BMC Emergency Medicine

RESEARCH

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Magnitude and outcome of urologic emergencies: prospective cohort study

Eyerusalem Fissehatsion Dejene[1], Ayalkibet Alemayehu Debele[1*] and Tilaneh Leyeh Demilow[1]

Abstract

Background Urological emergencies, which range from acute urinary retention to life-threatening malignancies, represent a significant source of morbidity and mortality. Despite their prevalence in routine clinical practice, the spectrum and overall burden of these conditions in developing countries remain poorly characterized.

Method A prospective cohort study was conducted at a tertiary hospital between August 2024 and February 2025, among all adult patients with urologic emergencies who visited the emergency department during the study period. Data collected by 2 research assistants from patient interviews by structured questionnaire, medical record reviews, and patients followed until discharge or transfer out from the emergency department.

Result About 162 patients were included in the study, and urologic emergencies account for 12.2% (176/1446) of all surgical emergencies. The most common presentation of urologic emergency patients was flank pain, at 100 (61.7%), followed by urinary retention, at 23 (14.2%), and hematuria, at 12 (7.4%). Trauma related to the Genitourinary system, which is seen in 14(8.6%), is among the reasons for emergency visits during the study period. Urolithiasis accounts for 51.7% (77/149), followed by Benign prostatic hyperplasia (BPH), cervical cancer, and urethral stricture as the commonest underlying causes for non-traumatic causes. Emergency surgical intervention was done for ($n=151$, 93%) of the patients, with the most common procedure performed for non-traumatic urologic emergencies being Ureteric stenting for 46 (30.5%), Percutaneous nephrostomy for 27(17.9%), transurethral catheterization for 23(15.2%), and stone extraction for ($n=19$ 12.5%). Patients who came within 1 month or less duration of symptoms have approximately 4.3 times higher odds of improved outcome when compared with those with duration of symptoms of >1month (AOR: 4,34; 95% CI: 1.45–12.99). Additionally, having increased abnormal creatinine at presentation has inversely affected improved outcome by an odds ratio of 0.1(95% CI: 0.01–0.82).

Conclusion Urological emergencies account for a significant proportion of all emergency surgery presentations. Renal colic with or without obstructive uropathy is the leading cause of surgical emergency admissions in this geographic area. Delayed presentation of over 1 month and abnormal creatinine level at presentation negatively affect the outcome of patients.

Keywords Urologic emergencies, Obstructive uropathy, Urolithiasis, Emergency department

*Correspondence:
Ayalkibet Alemayehu Debele
ayalke123@gmail.com
[1]Hawassa University College of Medicine and Health Sciences, Sidama, Ethiopia

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Introduction

Urological emergencies are conditions related to the urinary system that need to be treated right away to prevent morbidity and death. Around 5.84% of all surgical emergency admissions were cases of urologic emergency [1, 2]. These emergencies comprise a wide spectrum of conditions, from acute urinary retention to malignancies associated with significant morbidity and mortality. Urologic emergencies are a common component of routine clinical practice, accounting for up to 27% of all urology admissions in tertiary care institutions [3, 4]. The prevalence of urological emergencies may vary depending on the socioeconomic status and demographics of the local populations around the globe [1, 2, 5]. According to a study done at a regional Hospital in West Africa, urological emergencies accounted for 3.7% of all emergencies among all ED admissions [6].

Urologic emergencies can be traumatic or nontraumatic. Nontraumatic causes include urinary retention, hematuria, testicular torsion, and renal colic, with urinary retention being the most common [5–8].

The avoidance and treatment of consequences, including renal impairment and urosepsis, as well as the early presentation, identification, and quick care of urologic malignancies, will all contribute to a lower death rate [2].

Different regions have different epidemiology and a spectrum of urologic emergencies [9, 10].

Measuring the surgical burden of disease, especially urological cases, in sub-Saharan Africa is inherently challenging. Characteristics such as endemic poverty, poor literacy rates, cultural beliefs, and overall skepticism of healthcare, combined with the absence of national health insurance, cause diseases to be underestimated [11, 12]. Therefore, it is typical to present late with an advanced illness. The epidemiology of urologic emergencies is not studied in eastern Africa, including Ethiopia, a country with a population of around 120 million.

The primary aim of this study is to provide baseline data on epidemiology and outcome of urologic emergencies with the hope of providing important data for health planning.

Methodology

Study area

The Hawassa University Specialized Hospital served as the study's site. The Sidama region's capital, Hawassa, is situated 275 km south of Ethiopia's capital, Addis Ababa. This tertiary hospital's surgical department has six subspecialties, including urology.

