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Analysis of the Impact of Evidence-Based Nursing on Postoperative Complications and Stress Responses in Patients with Ureteral Calculi Undergoing Holmium Laser Lithotripsy

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Abstract: *Objective*: To explore the application effect of evidence-based nursing in the postoperative care of patients with ureteral calculi undergoing holmium laser lithotripsy, analyze its impact on the incidence of postoperative complications, the degree of stress response, and nursing satisfaction, and provide evidence-based support for optimizing clinical nursing practices. *Methods*: A total of 100 patients with ureteral calculi who underwent holmium laser lithotripsy in our hospital from January 2023 to June 2025 were selected and divided into an observation group (50 cases) and a control group (50 cases) using a random number table method. The control group received routine nursing interventions, while the observation group adopted an evidence-based nursing model. The incidence of postoperative complications (hematuria, urinary tract infection, renal colic, ureteral stricture), stress response indicators (heart rate, systolic blood pressure, diastolic blood pressure, Self-Rating Anxiety Scale (SAS) score, Self-Rating Depression Scale (SDS) score) before surgery and 24 hours after surgery, and nursing satisfaction were compared between the two groups. *Results*: The total incidence of postoperative complications in the observation group was significantly lower than that in the control group ($p < 0.05$). At 24 hours after surgery, the heart rate, systolic blood pressure, diastolic blood pressure, SAS score, and SDS score in the observation group were significantly lower than those in the control group (all $p < 0.01$). Nursing satisfaction in the observation group was significantly higher than that in the control group ($p < 0.01$). *Conclusion*: Evidence-based nursing can effectively reduce the incidence of postoperative complications in patients with ureteral calculi undergoing holmium laser lithotripsy, alleviate patients' stress responses, and improve nursing satisfaction, demonstrating significant clinical application value.

Keywords: Evidence-based nursing; Ureteral calculi; Holmium laser lithotripsy; Complications; Stress response; Nursing satisfaction

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1. Introduction

Ureteral calculi are a common urological condition characterized by clinical manifestations such as lumbar and abdominal colic, hematuria, and dysuria, which significantly impair patients' quality of life [1]. Holmium laser lithotripsy has become the preferred minimally invasive surgical approach for treating ureteral calculi due to its advantages, including minimal trauma, high intraoperative lithotripsy efficiency, ideal stone clearance rates, early postoperative ambulation, and rapid physical recovery [2]. However, this procedure is not entirely non-invasive; it still carries risks of postoperative complications such as hematuria, urinary tract infections, and renal colic. Additionally, the trauma caused by the surgery and the foreign body sensation and discomfort induced by the postoperative indwelling ureteral stent can easily trigger negative emotions such as anxiety and irritability in patients, leading to intense physiological and psychological stress responses. These responses disrupt the body's homeostasis, impede the postoperative recovery process, and increase the difficulty of nursing care. Conventional nursing models primarily rely on the past work experience of nursing staff for intervention, lacking systematic evidence-based support and targeted design. As a result, they struggle to precisely match the individual differences and rehabilitation needs of different patients and fail to efficiently address core nursing issues such as preventing postoperative complications, alleviating stress responses, and implementing rehabilitation guidance. Evidence-based nursing (EBN), as a scientific nursing model centered on evidence, formulates precise nursing plans by integrating scientific research evidence, clinical experience, and patient needs, demonstrating significant advantages in postoperative care across various surgical specialties [3]. Based on this, this study employed a randomized controlled trial design to compare and analyze the application effects of evidence-based nursing and conventional nursing in patients undergoing holmium laser lithotripsy for ureteral calculi. The aim is to further validate the clinical value of evidence-based nursing and provide scientific references and practical evidence for optimizing postoperative nursing procedures and enhancing the quality of clinical nursing care for ureteral calculi.

2. Materials and methods

2.1. General information

A total of 100 patients with ureteral calculi who underwent holmium laser lithotripsy in the urology department of our hospital from January 2023 to June 2025 were selected.

2.1.1. Inclusion criteria

(1) Diagnosed with ureteral calculi via urinary CT and ultrasound, with a stone diameter ranging from 0.6 to 2.0 cm;
(2) Met the surgical indications for holmium laser lithotripsy and received minimally invasive surgical treatment for the first time;
(3) Had clear consciousness, no cognitive dysfunction, and were able to cooperate in completing scale assessments;
(4) Provided informed consent, with both patients and their families signing the informed consent form.

2.1.2. Exclusion criteria

(1) Combined with severe dysfunction of the heart, liver, kidneys, or other organs;
(2) Coagulation dysfunction or in the active phase of infectious diseases;

(3) Pregnant or lactating women;
(4) Had a history of ureteral surgery or mental illness.

