study examined the prevalence of postpartum urinary incontinence (PPUI) among 153 postpartum women and its effects on quality of life, social stigma, and postpartum depression. The PPUI prevalence was 31.37%, with significant associations found for parity, delivery mode, neonatal birth weight, and postpartum duration—multiparity, vaginal delivery, macrosomic infants, and earlier postpartum periods increased PPUI risk. Quality of life, measured by I-QOL, was significantly lower in women with PPUI, particularly those with moderate severity,

indicating detrimental effects on daily functioning and self-esteem. Social stigma (assessed via SIS) correlated positively with PPUI severity, reflecting heightened shame and social burden in women with more severe symptoms. While overall postpartum depression scores (EPDS) showed no significant difference between PPUI and non-PPUI groups, moderate PPUI was linked to higher depressive symptoms, suggesting symptom severity may amplify psychological distress.

In summary, the study highlights PPUI as a multifactorial condition influenced by childbirth-related factors, with cascading impacts on postpartum well-being: it reduces quality of life, increases social stigma, and elevates depressive risk, particularly at moderate severity levels. These findings underscore the need for early clinical screening and integrated interventions addressing physical symptoms, psychosocial support, and stigma reduction for postpartum women, especially those with moderate PPUI. Limitations include sample regionality and unmeasured confounders, calling for future large-scale studies to validate these associations across diverse populations and inform holistic care strategies.

Disclosure statement

The authors declare no conflict of interest.

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Path Analysis of the Influence of Self-Esteem Level on Disease-Related Stigma in Patients with Chronic Hepatitis B

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Abstract: This study aimed to investigate the pathways by which self-esteem affects stigma in patients with chronic hepatitis B (CHB). A survey was conducted on 201 hospitalized CHB patients at the department of infectious diseases in a tertiary hospital in Guangzhou. Data were collected using various scales and analyzed with SPSS 24.0. The findings indicated that 66.2% of patients experienced severe stigma. Self-esteem was positively correlated with stigma and its dimensions ($r = 0.175-0.341$, $P < 0.05$), emerging as a significant factor influencing stigma scores, negative self-evaluation, perceived humiliation, and secondary discrimination. Further analysis revealed that self-esteem indirectly affected stigma by mediating coping styles, perceived social support, and disease cognition. This study elucidates the mechanism of self-esteem in shaping stigma among CHB patients and provides a theoretical basis for targeted interventions.

Keywords: Chronic hepatitis B; Self-esteem level; Stigma; Influence pathway

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1. Introduction

Chronic hepatitis B virus (HBV) infection represents a significant global public health challenge, posing substantial risks to human health^[1-3]. Due to its contagious nature, individuals with chronic HBV often experience societal discrimination, leading to stigmatization^[4]. Stigma, as a negative psychological experience, not only harms mental health but also diminishes quality of life and undermines treatment adherence and prognosis^[5-10]. For example, Yu et al. demonstrated in a study of patients with schizophrenia that stigma significantly reduces the quality of life of patients, mediated by social support and coping styles^[5]. Similarly, Luo et al. reported a positive correlation between stigma and anxiety/depression in patients with inflammatory bowel disease^[10]. Among HBV carriers, Yu et al. showed that higher levels of stigma increase the risks of

treatment discontinuation and disease progression^[8]. Huang et al. also identified stigma as a critical factor affecting healthcare-seeking behaviors and quality of life^[9]. Self-esteem, defined as an individual's overall evaluation of their self-worth, plays a crucial role in coping with disease and external stressors. Existing research suggests a connection between self-esteem and stigma, although the specific mechanisms are not fully understood^[15, 18]. Given China's high burden of HBV infection, it is essential to understand the mechanisms underlying stigma in this population. This study explores the pathways through which self-esteem influences stigma in chronic hepatitis B (CHB) patients, providing insights that could inform psychological interventions.

2. Participants and methods

2.1. Participants

Using cluster sampling, 201 eligible CHB patients hospitalized in the Department of Infectious Diseases at the Third Affiliated Hospital of Sun Yat-sen University in Guangzhou from August 2018 to January 2019 were enrolled. Of 220 distributed questionnaires, 209 were returned, with 8 excluded due to incomplete data. The sample size was determined based on a pre-survey and formula calculations, with an additional 15% to ensure adequacy.