The emergency room is a large department with distinct areas for children and adults. Patients with both medical and surgical issues are admitted to the adult emergency room, which has 54 beds.

Study design and period

A prospective cohort study conducted from August 2024 to February 2025 included all patients admitted to the emergency department with any urologic emergency condition.

Inclusion criteria

All patients admitted to the adult emergency department with any urologic emergency condition are evaluated by an emergency medicine physician consented to data collection.

Exclusion criteria

All patients without a urologic emergency condition or who refused to give consent for data collection.

Operational definition

Improved outcome: discharge with improved symptoms or improved renal function test.

Not Improved: Death, worsened, or similar symptoms at discharge or transfer, deteriorated renal function regardless of symptoms.

Data collection procedure

Following Hawassa University College of Medicine and Health Sciences' approval of the proposal (reference number IRB/294/16), two trained research assistants collected data from the emergency department under the supervision of two surgical residents, the principal investigators, following a thorough orientation and explanation of the study's goals. Direct patient evaluation and chart management in accordance with the patients' medical records were used to collect data. The target factors guided subsequent decisions and actions pertaining to the patient's status, which were recorded upon hospital discharge.

Data quality assurance

A thorough analysis of pertinent research and related literature preceded the preparation of the data collection tool to ensure the quality of the data. Enough information regarding the variables and cases, along with their measurement units, was provided to the data collectors. A readable and clear record format was also prepared, and the researcher oversaw the data collection process. The data collection tool was pretested for 1 week, and a refined format of the tool was prepared.

The supervisors evaluated and cross-checked the collected data every day, and the investigator used the Kobo Toolbox software every other day to verify completeness.

Data processing and analysis

Data were entered, cleaned, recoded, and analyzed using SPSS version 27. Descriptive statistics were used to

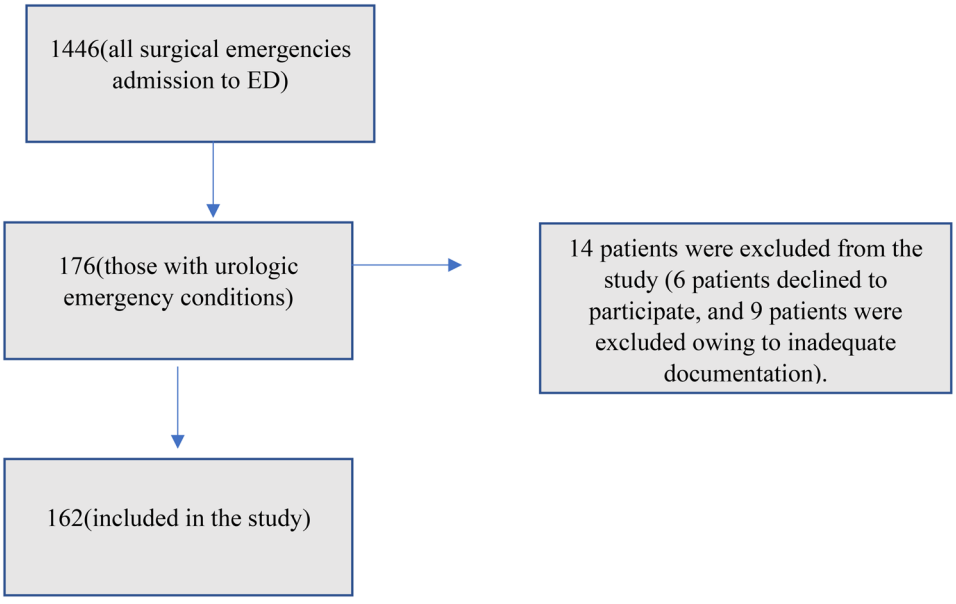


Fig. 1 Workflow diagram of the selection of participants

calculate the mean and standard deviation, as well as to describe the frequencies, percentages, and rates after the data distribution had been confirmed. A logistic regression model was used for multivariate analysis in order to identify the independent variable groups that influence the outcome of urologic emergency cases. Each independent variable was examined independently to look for any correlations. To account for all possible confounders, factors with p-values less than 0.25 were included in the multivariate analysis. A P-value of less than 0.05 was used to determine whether the variables had a statistically significant association. The 95% confidence interval for each of the crude and adjusted odds ratios (AORs) was used.

This prospective cohort study has been reported in line with the STROBE guideline [13].

Ethical consideration

Ethical approval was obtained from Hawassa University College of Medicine and Health Sciences with reference number IRB/294/16. Each participant was provided with clear written consent for the data collection.

