

## A Study on Urinary Tract Infection among the Individuals Underwent Gynaecological and Surgical Interventions

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### Abstract

**Introduction:** Urinary tract infections (UTIs) are significant concern for individuals undergoing gynecological and surgical interventions, often leading to increased morbidity and healthcare costs. Key risk factors include catheterization, surgical complexity, and inadequate antibiotic prophylaxis. This study explores the incidence and risk factors of UTIs in these populations to improve patient outcomes.

**Methods:** This prospective study, conducted at KIMS Amalapuram from January to March 2024, investigated UTI incidence and risk factors in patients undergoing gynecological and surgical procedures. Data on demographics, surgery details, and postoperative urine cultures were collected. Quantitative and qualitative analyses identified UTI risk factors. Ethical approval and informed consent were obtained.

**Results:** Among 500 patients, 70 (14%) developed postoperative UTIs. The highest rate was in hysterectomy patients (42.8%). Prolonged catheterization (OR: 2.5), complex surgeries (OR: 3.0), lack of antibiotic prophylaxis (OR: 2.2), age  $\geq 65$  years (OR: 1.8), and diabetes (OR: 2.0) were significant risk factors.

**Conclusion:** This study underscores the high incidence of UTIs post-gynecological and surgical interventions, identifying key risk factors like prolonged catheterization, surgery type, and inadequate antibiotic prophylaxis. Targeted interventions, such as early catheter removal, proper antibiotic use, and improved postoperative care, can reduce UTI incidence. Future research should validate these findings in larger studies.

**Keywords:** Urinary Tract Infections (UTIs), Gynecological Surgery, Catheterization, Antibiotic Prophylaxis, Postoperative Care.

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### Introduction

Urinary tract infections (UTIs) represent a significant health concern, especially among individuals who have undergone gynecological and surgical interventions. These infections are commonly associated with increased morbidity, extended hospital stays, and elevated healthcare costs. Understanding the risk factors and preventive measures is crucial for improving patient outcomes in these populations.

Several studies have highlighted the heightened risk of UTIs following gynecological surgeries. For instance, catheterization during surgical procedures is a well-documented risk factor for the development of UTIs. [1] Furthermore, surgeries involving the lower urinary tract can directly impact urinary function and increase susceptibility to infections. [2]

Postoperative care and hygiene practices are also critical in preventing UTIs. Research has shown that the duration of catheter use significantly influences the likelihood of infection. [3] Additionally, the type of surgical procedure, such as hysterectomy, can determine the risk levels, with some procedures posing a higher threat due to the complexity and duration of the operation. [4]

The role of antibiotics in preventing postoperative UTIs has been a subject of numerous studies. Proper antibiotic prophylaxis is essential to mitigate the risk of infections, especially in patients with additional risk factors such as diabetes or immunosuppression. [5] However, the inappropriate use of antibiotics can lead to resistance, complicating the treatment of UTIs. [6] This study aimed to delve deeper into the incidence and risk factors of UTIs among individuals

undergoing gynecological and surgical interventions, providing insights for better clinical practices and patient care.

#### Methods:

It was a prospective study, conducted in the department of KIMS, Amalapuram. Study was conducted between January 2024 to March 2024. Study protocol was approved by the Institutional Ethics Committee. Informed written consent was taken from the study members.

This study investigates the incidence and risk factors associated with UTIs among individuals who have undergone gynecological and surgical interventions. The research follows a mixed-methods approach, combining both quantitative and qualitative data to provide a comprehensive analysis. This design allows for the observation of the development of UTIs and the identification of potential risk factors.

Participants included individuals aged 18 and above who underwent any gynecological or surgical procedure involving the urinary tract. Patients were excluded if they had a pre-existing UTI or were on antibiotics for any other infection at the time of surgery. Demographic information (age, sex, medical history), surgical details (type and duration of surgery), and baseline urine cultures were obtained. Information on the type of anesthesia, use and duration of catheterization, and intraoperative antibiotic prophylaxis was recorded. Follow-up urine cultures were taken at 24 hours, 48 hours, and 7 days post-surgery to detect the presence of UTIs. Patients were monitored for symptoms of UTI, including dysuria, frequency, urgency, and fever.

Urine samples were cultured using standard microbiological techniques to identify uropathogens. Sensitivity testing was performed to determine the appropriate antibiotic therapy. A UTI was defined by the presence of  $\geq 10^5$  colony-forming units (CFU)/mL of uropathogens in a

midstream urine sample, along with clinical symptoms.

Quantitative data were analyzed using statistical software. Descriptive statistics summarized patient demographics and baseline characteristics. Incidence rates of UTIs were calculated, and logistic regression analysis was used to identify risk factors associated with the development of UTIs. Variables included in the regression model were age, type of surgery, duration of catheterization, type of anesthesia, and intraoperative antibiotic use.

Qualitative data were collected through semi-structured interviews with a subset of patients and healthcare providers to explore their experiences and perceptions related to UTI prevention and management. Thematic analysis was employed to identify common themes and insights.

**Ethical Considerations:** The study was approved by the Institutional Review Board (IRB) of the hospital. Informed consent was obtained from all participants before inclusion in the study. Confidentiality and privacy of patient data were strictly maintained throughout the study.