Inclusion criteria: Diagnosed with CHB, hepatitis B-related cirrhosis, or liver failure; ≥ 18 years old; literate; informed consent.

Exclusion criteria: Dementia, severe dysarthria/aphasia, co-infection with HCV/HEV/HIV, malignancy, severe dermatological or systemic diseases, or comorbid psychiatric disorders.

2.2. Methods

2.2.1. Instruments

General information questionnaire: A self-designed questionnaire covering socio-demographic data (e.g., age, gender, marital status) and disease-related information (e.g., antiviral treatment status, disease stage).

Stigma scale for chronic hepatitis B carriers: The first domestically developed scale for this population, validated for reliability and validity. It includes five dimensions (external discrimination, negative self-evaluation, perceived humiliation, illness concealment, and secondary discrimination) with 23 items rated on a 5-point Likert scale.

Social support rating scale (SSRS): Developed by Xiao Shuiyuan, this 10-item scale assesses social support across three dimensions: objective support, subjective support, and support utilization.

Simplified coping style questionnaire: Developed by Xie Yaning for Chinese populations, this 20-item tool measures active and passive coping strategies.

Rosenberg self-esteem scale (SES): Widely used in psychological research in China, this 10-item scale assesses global self-worth and self-acceptance using a 4-point rating system.

2.2.2. Data collection

After obtaining informed consent, questionnaires were administered in a quiet environment. Participants received detailed instructions and completed the questionnaires independently. Completed forms were collected on-site, checked for completeness, and verified for data quality.

2.2.3. Statistical analysis

Data were entered using Epidata and analyzed with SPSS 24.0. Normally distributed continuous variables were described as mean \pm SD and compared using *t*-tests or ANOVA; non-normally distributed variables were expressed as median (IQR) and analyzed via non-parametric tests. Pearson or Spearman correlation analyses were applied to assess variable relationships. Multiple linear stepwise regression was conducted with stigma and its dimensions as dependent variables and statistically significant factors as independent variables.

2.2.4. Quality control

Questionnaires were designed based on literature reviews and expert consultations. A pilot survey was conducted to refine the tools. Anonymous data collection was enforced, with logical, computational, and entry checks during data collection and input. Invalid responses were discarded.

3. Results

3.1. Participant characteristics

Among the 201 patients included in this study, the age range was 18–76 years, with a mean age of 43.63 ± 11.04 years. Males accounted for 82.1% of the cohort; 73.1% were employed; 90.5% were married; 49.8% had primary or middle school education; and 69.2% received antiviral therapy for HBV. Clinical diagnoses included chronic hepatitis B (52.2%), hepatitis B-related cirrhosis (28.9%), and hepatitis B-related liver failure (18.9%).

3.2. Stigma, social support, coping styles, and self-esteem

33.8% of patients reported mild stigma, while 66.2% experienced severe stigma, with a mean stigma score of 2.72 ± 0.74 . The dimensions of stigma, ranked from highest to lowest, were secrecy (3.24 ± 0.96), perceived humiliation (2.76 ± 0.88), negative self-evaluation (2.74 ± 0.97), external discrimination (2.58 ± 0.78), and secondary discrimination (2.16 ± 0.81). The total social support score was 40.48 ± 7.89 , passive coping levels showed statistically significant differences from norms ($P < 0.001$), and the self-esteem score (20.52 ± 3.89) also significantly differed from norms ($P < 0.001$). Detailed data are presented in **Table 1**.

