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Analysis of Nursing Satisfaction in Patients with Kidney Stones Undergoing Percutaneous Nephrolithotomy with Holmium Laser Lithotripsy Under the Impact of High-Quality Nursing Intervention

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Abstract: *Objective*: To analyze the value of high-quality nursing care for patients with kidney stones undergoing percutaneous nephrolithotomy with holmium laser lithotripsy (PCNL). *Methods*: A total of 72 patients with kidney stones treated with PCNL from November 2024 to November 2025 were selected as samples and randomly divided into groups using a random number table. Group A received high-quality nursing care, while Group B received conventional nursing care. Indicators such as pain, anxiety, nursing satisfaction, and complications were compared between the two groups. *Results*: The Visual Analog Scale (VAS) scores for pain and Self-Rating Anxiety Scale (SAS) scores for anxiety in Group A were lower than those in Group B ($p < 0.05$). The nursing satisfaction rate in Group A was higher than that in Group B ($p < 0.05$). The complication rate of PCNL in Group A was lower than that in Group B ($p < 0.05$). *Conclusion*: For patients with kidney stones treated with PCNL, receiving high-quality nursing care can alleviate anxiety, relieve pain, and reduce the risk of postoperative complications.

Keywords: Kidney stones; Percutaneous nephrolithotomy with holmium laser lithotripsy; High-quality nursing care

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1. Introduction

Kidney stones have a high incidence rate, are prone to being complicated by various conditions, and pose challenges in surgical treatment. Conventional surgical procedures can exacerbate physical trauma in patients with kidney stones and prolong postoperative recovery time [1]. With the continuous advancement of minimally invasive concepts, percutaneous nephrolithotomy with holmium laser lithotripsy (PCNL) has gradually been employed in the treatment of kidney stones, offering advantages such as safety, efficiency, and minimal trauma, thereby

shortening postoperative recovery time [2]. However, kidney stones predominantly occur in the elderly population, whose physical functions are in decline, imposing higher demands on perioperative nursing care. Conventional care based solely on medical advice fails to meet patient needs [3]. High-quality nursing care represents a novel nursing approach that tailors care methods according to the individual characteristics and disease progression of each patient, thereby minimizing the adverse impact of various subjective and objective factors on the rehabilitation process [4]. Based on this, this study explores the value of high-quality nursing care by taking 72 patients with kidney stones treated with PCNL from November 2024 to November 2025 as samples.

2. Materials and methods

2.1. Data

A total of 72 patients with kidney stones treated with percutaneous nephrolithotomy with holmium laser lithotripsy (PCNL) from November 2024 to November 2025 were selected as samples and randomly divided into groups using a random number table. The baseline data for kidney stones in Group A were compared with those in Group B, with $p > 0.05$. See **Table 1**.

Table 1. Data analysis table for kidney stones treated with PCNL

Group	n	Gender (%)		Age (years)		Disease duration (months)	
		Male	Female	Range	Mean ± SD	Range	Mean ± SD
A	36	20 (55.56)	16 (44.44)	24–59	41.29 ± 2.42	1–3	1.91 ± 0.42
B	36	22 (61.11)	14 (38.89)	24–60	41.33 ± 2.39	1–4	1.89 ± 0.38
χ^2/t	-	0.2286		0.0706		0.2119	
p	-	0.6326		0.9439		0.8328	

2.2. Inclusion and exclusion criteria

2.2.1. Inclusion criteria

(1) Patients with kidney stones conforming to the criteria outlined in the Interpretation of the Guidelines for the Diagnosis and Treatment of Urinary Calculi [5];
(2) Patients diagnosed via B-ultrasound, CT, or other imaging modalities, meeting the indications for PCNL treatment;
(3) Patients who have signed an informed consent form;
(4) Patients with stone diameters ≤ 20 mm.

2.2.2. Exclusion criteria

(1) Patients with infectious diseases;
(2) Patients with coagulation disorders;
(3) Patients with organ lesions.

2.3. Methods

2.3.1. Group A

(1) Education and psychological care

Inform patients about the PCNL surgical procedure and precautions, train them in common intraoperative positions, and monitor their blood pressure, heart rate, and respiratory status. Address patients' concerns, provide targeted psychological counseling to alleviate negative emotions caused by kidney stones or PCNL surgery, and stimulate patients' subjective initiative.

(2) Intraoperative care

Monitor vital signs during surgery, assist patients in changing positions, and observe changes in blood pressure, respiration, and abdominal pressure.

