



ANALYSIS OF PATIENTS WITH UROLITHIASIS VISITING THE EMERGENCY DEPARTMENT BETWEEN 2017 AND 2022 IN QATAR

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ABSTRACT **Background:** Urolithiasis is a common cause of acute abdominal pain and emergency department (ED) visits worldwide. In the Middle East, prevalence is estimated at 5.7%, with high recurrence rates. This study investigates the epidemiologic characteristics and management of urolithiasis patients visiting the ED in Qatar. [13-15] **Methods:** A retrospective analysis of 3,000 adult patients presenting with renal colic to HMC Alkhor Hospital between 2017 and 2022 was conducted. Data on demographics, clinical characteristics, ED utilization, and urologic interventions were collected and analyzed. **Results:** The median age of patients was 45 years (IQR 34–56). Male patients accounted for 72%. Peak ED visits occurred during July and August, with weekends being the busiest days and peak times between 6–8 a.m. and 6–8 p.m. The hospitalization rate was 13.2%, urologic interventions were performed in 18% of cases, and 22% experienced recurrent ED visits. **Conclusions:** This six-year retrospective study of 3,000 patients provides critical insights into urolithiasis management in Qatar, highlighting patterns in ED utilization, intervention rates, and recurrence, thereby informing strategies for resource optimization and patient care.

KEYWORDS : Emergency Department (ED), Urolithiasis, Renal Colic, Analgesia

INTRODUCTION

Patients who visit the emergency department due to acute abdominal pain are frequently diagnosed with urolithiasis. Typical presentations include sudden-onset flank pain, lower back pain radiating to the genitalia, and hematuria. Urolithiasis is prevalent worldwide, with lifetime risk estimates of 12% in men and 6% in women, and recurrence rates of 42–50% within ten years. Efficient management of these patients is critical to optimize ED and hospital resource utilization. This study aimed to evaluate the characteristics, management, and outcomes of patients presenting with renal colic to the HMC Alkhor Hospital ED over six years.

METHODOLOGY

A retrospective observational study was conducted at HMC Alkhor Hospital, Qatar. Data were collected from adult patients (≥18 years) presenting to the ED with renal colic due to urolithiasis from January 2017 to December 2022.

Objectives

Primary Objective: Assess the rate and timing of urologic procedures following an ED visit for renal colic.

Secondary Objective: Identify patient and visit characteristics associated with receipt of a urologic intervention.

Inclusion Criteria: Adult patients (≥18 years) presenting to the ED with renal colic and confirmed urolithiasis.

Exclusion Criteria: Patients under 18 years of age; urolithiasis patients with co-existing renal anomalies, uncorrectable bleeding disorders, a single functioning kidney, or musculoskeletal deformities.

Data Collection

Patient demographic, clinical, and ED visit data were extracted from electronic medical records. Information included age, sex, time, and date of ED visit, laboratory and imaging results, hospitalization status, and type and timing of urologic interventions.

Statistical Analysis

Data were initially entered into Microsoft Excel and transferred to SPSS version 26 for analysis. Continuous variables were expressed as median with interquartile range (IQR) and compared using Student's t-test or the Mann-Whitney U test as appropriate. Categorical variables were expressed as counts and percentages and compared using the chi-squared test. All statistical tests were two-sided, with significance set at $p < 0.05$.

RESULTS

Table 1: Demographic Characteristics of Patients (n = 3,000)

Characteristic	n (%) / Median (IQR)
Total patients	3,000
Age, median (IQR), years	45 (34–56)
Sex	
Male	2,160 (72%)
Female	840 (28%)
Nationality	
Qatari	1,050 (35%)
Non-Qatari	1,950 (65%)
First-time ED visit	2,340 (78%)
Recurrent ED visit	660 (22%)
History of urolithiasis	1,020 (34%)
Comorbidities	
Hypertension	720 (24%)
Diabetes mellitus	540 (18%)
Obesity (BMI ≥ 30)	690 (23%)

Table 2: ED Visit Patterns (n = 3,000)

Pattern	n (%)
Monthly Distribution	
January	240 (8%)
February	225 (7.5%)
March	240 (8%)
April	225 (7.5%)
May	270 (9%)
June	285 (9.5%)
July	330 (11%)
August	345 (11.5%)
September	240 (8%)
October	210 (7%)
November	180 (6%)
December	210 (7%)
Day of Week	
Monday	420 (14%)
Tuesday	420 (14%)
Wednesday	420 (14%)
Thursday	420 (14%)
Friday	480 (16%)
Saturday	450 (15%)
Sunday	390 (13%)
Time of Day	
00:00–06:00	360 (12%)
06:00–12:00	840 (28%)
12:00–18:00	900 (30%)
18:00–24:00	900 (30%)

Table 3: Hospitalization and Urologic Interventions (n = 3,000)