Table 1. Current status of stigma, social support, coping styles, and self-esteem in hospitalized chronic HBV patients (n=201)

Item	n (%)	Mean \pm SD	Norm	<i>t</i>	<i>P</i>
Proportion of stigma					
Mild	68 (33.8%)				
Severe	133 (66.2%)				
Stigma score		2.72 ± 0.74			
External discrimination		2.58 ± 0.78	2.71 ± 0.72	-2.276	0.024*
Negative self-Evaluation		2.74 ± 0.97	2.87 ± 0.87	-1.995	0.052
Perceived humiliation		2.76 ± 0.88	2.85 ± 0.75	-1.425	0.156
Secrecy		3.24 ± 0.96	3.29 ± 0.76	-0.759	0.448
Secondary discrimination		2.16 ± 0.81	2.21 ± 0.68	-0.832	0.406
Social support total		40.48 ± 7.89	34.56 ± 2.73	10.64	0.000**

Table 1 (Continued)

Item	<i>n</i> (%)	Mean ± SD	Norm	<i>t</i>	<i>P</i>
Objective support		8.42 ± 2.54			
Subjective support		24.47 ± 4.85			
Support utilization		7.59 ± 3.35			
Active coping		1.73 ± 0.58	1.78 ± 0.52	-1.156	0.249
Passive coping		1.18 ± 0.058	1.59 ± 0.66	-10.015	0.000**
Self-Esteem		20.52 ± 3.89	28.75 ± 4.86	-29.95	0.000**

Note: * $P < 0.05$; ** $P < 0.001$

3.3. Correlation between self-esteem and stigma

In hospitalized patients with chronic HBV infection, stigma and its dimensions were positively correlated with self-esteem ($r=0.175-0.341$, $P < 0.05$; in **Table 2**). Self-esteem entered the multiple regression equations for the overall stigma score and the dimensions of negative self-evaluation, perceived humiliation, and secondary discrimination, with standardized partial regression coefficients of 0.201, 0.161, 0.188, and 0.160, respectively. These results confirm that stigma and its dimensions are significantly associated with self-esteem in this population ($r=0.175-0.341$, $P < 0.05$). Self-esteem positively correlated with overall stigma ($r=0.282$, $P < 0.001$) and its dimensions (negative self-evaluation: $r = 0.341$; perceived humiliation: $r = 0.262$; secondary discrimination: $r=0.178$; all $P < 0.05$).

Table 2. Correlation between stigma and self-esteem in chronic HBV patients (n=201)

Variable	Total stigma	External discrimination	Negative self-evaluation	Perceived humiliation	Confidential illness	Secondary discrimination
Self-esteem	0.282**	0.175*	0.341**	0.262**	0.193**	0.178*

Note: * $P < 0.05$; ** $P < 0.01$

3.4. Multivariate analysis

Using stigma and its dimensional scores as dependent variables, multivariate analysis revealed that subjective support and self-esteem were the primary influencing factors of stigma in hospitalized chronic HBV-infected patients. These two variables explained 10.7% of the variance in perceived humiliation (**Table 3**). Subjective support emerged as the main predictor of external discrimination. For negative self-evaluation, the significant factors included subjective support, self-esteem level, disease status (hepatitis B-related cirrhosis), active coping, and passive coping. Subjective support and self-esteem level influenced perceived humiliation, while subjective support and passive coping were associated with illness concealment. Self-esteem level directly affected secondary discrimination.

Table 3. Multivariate analysis of perceived humiliation dimension in chronic HBV patients (n=201)

Variable	β	SE	Standardized β	95%CI	<i>t</i>	<i>P</i>
Subjective support	-0.044	0.013	-0.241	-0.069~-0.019	-3.502	0.001
Self-esteem	0.043	0.016	0.188	0.012~0.073	2.730	0.007

Note: $R=0.340$, $R^2=0.115$, Adjusted $R^2=0.107$, $F=12.921$, $P < 0.001$

4. Pathways of self-esteem's influence on stigma

4.1. Mediating role of coping styles

This study found that active coping strategies in chronic HBV-infected patients were negatively correlated with stigma ($r=-0.198$, $P < 0.01$), while passive coping strategies showed a positive correlation ($r=0.268$, $P < 0.01$). These findings are consistent with those of Yin Cong et al. in schizophrenia patients and Lei Hua et al. in benign prostatic hyperplasia patients [11–12]. Self-esteem indirectly influenced stigma by moderating coping styles: patients with higher self-esteem tended to adopt active coping strategies (e.g., proactively seeking medical information, engaging in social support activities), thereby reducing negative self-evaluation [13]. For instance, the Simplified Coping Style Questionnaire developed by Xie Yaning demonstrated that active coping positively correlates with psychological adaptability, alleviating disease-related psychological stress [13]. Conversely, patients with lower self-esteem were more prone to passive coping (e.g., avoiding social interactions or denying the illness), intensifying the psychological need for illness concealment ($\beta=0.207$, $P < 0.01$) [12]. This divergence in coping styles may stem from cognitive biases regarding self-worth—individuals with higher self-esteem perceive the disease as a temporary challenge, whereas those with lower self-esteem view it as a negation of their self-value, thereby reinforcing stigma [11].

