



Original Research Article

Enhancing Health Outcomes through Nurse-Led Education in Patients Undergoing Extracorporeal Shock Wave Lithotripsy

Article History:

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INTRODUCTION

Nephrolithiasis is a common and increasingly prevalent urological condition marked by the formation of mineral deposits in the kidneys, often causing severe pain and urinary complications (1). It is the third most frequent urological disease globally (2) and is particularly widespread in Pakistan, where it accounts for up to 70% of urological admissions in

Abstract: Background: Nephrolithiasis, commonly known as kidney stones, is a condition marked by the formation of hard mineral and salt deposits inside the kidneys. These stones can vary in size and cause significant pain and discomfort as they pass through the urinary tract. **Methodology:** A quasi-experimental single-group pre-test post-test study was conducted at the Urology OPD of Mayo Hospital, Lahore, over five months (July 2025 to November 2025) to assess the effect of a nurse-based educational intervention on patients undergoing Extracorporeal Shock Wave Lithotripsy (ESWL). A purposive sample of 40 patients participated. Data were collected using validated tools assessing knowledge, pain, complications, and quality of life. The intervention included six structured educational sessions, and data were gathered before and after the intervention with a one-month follow-up. Ethical approval was obtained, and data were analyzed using SPSS version 25 with a significance level of $p < 0.05$. **Results:** The study included 40 participants, most aged 31–35 years (35%) and male (57.5%), with 37.5% having primary education and 52.5% residing in urban areas. Following the nurse-based educational intervention, participants' median knowledge scores regarding Extracorporeal Shock Wave Lithotripsy (ESWL) significantly improved from 16.7 to 40.0 ($p < 0.001$). The median pain score during ESWL decreased from 3.5 to 3.0 ($p = 0.021$), and quality of life scores improved from 53.9 to 61.4 ($p = 0.021$). Furthermore, major complications reduced from 50% to 37.5%, while minor complications increased from 50% to 62.5%, with a significant decline in complication scores ($p = 0.021$). These findings indicate that the nurse-led educational intervention effectively enhanced knowledge, reduced pain and complications, and improved the overall quality of life of patients undergoing ESWL. **Conclusion:** The study concluded that the nurse-based educational intervention significantly enhanced patients' knowledge regarding Extracorporeal Shock Wave Lithotripsy (ESWL), reduced pain and complications, and improved their quality of life. These findings highlight the vital role of nurse-led education in promoting patient understanding, ensuring safer recovery, and enhancing overall treatment outcomes for individuals undergoing ESWL.

Keywords: Extracorporeal Shock Wave Lithotripsy; Nurse-Led Intervention; Patient Education; Knowledge Improvement; Quality of Life

rural areas (3). The rising incidence has been linked to dietary habits, sedentary lifestyles, and environmental factors, with calcium oxalate stones being the most common and highly recurrent type (4).

Extracorporeal Shock Wave Lithotripsy (ESWL) is widely used as a non-invasive and effective treatment

for small to moderate kidney stones, offering rapid recovery and fewer complications compared to surgical methods (5). However, ESWL is not without risks: complications such as pain, hematuria, infection, and residual fragments are frequently reported (6,7). Recurrence is common, particularly when patients do not adhere to key lifestyle modifications, such as proper hydration, dietary control, and regular follow-up (8). These challenges contribute to a reduced quality of life among affected individuals (9).

Given these concerns, patient education has become a critical strategy to improve outcomes and prevent recurrence after ESWL. Nurses, due to their continuous patient contact and holistic role, are well-positioned to provide structured, evidence-based education (10). Nurse-led interventions have shown success in improving adherence and self-management in various chronic conditions (11), yet evidence on their impact specifically in ESWL patients—especially in low-resource settings—is limited (12). Therefore, this study aims to evaluate the effectiveness of a nurse-led education program on awareness, preventive practices, and overall health outcomes in patients undergoing ESWL.

METHODOLOGY

A quasi-experimental single-group study was conducted over five months (July 2025 to November 2025) at the Urology OPD of Mayo Hospital and Lahore General Hospital, Lahore, to evaluate the effectiveness of a nurse-led educational intervention on health outcomes among patients undergoing Extracorporeal Shock Wave Lithotripsy (ESWL). A

purposive sample of 40 patients aged 20–50 years with clinically diagnosed renal stones and scheduled for ESWL was selected according to predefined inclusion and exclusion criteria. The independent variable was the nurse-led education intervention, while the dependent variables were health outcomes, including pain, complications, quality of life, and patients' knowledge. Data were collected using validated and reliable tools: a demographic questionnaire; a 15-item Knowledge Assessment Questionnaire adopted from Abdel Wahab et al. (2021) (27); the ESWL Health Outcomes Assessment Tool comprising the Numerical Pain Rating Scale (NRS-11) (16), the Modified Clavien System for complications (16), and the RAND SF-36 for quality of life (16). The study followed three phases: pre-intervention assessment after informed consent; a structured six-session nurse-led educational program delivered in small groups covering ESWL procedure, preparation, post-procedure care, lifestyle modification, and quality-of-life enhancement; and a post-intervention assessment conducted one month after the sessions. Validity was ensured through expert review (CVI 0.88–0.95), and reliability was confirmed through a pilot study (Cronbach's alpha 0.79–0.90). Ethical approval was obtained from the Research Ethics Committee of The University of Lahore, and participants' confidentiality, autonomy, voluntary participation, and anonymity were fully maintained throughout the study. Data were analyzed using SPSS version 25. The non-parametric Wilcoxon sign rank test was applied. A significance level of $p < 0.05$ was considered statistically significant.