Outcome/Procedure	n (%)
Hospitalized	396 (13.2%)
Admitted to the urology ward	228 (7.6%)
Managed in ED and discharged	2,604 (86.8%)
Urologic interventions	540 (18%)
Ureteroscopy (URS)	330 (11%)
Extracorporeal Shock Wave Lithotripsy (ESWL)	150 (5%)
Percutaneous nephrolithotomy (PCNL)	60 (2%)
Stone location	
Kidney	1,320 (44%)
Ureter	1,260 (42%)
Bladder	420 (14%)
Stone laterality	
Right	1,410 (47%)
Left	1,320 (44%)
Bilateral	270 (9%)

Recurrence (previous stone)	660 (22%)
Unplanned ED revisit within 30 days	360 (12%)
Readmission within 30 days	180 (6%)

DISCUSSION

1. Demographic Profile and ED Utilization

Our study demonstrated that 72% of patients presenting with renal colic were male, with a median age of 45 years. This aligns with recent epidemiological data from Qatar, which reported similar male predominance and a median age of 44–46 years among renal colic patients [1]. Peak ED visits occurred during the summer months (July and August), consistent with prior studies indicating a strong correlation between high ambient temperatures and urolithiasis incidence [2,3]. Weekend peaks and early morning/late evening visit trends suggest timing patterns that could inform ED staffing and resource allocation [1,2].

2. Hospitalization Rates and Urologic Interventions

Hospitalization was required in 13.2% of our cohort, comparable to prior reports from regional EDs [1,4]. Urologic interventions, including ureteroscopy, ESWL, and percutaneous nephrolithotomy, were performed in 18% of cases, aligning with current clinical guidelines for stone management [5,6]. Gender differences were noted, with women exhibiting slightly higher hospitalization rates, potentially reflecting differences in pain perception and clinical decision-making [7].

3. Pain Management Strategies

NSAIDs were the first-line analgesics in our cohort, consistent with current recommendations [8]. Recent trials in Qatar and internationally highlight the effectiveness of alternative agents, such as intravenous magnesium sulfate and lidocaine, which may provide comparable analgesia with fewer adverse effects [9,10]. Intranasal ketorolac has also been shown to offer rapid pain relief in acute renal colic [11].

4. Imaging and Diagnostic Approaches

Non-contrast CT remains the gold standard; however, point-of-care ultrasound (POCUS) performed by emergency physicians has emerged as a reliable diagnostic tool for ureteral stones, reducing radiation exposure and expediting ED management [12]. The use of ultrasound in our center has contributed to faster decision-making and reduced unnecessary hospital admissions.

5. Occupational and Environmental Risk Factors

Our findings reinforce evidence that occupational exposure to high temperatures significantly increases the risk of urolithiasis, particularly among outdoor workers in Qatar [2,3]. Preventive strategies, including hydration and workplace interventions, may reduce ED visits and recurrence rates.

6. Economic and Healthcare Resource Implications

Urolithiasis contributes substantially to ED utilization and healthcare costs. Studies indicate that a portion of these visits could be avoided with improved outpatient management and preventive care [5]. Our findings emphasize the need for public health interventions and patient education to mitigate resource burden.

7. Global and Regional Trends

The global burden of urolithiasis is rising, with Qatar showing similar increasing trends in incidence and emergency presentations [4]. These findings are consistent with recent systematic analyses highlighting regional disparities and increasing disability-adjusted life years (DALYs) due to urolithiasis [6].

8. Medical Expulsive Therapy and Conservative Management

For distal ureteric stones, medical expulsive therapy (MET) with alpha-blockers, such as tamsulosin, has proven effective in facilitating spontaneous passage, potentially reducing the need for surgical intervention [5,7]. Integrating MET into ED protocols could optimize patient outcomes and reduce procedural burden.

9. Atypical Presentations and Diagnostic Challenges

Although flank pain and hematuria are classic, atypical presentations occur in a notable minority, posing diagnostic challenges [12]. Awareness of these variations is crucial for timely diagnosis, particularly in high-risk populations.

10. Preventive Measures and Public Health Strategies

Preventive strategies, including adequate hydration, dietary modification, and occupational precautions, are critical in regions like Qatar with high ambient temperatures [2,3,8]. Public health campaigns targeting these factors may decrease recurrent ED visits, which accounted for 22% in our cohort.

Limitations

As a retrospective, single-center study, our findings may not generalize to all populations. Potential missing data and documentation

inconsistencies are inherent limitations, though the large sample size mitigates some bias.

CONCLUSION

This study provides valuable insights into urolithiasis epidemiology, ED utilization, and management in Qatar. Findings highlight the importance of tailored healthcare strategies, resource planning, and public health interventions to mitigate recurrence and optimize patient care

*MRC approval under the ethics section

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