Results

Magnitude and socio-demographic characteristics of study participants

Of all surgical emergencies hospitalized throughout the study period, urological emergencies account for 12.2% (176/1446). During the study period, we managed to include 162 study participants identified as presenting to the emergency department with complaints of urologic conditions who fulfilled the inclusion criteria as described in Fig. 1.

Table 1 Socio-demographic characteristics of Urologic emergency patients ($n=162$)

		Frequency ($n=162$)	Percentage
Sex	Male	126	77.8%
	Female	36	22.2%
Address	Rural	108	66.7%
	Urban	54	33.3%
Occupation	Farmer	80	49.1%
	Housewife	34	20.9%
	Merchant	10	6.1%
	Employee	18	11.0%
	Student	14	8.6%
	Driver	7	4.3%
health insurance coverage	Yes	98	60.5%
	No	64	39.5%
marital status	Married	127	78.4%
	Single	29	17.9%
	Widowed	6	3.7%

In terms of sociodemographic characteristics, the study found that the majority of participants came from rural areas, accounting for 108(66.7%), and there was a male predominance of 126(78%). The mean age of the patients was 44 ± 17.1 years, with extremes of 17 and 99 years (Table 1).

Clinical presentation of urologic emergencies

The analysis by mode of arrival revealed that 63% (102/162) of those who referred to this tertiary hospital, and only a small share, 3.7% (6/162), came directly from home. The commonest presentation of urologic

emergency patients was flank pain, 61.7% (100/162), followed by urinary retention, 14.2% (23/162), and hematuria, 7.4% (12/162). Traumatic urologic emergencies take only a small share of all urologic emergencies when compared to non-traumatic causes. Tale 2.

Half of the non-traumatic urologic emergencies, 49.7% (73/147), came with symptoms of greater than 1 month. Overall, anemia prevalence was 38.9% (63/162), and 37% (60/162) had raised creatinine levels. Of the 144 research participants with nontraumatic etiology, abdominopelvic ultrasonography revealed hydronephrosis in at least one kidney in 72.9% (105/144), with urolithiasis being the most common cause in 69% (73/105) of these cases. The primary cause of flank discomfort and 69/100 (69%) of urologic emergencies that result in obstructive uropathy is urolithiasis, or the presence of a stone at any anatomic area of the urinary tract.

Urinary retention is the second most common presentation observed in 25(15.4%) participants with urethral stricture, in 9 cases being the primary cause for retention, followed by benign prostatic hyperplasia seen in 7 cases. Benign prostatic hyperplasia (BPH)/ bleeding prostate was the main etiology of gross hematuria in 50% (6/12), and bladder cancer in 4/12 of the participants. Table 2.

Management and initial outcome of urologic emergencies

Emergency intervention was done for ($n = 151$, 93%) of the patients, with the remaining managed with follow-up and observation conservatively, though some were not managed due to being discharged against medical advice for financial reasons ($n = 11$, 6.8%).

The most common procedure performed for non-traumatic urologic emergencies was Ureteric stenting for 46 (30.5%), Percutaneous nephrostomy 27(17.9%), transurethral catheterization 23(15.2%), and stone extraction (each $n = 19$, 12.5%).

Of the 14 trauma cases, emergency interventions were done for 12 participants. 6 were surgically explored and managed, 3 suprapubic cystostomy, and the rest underwent stenting, transurethral successful catheterization, and percutaneous nephrostomy. 1 participant was managed conservatively with follow-up for Grade 3 renal injury, and 1 patient left against medical advice.

The majority of patients, $n = 131$ (80.9%), had favorable outcomes. However, complications included mortality of 3 participants and $n = 14$(8.6%) left against medical advice, while the remaining 14 (8.6%) cases were discharged with a link to Nephrology for management of end-stage renal disease. Table 3.

Factors associated with the overall outcome of the urologic emergency patients

Binary regression analysis was done to identify variables that affect the outcome and tested individually. The sociodemographic variables, such as Sex, occupation, educational status, marital status, mode of arrival, and the ownership of health insurance, have no significant association with the outcome of patients managed with urologic emergencies.

As well as analysis was done to test other variables such as presenting complaints, ultrasound findings, presence of infection on urinalysis, and working diagnosis, which all did not show a statistically significant association with the overall outcome.