(3) Postoperative care

Complication Intervention: a. Postoperative Pain Management: Use the VAS scale to quantitatively assess pain levels. For patients with mild pain, maintain a supine position within 6 hours postoperatively to reduce pressure on the affected kidney; transition to a semi-recumbent or healthy-side lying position after 6 hours to alleviate pressure on perirenal tissues. Within 24 hours postoperatively, apply cold compresses to the puncture site on the affected side to reduce edema and congestion, and relieve traumatic pain. Instruct patients in correct deep breathing techniques (inhale through the nose, hold for 3 seconds, then exhale slowly through the mouth) while playing soothing videos or music to distract patients from pain. Strengthen communication with patients, encourage them to express their pain experiences, and provide positive feedback to enhance pain tolerance. For patients with moderate to severe pain, administer analgesics as prescribed, such as nonsteroidal anti-inflammatory drugs, weak opioids, or patient-controlled analgesia pumps. b. Postoperative Hemorrhage Management: Observe the color, nature, and volume of drainage fluid, and monitor vital signs. If no hematuria is observed 1 day postoperatively, encourage patients to attempt ambulation. If hematuria persists, continue bed rest, increase fluid intake, and initiate bed exercises. Maintain patency of the drainage tube and inquire about patients' flank distension; adjust immediately if the tube is obstructed. c. Postoperative Pressure Ulcer Prevention: Regularly assist kidney stone patients in turning over postoperatively. Initially, massage pressure points on the limbs and place soft pillows at bony prominences. Once vital signs stabilize, encourage patients to ambulate. d. Postoperative Urinary Extravasation Management: Nurses should manually compress the catheter and prepare saline for low-pressure irrigation of the nephrostomy tube to prevent catheter obstruction.

(4) Postoperative humanistic care

Regularly ventilate the patient's room, maintain soft indoor lighting, and adjust temperature and humidity according to patient needs. Limit daily visitors, place green plants in the room, and prepare educational brochures on kidney stones, including perioperative precautions, for patients to read independently. Assess patients' emotional fluctuations, encourage them to express their feelings, provide reassurance and encouragement, and cite excellent cases of postoperative recovery after PCNL to strengthen patients' confidence in recovery. Respect different patients' habits, such as placing snoring patients in the same room to avoid disturbing others' rest.

(5) Continuity of care

Before discharge, create a file for kidney stone patients, explain kidney stone knowledge, and inform them of daily precautions. Advise patients to maintain a light diet, avoid spicy or high-protein foods, and abstain from alcohol and tobacco. Increase daily water intake at home, adhere to regular exercise, and cultivate good sleep habits to enhance immunity. Inform patients of postoperative follow-up times

and instruct them to return to the hospital immediately if they experience significant discomfort at home.

2.3.2. Group B

Provide general education on kidney stone surgery, explain perioperative precautions, monitor vital signs, and advise patients to reduce strenuous activities postoperatively.

2.4. Observation indicators

2.4.1. Pain and anxiety scores

VAS scores are positively correlated with postoperative pain in kidney stone patients (range: 0–10). SAS scores are positively correlated with anxiety levels in kidney stone patients (threshold: 50).

2.4.2. Satisfaction

Assess satisfaction using a self-made kidney stone satisfaction scale, with scores of 70–100, 30–69, and 0–29 indicating satisfaction, basic satisfaction, and dissatisfaction, respectively. Complications: Record the occurrence of hemorrhage, infection, and urinary extravasation.

2.5. Statistical analysis

Data were processed using SPSS 23.0. Count data were analyzed using the chi-square test and recorded as percentages (%). Measurement data were analyzed using the *t*-test and recorded as mean ± standard deviation ($\overline{x} \pm s$). Statistical significance was defined as $p < 0.05$.

3. Results

3.1. Pain scores and anxiety scores

After nursing care, the VAS and SAS scores in Group A were significantly lower than those in Group B ($p < 0.05$). See **Table 2**.

Table 2. Analysis of pain scores and anxiety scores in patients with kidney stones treated with PCNL ($\overline{x} \pm s$)

Group	VAS (points)		SAS (points)	
	Before care	After care	Before care	After care
Group A (n = 36)	5.51 ± 0.88	1.42 ± 0.29	64.29 ± 2.49	43.29 ± 1.21
Group B (n = 36)	5.49 ± 0.91	3.09 ± 0.43	64.33 ± 2.51	48.06 ± 1.72
t	0.0948	19.3193	0.0679	13.6093
p	0.9247	0.000	0.9461	0.000

3.2. Nursing satisfaction

The nursing satisfaction rate among kidney stone patients treated with PCNL in Group A was higher than that in Group B ($p < 0.05$). See **Table 3**.

Table 3. Analysis of nursing satisfaction among kidney stone patients treated with PCNL (n, %)

Group	Satisfied	Basically satisfied	Dissatisfied	Satisfaction rate
Group A (n = 36)	25 (69.44)	10 (27.78)	1 (2.78)	35 (97.22)
Group B (n = 36)	15 (41.67)	14 (38.89)	7 (19.44)	29 (80.56)
χ^2	-	-	-	5.2411
p	-	-	-	0.0221

3.3. Postoperative complications

The incidence of postoperative complications among kidney stone patients treated with PCNL in Group A was lower than that in Group B ($p < 0.05$). See **Table 4**.