2.1.3. Study design

Patients were randomly divided into an observation group and a control group using a random number table method, with 50 cases in each group. In the observation group, there were 26 males and 24 females; ages ranged from 25 to 68 years, with an average age of (45.36 ± 8.72) years; stone locations: 21 cases in the upper ureter, 15 cases in the middle ureter, and 14 cases in the lower ureter; stone diameter was (1.25 ± 0.32) cm. In the control group, there were 28 males and 22 females; ages ranged from 24 to 69 years, with an average age of (44.89 ± 9.05) years; stone locations: 22 cases in the upper ureter, 14 cases in the middle ureter, and 14 cases in the lower ureter; stone diameter was (1.28 ± 0.35) cm. There were no statistically significant differences in general information such as gender, age, stone location, and diameter between the two groups ($p > 0.05$), indicating comparability.

2.2. Methods

The control group received routine postoperative nursing care in the urology department: Preoperatively, routine health education was conducted to inform patients about the surgical procedure and precautions, and preoperative examination preparations were completed. Intraoperatively, nurses cooperated with the doctor's operations and monitored vital signs. Postoperatively, vital signs were continuously monitored, wound and indwelling catheter care were provided, anti-infective and analgesic drugs were administered according to doctor's orders, and patients were instructed on diet, activity, and postoperative precautions and follow-up time. The observation group adopted evidence-based nursing, following a five-step process of "raising questions–retrieving evidence–evaluating evidence–formulating a plan–implementing and evaluating":

(1) Raised evidence-based questions focusing on three core aspects
Prevention and control of postoperative complications, alleviation of stress responses, and improvement of nursing satisfaction and rehabilitation compliance.
(2) Retrieved literature from relevant databases over the past five years
Three nursing experts evaluated the authenticity, reliability, and applicability of the evidence to determine core nursing measures.
(3) Formulated personalized plans
Preoperatively, health education was conducted through a combination of graphics, videos, and one-on-one communication. The SAS and SDS scales were used to assess emotions, and cognitive-behavioral interventions were implemented for patients with anxiety and depression. Position training plans were formulated based on the stone situation. Intraoperatively, the operating room temperature was maintained at 24–26 ℃, and 37 ℃ warmed fluids were infused. Position placement was optimized, and heart rate and blood pressure were monitored meticulously. Postoperatively, targeted prevention of complications such as hematuria and urinary tract infections was carried out. Vital signs were monitored within 24 hours, and stress was alleviated through communication and abdominal breathing training. Individualized diet and rehabilitation activity plans were formulated.
(4) Measurement of effectiveness
Dynamically assessed rehabilitation progress and adjusted nursing plans based on patient feedback to ensure the effectiveness of the measures.

2.3. Observation indicators

(1) Incidence of complications

The occurrence of hematuria, urinary tract infections, renal colic, and ureteral stricture within 7 days postoperatively was counted, and the total incidence of complications was calculated.

(2) Stress response indicators

Patients' heart rate, systolic blood pressure, and diastolic blood pressure were measured one day before surgery and 24 hours after surgery. The SAS scale (with a maximum score of 80; higher scores indicate more severe anxiety) and the SDS scale (with a maximum score of 80; higher scores indicate more severe depression) were used to assess patients' psychological stress states.

(3) Nursing satisfaction

Seven days postoperatively, a self-made nursing satisfaction scale (with a maximum score of 100) was used for assessment. The results were classified as very satisfied (≥ 90 points), satisfied (80–89 points), fair (60–79 points), and dissatisfied (< 60 points). The total satisfaction rate = (number of very satisfied cases + number of satisfied cases) / total number of cases × 100%.

2.4. Statistical methods

Data analysis was performed using SPSS 22.0 statistical software. Measurement data were expressed as ($\overline{x}$ ± s), and inter-group comparisons were conducted using the *t*-test. Count data were expressed as [n (%)], and inter-group comparisons were conducted using the χ^2 test. A *p*-value < 0.05 indicated a statistically significant difference.

3. Results

3.1. Comparison of the incidence of postoperative complications between the two groups

The total incidence of postoperative complications in the observation group was significantly lower than that in the control group ($p < 0.05$). See **Table 1** for details.

Table 1. Comparison of the incidence of postoperative complications between the two groups [n (%)]

Complication type	Hematuria	Urinary tract infection	Renal colic	Ureteral stricture	Total complications
Observation group (n = 50)	1 (2)	1 (2)	0	0	2 (4)
Control group (n = 50)	3 (6)	2 (4)	2 (4)	1 (2)	8 (16)
χ^2					4.000
p					0.046

3.2. Comparison of stress response indicators between the two groups before and 24 hours after surgery

At 24 hours postoperatively, the heart rate, systolic blood pressure, diastolic blood pressure, Self-Rating Anxiety Scale (SAS) score, and Self-Rating Depression Scale (SDS) score in the observation group were significantly lower than those in the control group (all $p < 0.01$). See **Table 2** for details.