In bivariate analysis, duration of symptoms, elevated creatinine above the normal range, and presence of intervention independently showed significant associations with the overall outcome of the participants. The multivariable logistic regression demonstrated that those who came within 1 month or less duration of symptoms have approximately 4.3 times higher odds of improved outcome when compared with those with duration of symptoms of >1month (AOR: 4,34; 95% CI: 1.45–12.99). Additionally, having increased creatinine at presentation has inversely affected improved outcome by an odds ratio of 0.1(95% CI: 0.01–0.82). Sex, occupation, educational status, marital status, mode of arrival, and the ownership of health insurance, Hematocrit, and presence of UTI were used as covariates. Table 4.

Discussion

The average age of participants with the urologic emergency in mid-forties is in line with prior studies [5, 14].

We observed a definite male predominance in our series, with a sex ratio of 3.5. In fact, almost all reports on urological emergencies show this male predominance [6, 15, 16]. This is ascribed to the increased number of urethro-prostatic pathology-related emergencies [17].

Urolithiasis is the most common cause of non-traumatic urologic emergencies, with flank pain as its main presenting complaint. Though slightly higher in this study, renal colic is seen similarly as the commonest urologic emergency with obstructive uropathy observed in 24.2% Shyam et al.'s study in India and 25% Fabrice Mondet et al.'s study in France [1, 18]. In contrast, most of the studies done in Africa showed urinary retention being the leading cause of urologic emergency admission [5, 6, 17, 19]. Ethiopia's high urolithiasis prevalence, genetic heterogeneity, and disparities in the healthcare system could all contribute to this [20, 21]. With this regard, the commonest procedures performed in our study to alleviate the obstruction were Ureteric stenting and percutaneous nephrostomy tube insertion, which make high demand and require easy availability of these materials with an affordable price for areas with low socio-economic status. This high magnitude was reported similarly in India, where 997 cases were managed with percutaneous nephrostomies to mitigate obstructive uropathy of

Table 2 Clinical characteristics at presentation

Category	Variables	Frequency	Percentage
Presenting chief complaint*	Urinary retention	23	14.2%
	Hematuria	12	7.4%
	Flank pain with fever	13	8.0%
	Flank pain without fever	87	53.7%
	Anuria or oliguria	8	4.9%
	Burning type of urination	4	2.5%
	Genital ulcer/wound	1	0.6%
	Trauma	11	6.8%
	Other	3	1.9%
For non-traumatic causes, duration of complaint	Less than 1 month	74	50.3%
	Between 1month and 1 year	61	41.5%
	Above 1 year	12	8.2%
	Total	147	100%
Reason for the delayed presentation of those greater than 1 month	Financial	20	27.8%
	Lack of awareness	21	29.2%
	Unavailability of transportation	1	1.4%
	Undermining symptoms	20	27.8%
	Delayed referral	10	13.9%
	Total	72	100%
Mode of arrival at the hospital*	Direct from home	6	3.7%
	Linked from the urology clinic	37	22.8%
	Referral from other institutions	102	63.0%
	Transferred from another department	17	10.5%
Hematocrit interpretation*	Normal	99	61.1%
	Anemia	63	38.9%
Creatinine*	Normal	60	37.0%
	Increased	102	63.0%
Urine analysis at presentation	Show signs of urinary tract infection	88	59.5%
	No sign of urinary tract infection	60	40.5%
Ultrasound findings for non-traumatic causes	Hydronephrosis with stone	73	50.7
	Hydronephrosis with bladder mass	5	3.5
	Hydronephrosis with an enlarged prostate	12	8.3
	Enlarged prostate	14	9.7
	Other finding	25	17.4
	Hydronephrosis with cervical cancer	15	10.4
	Total	144	100.0
Causes of trauma for traumatic causes	Motor Vehicle accident	7	50
	Falling accident	1	7.1
	Fighting injury	1	7.1
	IATROGENIC	4	28.7
	Unknown	1	7.1
	Total	13	100
Diagnosis for non-traumatic causes	BPH	17	11.4
	Prostatic cancer	8	5.4
	Cervical Cancer	15	10.1
	Urethral stricture	11	7.4
	Bladder Cancer	8	5.4
	Urolithiasis	77	51.7
	Other diagnosis	13	8.7
	Total	149	100.0

Note: $n = 162$ for categories with asterisks (*)

Table 3 Emergency surgical interventions for urologic emergencies

		Frequency	Percent
Emergency surgical intervention	Done	151	93.2
	Not Done	11	6.8
	Total	162	100
Type of surgical intervention*	Transurethral catheterization	23	15.2
	Suprapubic catheterization	9	6.0
	Bladder irrigation	8	5.3
	Stenting	46	30.5
	Percutaneous nephrostomy	27	17.9
	stone extraction	19	12.6
	Debridement	3	2.0
	Other interventions	14	10.6
	Bad (same, deteriorated, death)	31	19.1
Overall outcome	Good (Improved)	131	80.9

Note: $n = 151$ for categories with asterisks (*)

different causes, with the highest indication being renal colic [1].