Table 4. Analysis of postoperative complications among kidney stone patients treated with PCNL (n, %)

Group	Hemorrhage	Infection	Urine extravasation	Incidence rate
Group A (n=36)	0 (0.00)	1 (2.78)	0 (0.00)	1 (2.78)
Group B (n=36)	1 (2.78)	2 (5.56)	4 (11.11)	7 (19.44)
χ^2	-	-	-	5.2411
p	-	-	-	0.0221

4. Discussion

Typical symptoms of patients with kidney stones include lumbodorsal and abdominal colic, nausea and vomiting, hematuria, abdominal distension, etc., which seriously threaten their physical and mental health [6]. At present, surgery is the primary clinical treatment for kidney stones, with PCNL, a minimally invasive procedure, being commonly used. This involves creating an artificial channel from the waist skin to the kidney, inserting a nephroscope to perform ultrasonic lithotripsy, pneumatic ballistic lithotripsy, or holmium laser lithotripsy, and finally removing the stones [7]. PCNL has been widely applied in the treatment of patients with kidney stones, but it is an invasive procedure that often leaves patients with persistent postoperative pain and prolongs their recovery process. Therefore, it should be complemented with safe and efficient nursing services. Conventional surgical nursing for kidney stones is carried out according to departmental procedures, with a single content that fails to meet the needs of modern patients undergoing PCNL treatment [8]. High-quality nursing incorporates modern humanistic care concepts, providing nursing services from multiple dimensions such as emotion regulation, pain management, and complication prevention and control, which can promote patient recovery [9].

According to the data analysis in this article, after high-quality nursing, the VAS and SAS scores of patients with kidney stones decreased. The reasons are as follows: during high-quality nursing, preoperative positional training helps patients adapt to the PCNL surgical position in advance, avoiding pain caused by positional discomfort; postoperative pain relief is achieved through multiple methods such as positional adjustment, analgesic medication as prescribed, cold compress on the puncture site on the waist of the operated side, and deep breathing exercises, effectively reducing postoperative pain; playing music and videos to divert patients' attention from pain can activate the pleasure center of the cerebral cortex, block pain signal transmission, and reduce patients' perception of pain, thus lowering the VAS score [10]. In addition, during high-quality nursing, emphasis is placed

on education and psychological counseling. Informing patients in advance about the PCNL surgical process and precautions, and continuously monitoring their vital signs throughout the procedure, can reduce anxiety caused by fear of surgery; nurses addressing patients' inner doubts and engaging in in-depth communication with them can stimulate their subjective initiative and enable them to face surgery positively; active prevention and control of various complications and implementation of humanistic care measures after surgery can avoid stress reactions caused by complications or the healthcare environment, further reducing patients' anxiety, thus lowering the SAS score [11]. Another set of data indicates that after high-quality nursing, the nursing satisfaction of patients with kidney stones increased. The reasons are as follows: high-quality nursing requires nurses to provide professional services to patients with kidney stones, including monitoring vital signs, stratified pain management, preventing postoperative complications, observing drainage fluid, and pressure ulcer positional care, which can enhance patients' recognition of nurses' professional competence; nurses adjusting the ward environment according to individual needs, fully respecting and caring for patients, and meeting their personalized sleep needs can improve their healthcare experience; continuous nursing guiding patients in correct home care can enhance their self-care quality after discharge, thus improving overall nursing satisfaction [12]. The last set of data shows that after high-quality nursing, the postoperative complication rate of patients with kidney stones decreased. The reasons are as follows: during high-quality nursing, comprehensive prevention and control of complications are implemented. Preventing bleeding by recording drainage status and guiding patients in correct postoperative activities can avoid bleeding caused by premature ambulation or increased renal pressure due to drainage tube obstruction; maintaining drainage tube patency through measures such as finger compression of the catheter and low-pressure saline irrigation of the nephrostomy tube can prevent urine extravasation into the perirenal tissues, thus reducing the rate of urine extravasation [13,14]. In addition, during high-quality nursing, limiting the number of daily visitors and regularly ventilating the ward can prevent cross-infection; maintaining drainage tube patency can avoid retrograde infection; instructing patients to increase their water intake and persist in exercise can enhance their immunity and accelerate the excretion of bacteria from the urinary tract, thus reducing the risk of postoperative infection [15].

5. Conclusion

In conclusion, patients with kidney stones treated with PCNL who receive high-quality nursing interventions can experience reduced postoperative pain, alleviated anxiety, improved nursing satisfaction, and fewer postoperative complications, demonstrating its value for promotion.

Disclosure statement

The authors declare no conflict of interest.

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