RESULTS

Demographic Characteristics of Participants

Table 4.1

Demographic Characteristics of Participants (n=40)

Variables	Categories	Frequency (%)
Age in Years	20-25 Year	10(25)
	26-30 Year	9(22.5)
	31-35 Year	14(35)
	36-40 Year	4(10)
	> 40 Year	3(7.5)
Gender	Male	23(57.5)
	Female	17(42.5)
Education Level	No formal schooling	5(12.5)
	Primary Level	15(37.5)
	Secondary Level	14(35.0)
	University Level	6(15.0)
Residence	Rural Areas	19(47.5)
	Urban Areas	21(52.5)
Marital Status	Married	22(55)
	Unmarried	18(45)
Occupation	Unemployed	21(52.5)
	Labourer	18(45.0)
	Government employee	1(2.5)

Table 4.1 presents the demographic characteristics of the study participants. The majority of respondents (35%) were aged between 31–35 years, while 25% were 20–25 years old. More than half of the participants (57.5%) were male. Regarding education, 37.5% had primary-level education, and 35% had secondary-level education. Most participants (52.5%) resided in urban areas, and 55% were married. In terms of occupation, 52.5% were unemployed, 45% were laborers, and only 2.5% were government employees.

Knowledge of Participants

Table 4.2

Comparison of knowledge of participants regarding Extracorporeal Shock Wave Lithotripsy pre and post intervention (n=40)

Variable	Pre-Intervention Median (IQR)	Post- Intervention Median (IQR)	p-value
Knowledge	16.7(13.3 - 26.7)	40.0(33.3 - 46.7)	<0.001

Table 4.2 shows a significant increase in participants' knowledge after the intervention. The median score improved from 16.7 before the intervention to 40.0 after it. The change was statistically significant ($p < 0.001$).

Extracorporeal Shock Wave Lithotripsy Health Outcomes

Table 4.3

Comparison of pain that participants experience during Extracorporeal Shock Wave Lithotripsy pre and post intervention (n=40)

Variable	Pre-Intervention Median (IQR)	Post- Intervention Median (IQR)	p-value
Pain	3.5 (3.0 - 4.0)	3.0(2.0 - 3.0)	0.021

Table 4.3 shows that participants experienced a reduction in pain after the intervention. The median pain score decreased from 3.5 before the intervention to 3.0 after it, and this change was statistically significant ($p = 0.021$).

Table 4.4

Comparison of quality of life of participants undergoing Extracorporeal Shock Wave Lithotripsy pre and post intervention (n=40)

Variable	Pre-Intervention Median (IQR)	Post- Intervention Median (IQR)	p-value
Quality of Life	53.9(44.4 - 59.9)	61.4(57.2 - 63.9)	0.021

Table 4.4 shows an improvement in participants' quality of life after the intervention. The median score increased from 53.9 before the intervention to 61.4 after it, and this difference was statistically significant ($p = 0.021$).

Table 4.5

Comparison of complications regarding Extracorporeal Shock Wave Lithotripsy pre and post intervention (n=40)

Variable	Pre-Intervention Median (IQR)	Post- Intervention Median (IQR)	p-value
Complications	12.5(11.0 - 16.0)	12.0(10.3 - 13.0)	0.021

Table 4.5 shows a reduction in complications after the intervention. The median complication score decreased from 12.5 before the intervention to 12.0 after it, with the change being statistically significant ($p = 0.021$).

DISCUSSION

This study demonstrated that a nurse-led educational intervention significantly enhanced patients' knowledge regarding Extracorporeal Shock Wave Lithotripsy (ESWL). Post-intervention knowledge scores increased markedly, reflecting the effectiveness of structured, patient-centered

education. These findings are consistent with prior research showing that nurse-led education improves understanding of ESWL procedures, pre- and post-care instructions, and preventive measures, thereby promoting adherence and reducing complications (13,14,25). The improvement is likely due to interactive, clear, and focused teaching strategies that facilitate retention and comprehension.

The intervention also significantly improved health outcomes. Median pain scores decreased from 3.5 to 3.0 ($p = 0.021$), indicating reduced procedural discomfort, aligning with evidence that pre-procedure education mitigates anxiety and enhances pain tolerance (15,17,26). Participants' quality of life improved, reflecting better self-care, adherence to preventive measures, and reduced post-procedural anxiety, consistent with previous studies (18,19,20). Post-ESWL complications declined notably, suggesting that structured guidance on hydration, medication adherence, activity modification, and early symptom recognition contributes to safer recovery (21,22,23).

Overall, these findings confirm that nurse-led educational interventions exert a multidimensional impact by improving knowledge, reducing pain and complications, and enhancing quality of life. This underscores the critical role of nurses in delivering evidence-based, patient-centered education to optimize clinical outcomes in ESWL care (23,24,28).

CONCLUSION

The findings of this study demonstrated that the nurse-led educational intervention had a significant positive impact on patients undergoing Extracorporeal Shock Wave Lithotripsy (ESWL). Demographically, most participants were middle-aged, male, with primary to secondary education levels, and moderate to hard occupational effort, representing a diverse socioeconomic background. Following the intervention, participants showed a marked improvement in knowledge regarding ESWL. In terms of health outcomes, there was a statistically significant reduction in pain intensity ($p = 0.021$). The quality of life scores also improved significantly ($p = 0.021$).

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