Table 2. Comparison of stress response indicators between the two groups before and 24 hours after surgery

Index	Group	Preoperative 1 day	24h Postoperative	*t* (Postoperative)	*p* (Postoperative)
Heart rate (beats/min)	Observation group	78.36 ± 6.25	72.15 ± 5.83	6.056	< 0.001
	Control group	77.98 ± 6.53	79.42 ± 6.17		
Systolic pressure (mmHg)	Observation group	128.65 ± 10.32	120.43 ± 9.56	3.683	< 0.001
	Control group	127.89 ± 10.58	127.68 ± 10.12		
Diastolic pressure (mmHg)	Observation group	78.54 ± 8.21	72.36 ± 7.65	2.888	0.005
	Control group	77.96 ± 8.45	76.89 ± 8.03		
SAS score (points)	Observation group	52.36 ± 4.58	41.26 ± 3.85	9.259	< 0.001
	Control group	51.98 ± 4.72	48.73 ± 4.21		
SDS score (points)	Observation group	51.72 ± 4.36	40.18 ± 3.62	10.142	< 0.001
	Control group	51.35 ± 4.51	47.95 ± 4.03		

3.3. Comparison of nursing satisfaction between the two groups

The nursing satisfaction in the observation group was significantly higher than that in the control group ($p < 0.01$). See **Table 3** for details.

Table 3. Comparison of nursing satisfaction between the two groups

Satisfaction level	Very satisfied	Satisfied	Fair	Dissatisfied	Overall satisfaction
Observation group (n = 50)	38 (76)	8 (16)	2 (4)	2 (4)	48 (96)
Control group (n = 50)	15 (30)	20 (40)	3 (6)	12 (24)	38 (76)
χ^2					8.306
p					0.004

4. Discussion

Although holmium laser lithotripsy is a minimally invasive surgical procedure, there is still a risk of various postoperative complications, which are closely related to factors such as surgical trauma, urinary tract irritation, and inadequate nursing interventions [4]. The conventional nursing model lacks specificity and mostly relies on empirical measures for complication prevention, resulting in limited effectiveness [5]. In this study, the observation group adopted an evidence-based nursing model. By retrieving literature, the core risk factors for complications such as hematuria and urinary tract infections were identified, and precise preventive measures were formulated. For hematuria, emphasis was placed on postoperative bed rest and urine monitoring to reduce damage to the urinary tract mucosa caused by strenuous activities. For urinary tract infections, measures such as urethral orifice care and increased water intake were implemented to reduce the risk of bacterial growth. For renal colic, dynamic pain score monitoring and multimodal analgesic interventions were used to effectively alleviate patient discomfort [6]. The results showed that the total incidence of complications in the observation group was significantly lower than that in the control group, consistent with the 5.71% complication rate in the evidence-based nursing group reported in Zhang Haiyan's study [7]. This confirms that evidence-based nursing can significantly reduce the incidence of postoperative

complications through scientific risk prevention and control measures. It is noteworthy that the incidence of ureteral stricture was low in both groups and showed no statistical difference, which may be related to the fact that ureteral stricture is mostly a long-term complication. The observation period in this study was 7 days postoperatively, failing to capture long-term effects. Therefore, further long-term follow-up studies are needed.

Surgery, as a traumatic medical procedure, can easily trigger both physiological and psychological stress responses in patients, manifested as increased heart rate, elevated blood pressure, anxiety, and depression. Excessive stress responses can interfere with the body's postoperative recovery process and affect the recovery outcome [8]. Evidence-based nursing, supported by scientific evidence, implements precise interventions throughout the entire process to address stress responses. Preoperatively, personalized health education and psychological counseling help patients correctly understand the surgery and alleviate anxiety caused by cognitive biases. Intraoperatively, temperature protection and position optimization reduce physiological stressors. Postoperatively, emotional counseling and relaxation training help patients regulate their psychological state [9]. The results of this study showed that at 24 hours postoperatively, the heart rate, blood pressure, and SAS and SDS scores in the observation group were significantly lower than those in the control group, confirming that evidence-based nursing can effectively reduce patients' postoperative stress responses from both physiological and psychological dimensions, laying a solid foundation for smooth postoperative recovery.