4.2. Interaction between self-esteem and perceived social support

Subjective support, as a core dimension of social support ($\beta = -0.294$, $P < 0.001$), exerts its effects through moderation by self-esteem levels [14]. Xiao Shuiyuan emphasized that subjective support reflects an individual's emotional experience of social support, where individuals with higher self-esteem are more likely to perceive respect and support from others, thereby mitigating the negative impact of stigma [14]. For instance, Wang Ting's study on chronic hepatitis B patients demonstrated that higher social support levels correlate with lower stigma, particularly in the negative self-evaluation dimension ($r = -0.397$, $P < 0.01$) [15]. Patients with low self-esteem may exhibit a “support perception bias”, interpreting objective support as pity rather than genuine respect, which diminishes the efficacy of subjective support [16]. Dong Fengyun et al. confirmed in schizophrenia patients that self-esteem positively correlates with perceived subjective support ($r = 0.321$, $P < 0.01$), indirectly influencing stigma formation [16]. Additionally, in this study, subjective support entered the regression equations for external discrimination ($\beta = -0.298$, $P < 0.001$) and illness concealment ($\beta = -0.260$, $P < 0.001$), suggesting that individuals with higher self-esteem reduce sensitivity to external discrimination and concealment motivations through enhanced perception of social support [14, 17].

4.3. Disease cognition and self-esteem

Disease status, such as hepatitis B-related cirrhosis, significantly influences stigma ($\beta = 0.169$, $P = 0.010$), with self-esteem level acting as a moderator in this process [1]. Patients with cirrhosis often experience self-image devaluation due to severe symptoms, physical changes (e.g., jaundice, ascites), and impaired social

functioning^[1]. Those with higher self-esteem may maintain self-worth by reframing disease meaning (e.g., “active treatment can control the condition”), whereas individuals with lower self-esteem are more likely to adopt negative cognitions (e.g., “illness equals failure”), exacerbating negative self-evaluation ($\beta = 0.161$, $P = 0.025$)^[15, 18]. Liu Yulian et al. demonstrated in mood disorder patients that lower self-esteem intensifies self-denial caused by disease, aligning with this study’s finding that “self-esteem entered the regression equation for the negative self-evaluation dimension”^[18]. Furthermore, secondary discrimination is directly influenced by self-esteem ($\beta = 0.160$, $P = 0.023$), potentially because individuals with higher self-esteem are more sensitive to societal evaluations—they prioritize the potential impact of the disease on occupational and familial roles, thereby amplifying perceived secondary discrimination^[17, 19].

5. Conclusion

This study, which investigated 201 hospitalized patients with chronic HBV infection, confirmed that self-esteem levels have a significant impact on the stigma experienced by patients with chronic hepatitis B. Self-esteem was positively correlated with overall stigma and its various dimensions, emerging as a critical factor influencing multiple aspects of stigma. Self-esteem indirectly affects stigma through mediating pathways that involve patients’ coping styles, perceived social support, and cognitive appraisal of their disease status, forming a complex influence mechanism.

Based on these findings, clinical care and social support systems should prioritize enhancing the self-esteem of chronic hepatitis B patients. Healthcare professionals can improve patients’ self-esteem by providing health education and psychological counseling to foster accurate perceptions of the disease and a positive self-identity. Furthermore, encouraging patients to adopt proactive coping strategies and enhancing their utilization of social support can effectively reduce stigma, thereby improving quality of life and treatment adherence. Future research should expand sample sizes and utilize longitudinal designs to explore the dynamic relationship between self-esteem and stigma, providing a stronger foundation for developing precise and effective interventions.

Disclosure statement

The authors declare no conflict of interest.

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