#### Results:

Out of the 500 patients included in the study, 70 (14%) developed UTI postoperatively. Those undergoing hysterectomy had the highest UTI rate (42.8%). Urogynecological surgeries, laparoscopies, and other gynecological procedures had lower rates at 21.4%, 14.3%, and 14.3%, respectively (Table 1). Prolonged catheterization had an odds ratio (OR) of 2.5 (95% CI: 1.5 – 4.1,  $p = 0.001$ ). Complex surgeries were associated with an OR of 3.0 (95% CI: 1.8 – 5,  $p = 0.001$ ). Lack of antibiotic prophylaxis showed an OR of 2.2 (95% CI: 1.3 – 3.7,  $p = 0.002$ ). Age  $\geq 65$  years had an OR of 1.8 (95% CI: 1.1 – 3,  $p = 0.015$ ), and diabetes had an OR of 2.0 (95% CI: 1.2 – 3.4,  $p = 0.007$ ) (Table 2).

**Table 1: Incidence of UTIs by type of surgery; n (%)**

S. No	Type of surgery	Total	UTI
1	Hysterectomy	150 (30)	30 (42.8)
2	Urogynecological Surgery	100 (20)	15 (21.4)
3	Laparoscopy	100 (20)	10 (14.3)
4	Other Gynecological	150 (30)	10 (14.3)
Total		500 (100)	70 (100)

**Table 2: Logistic Regression Analysis of Risk Factors for UTIs**

Risk factor	Odds ratio (OR)	95% Confidence Interval (CI)	P value
Prolonged Catheterization	2.5	1.5 – 4.1	0.001
Type of Surgery (Complex)	3	1.8 – 5	0.001
Lack of Antibiotic Prophylaxis	2.2	1.3 – 3.7	0.002
Age ( $\geq 65$ years)	1.8	1.1 – 3	0.015
Diabetes	2	1.2 – 3.4	0.007

## Discussion

UTIs are a prevalent complication following gynecological and surgical interventions, leading to significant morbidity and extended hospital stays. This study aimed to explore the incidence and risk factors of UTIs in this context, providing crucial insights for improving clinical practices. The findings underscore the importance of addressing key risk factors such as prolonged catheterization, type of surgery, and antibiotic prophylaxis.

The study revealed a UTI incidence rate of 14% among the 500 patients, with higher rates observed in patients undergoing complex gynecological surgeries. This aligns with previous research indicating that surgical interventions, particularly those involving the urinary tract, are associated with an increased risk of UTIs. [7] The higher incidence in hysterectomy patients (20%) compared to other types of surgeries suggests that the invasiveness and duration of the procedure play critical roles in UTI development.

Prolonged catheterization emerged as a significant risk factor, with an OR of 2.5. This finding is consistent with other studies that have identified indwelling urinary catheters as a primary source of infection due to the introduction of pathogens and disruption of the natural urinary flow. [8] The type of surgery, particularly complex gynecological procedures, was associated with an OR of 3.0 for developing UTIs. This is likely due to the extensive manipulation of the urinary tract and longer operative times, which provide greater opportunities for bacterial contamination. [9]

The role of antibiotic prophylaxis in preventing UTIs was also highlighted, with inadequate prophylaxis significantly increasing the risk (OR 2.2). Appropriate antibiotic use has been shown to reduce postoperative infections, but the timing and selection of antibiotics are critical to their effectiveness. [10] However, misuse or overuse of antibiotics can lead to resistance, complicating treatment options for UTIs. [11]

The study's qualitative findings emphasized the importance of postoperative hygiene and early mobilization. Patients and healthcare providers reported concerns about the duration of catheterization and the timing of antibiotic administration. Early removal of catheters and prompt mobilization have been associated with lower UTI rates, as they reduce the risk of bacterial colonization and improve urinary flow. [12]

Older age ( $\geq 65$  years) and comorbid conditions like diabetes were significant risk factors for UTIs, with ORs of 1.8 and 2.0, respectively. Aging is associated with various physiological changes that predispose individuals to infections, including

diminished immune response and changes in the urinary tract. [13]. Diabetes, on the other hand, compromises immune function and can cause autonomic neuropathy, affecting bladder function and increasing the risk of UTIs. [14]

The findings of this study have several implications for clinical practice. Firstly, strategies to minimize the duration of catheterization are crucial. Protocols for early catheter removal and alternative methods for managing postoperative urinary retention should be implemented. [15] Secondly, careful consideration should be given to antibiotic prophylaxis. Guidelines should be followed to ensure appropriate selection and timing of antibiotics to maximize their effectiveness while minimizing the risk of resistance. [16]

Enhanced postoperative care, including meticulous hygiene practices and patient education, can further reduce the risk of UTIs. Healthcare providers should emphasize the importance of hydration, regular voiding, and early mobilization to patients. Additionally, monitoring high-risk patients, such as older adults and those with diabetes, is essential for early detection and intervention of UTIs.

This study has several limitations that should be considered. The single-center design may limit the generalizability of the findings. Multicenter studies would provide more comprehensive data and enhance the applicability of the results across different settings. Additionally, the reliance on self-reported symptoms for diagnosing UTIs may introduce bias. Future research should incorporate objective measures, such as biomarker analysis, to confirm infections. Further research is also needed to explore the long-term outcomes of UTIs in this patient population. Understanding the impact of recurrent UTIs on quality of life and healthcare utilization is crucial for developing comprehensive management strategies. Investigating the effectiveness of various prophylactic measures, such as probiotics or non-antibiotic interventions, could provide alternative approaches to reducing UTI risk.

## Conclusion

This study highlights the significant incidence of UTIs following gynecological and surgical interventions and identifies key risk factors such as prolonged catheterization, type of surgery, and inadequate antibiotic prophylaxis. Addressing these factors through targeted interventions, including early catheter removal, appropriate antibiotic use, and enhanced postoperative care, can significantly reduce the burden of UTIs in this population. Future research should focus on validating these findings in larger, multicenter studies and exploring innovative preventive measures to further improve patient outcomes.

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