Nursing satisfaction is a core indicator for evaluating nursing quality and is closely related to the specificity of nursing measures and the degree of humanistic care [10]. The evidence-based nursing model breaks away from the passive implementation mode of traditional conventional nursing and is oriented towards the individual needs of patients, providing precise services based on high-quality scientific research evidence. Preoperatively, thorough communication and answering of questions alleviate patient concerns. Intraoperatively, meticulous nursing ensures diagnostic and therapeutic safety. Postoperatively, precise rehabilitation guidance facilitates recovery. Throughout the entire process, patients feel valued and cared for, laying a solid foundation for improving nursing satisfaction. The results of this study showed that nursing satisfaction in the observation group was significantly higher than that in the control group, indicating that evidence-based nursing can effectively improve patients' medical experiences and further enhance nursing satisfaction by systematically optimizing nursing processes, improving service quality, and enriching humanistic connotations, providing strong support for the continuous improvement of clinical nursing quality.

This study still has several limitations that need to be addressed in future research. First, the sample source is singular, including only patients admitted to our hospital, which limits the representativeness of the sample and may affect the generalizability of the study results due to selection bias. Second, the observation period is relatively short, focusing only on short-term postoperative nursing effects and failing to systematically evaluate the long-term impact of evidence-based nursing on patients' long-term rehabilitation outcomes and quality of life. Third, the study does not involve a cost-effectiveness analysis of evidence-based nursing, making it impossible to provide data support for its economic feasibility in large-scale clinical promotion. Based on this, future research should expand the sample size and conduct multi-center, large-sample randomized controlled trials to reduce bias and improve result reliability. At the same time, the follow-up period should be extended to comprehensively explore the long-term effects of the intervention measures. In addition, the deep integration of evidence-based nursing with intelligent nursing technologies can be explored to optimize nursing processes, further improve the effectiveness and efficiency of nursing services, and provide more comprehensive evidence for the innovation of clinical nursing models.

5. Conclusion

In conclusion, evidence-based nursing, by integrating scientific research evidence, clinical experience, and patient needs to formulate and implement precise nursing plans, can effectively reduce the incidence of complications after holmium laser lithotripsy in patients with ureteral calculi, alleviate patients' physiological and psychological stress responses, and improve nursing satisfaction, providing strong support for patients' postoperative recovery. This nursing model is scientific, efficient, and personalized and is worthy of promotion and application in clinical urological nursing.

Disclosure statement

The author declares no conflict of interest.

References

[1] Ding C, 2025, Comparative Efficacy of Different Analgesic Drugs in the Treatment of Ureteral Calculi Complicated with Renal Colic. Contemporary Medicine Symposium, 23(16): 70–72.

[2] Yuan C, Ji K, 2025, Application Effect of Flexible Ureteroscope Holmium Laser Lithotripsy Combined with a Basic Stone-Expelling Formula in Treating Qi Stagnation and Blood Stasis Type Ureteral Calculi. China Medical Innovation, 22(36): 37–41.

[3] Gao T, Peng Y, Guo L, 2025, Advances in the Application of the Johns Hopkins Evidence-Based Nursing Model in Clinical Practice. Tianjin Journal of Nursing, 33(6): 746–750.

[4] Chu G, Shi Y, Xiao W, et al., 2025, Feasibility of Promoting Negative Pressure Suction Flexible Ureteroscope Sheath Combined with Flexible Ureteroscope Holmium Laser Lithotripsy in Primary Hospitals. Journal of Urology (Electronic Edition), 17(4): 43–47.

[5] Liu C, 2021, Effects of Extended Nursing Services on Self-Care Behaviors, Complications, and Recurrence in Patients Undergoing Flexible Ureteroscopic Lithotripsy. China Contemporary Medicine, 28(10): 209–211.

[6] Zhang L, 2025, Exploration of the Impact of Individualized Nursing Interventions on Renal Fistula and Complications in Patients After Renal Calculus Surgery. Contemporary Medicine Symposium, 23(6): 143–145.

[7] Zhang H, 2024, Study on the Impact of Evidence-Based Nursing on Postoperative Complications and Stress Responses in Patients with Ureteral Calculi Undergoing Holmium Laser Lithotripsy. Intelligent Health, 10(29): 130–133.

[8] Wu Y, He J, 2025, Impact of Evidence-Based Nursing on Stress Responses and Satisfaction in Patients with Ureteral Calculi Undergoing Holmium Laser Lithotripsy. Journal of Shanxi Health Vocational College, 35(4): 128–130.

[9] Cheng Y, 2022, Application Effect of the Evidence-Based Nursing Model in Patients with Pain After Laparoscopic Surgery for Gallbladder Stones. Guide of China Medicine, 20(8): 142–144 + 148.

[10] Huang G, 2023, Analysis of the Application of Evidence-Based Nursing in the Postoperative Care of Patients with Ureteral Calculi Undergoing Holmium Laser Lithotripsy. Guide of China Medicine, 21(27): 171–173.