The second most common urological emergency in our study was urinary retention. The majority of causes for retention were urethral stricture ($n = 9$), followed by chronic retentions exacerbated by acute provoking factors of benign prostatic hyperplasia ($n = 7$). This is similar to the one reported by Talreja et al. in India [1]. But urinary retention is primarily associated with prostate tumors and continues to be the first urological emergency in most African series [6, 17, 19]. Due to specific socioeconomic and cultural limitations, patients in Africa typically only visit medical institutions at the stage of complications. In most cases, patients are not concerned by the initial signs of a prostate tumor [10]. Urethral stricture is also reported as the commonest cause of urologic admissions in Malawi, similar to our study, due to an equivalent increase in urethral injury from increased Motor Vehicle use and civil violence [22]. The two main methods of managing urine retention were Transurethral catheterization $n = 16$ and suprapubic catheterization $n = 5$. Two other patients were managed with Urethral dilation and urethral stone extraction. The same way patients were managed in other reported studies [15].

Bleeding prostate followed by Bladder cancer were the commonest causes for emergency visits among participants with Hematuria, which accounts for 7.4% and is the third cause of all urologic emergencies. This figure is similar to the studies reported by Traore M et al. in Burkina Faso, which was 7.28% [6]. To manage these patients, a three-way urinary catheter must be inserted, and continuous bladder irrigation using normal saline must be started to remove any bladder clots.

According to our study, the short-term outcome of patients managed for urologic emergencies is a favorable outcome of 80.9%. The mortality rate was 1.85%, with 8.6% left against medical advice. Around 8.6% are found to have end-stage renal disease due to long-term effects and complications of urologic conditions.

Conclusion

According to this study, urological emergencies account for a significant proportion of all emergency admissions, and the spectrum of urologic emergency causes ranges from benign causes like urinary retention due to BPH to severe hydronephrosis due to advanced malignancies. The most frequent underlying cause for urologic admission is urolithiasis. The commonest intervention done was ureteric stenting to alleviate obstruction. Delays in presentation and abnormal creatinine at presentation were responsible for the negative outcomes. Community health education and training of primary health care providers could help to decrease delayed presentation. We recommend that health care providers consider this wide spectrum of urologic emergencies in terms of facility preparedness and skilled human resource availability. And we also recommend further study of why urolithiasis is common in this geographic area, as it has a high prevalence in this region.

Limitations of the study

The study was carried out in a single institution, which may limit the external validity and generalizability of the findings across different levels of the health system. Additionally, the study has a small sample size ($n = 162$), which may also affect generalizability to the regional level.

Table 4 Factors associated with outcome of urologic emergencies

Variables	Category	Outcome		COR (95%CI)	p-value	AOR (95%CI)
		Improved	Not Improved			
Emergency intervention	Done	130	21	0.02(0.01–0.13)		
	Not done	1	10			
Creatinine at presentation	Normal	56	4		0.03	
	Elevated	75	27	0.19(0.06–0.59)		0.11(0.01–0.82)*
Duration of symptoms	≤ 1 month	73	5	8.20(2.90–23.34)	0.01	4.34(1.45–12.90)*
	> 1month	44	25			

*Significant at a-p value < 0,05; AOR: adjusted odds ratio; COR: crude odds ratio

Abbreviations

AOR	Adjusted odds ratio
BPH	Benign prostatic hyperplasia
CI	confidence interval
COR	Crude odds ratio
ED	Emergency department
IRB	institutional review board
UTI	Urinary tract infections

Acknowledgements
WE would like to thank our families for their unwavering support.

Author contributions
EFD was responsible for Conceptualization and supervised data collection, co-designed the study, and oversaw the study's procedures. TLD and AAD co-designed the study, analyzed data, approved the proposal, and the manuscript.

Funding
No funding received.

Data availability
The electronic datasets generated and/or analyzed during the current study are not publicly available due to confidentiality and ethical restrictions, but they can be obtained from the corresponding author upon reasonable request. Access will be granted to qualified researchers for purposes of academic inquiry, provided that appropriate ethical considerations are met.

Declarations

Ethics approval and consent to participate
Approval of the Ethical and Protocol Review Committee of the College was obtained for this study. Informed consent was then obtained from each participant, ensuring that their participation was voluntary and based on a clear understanding of the research process. It has been registered at the research registry with registration number- *researchregistry11621*.

Competing interests
The authors declare no competing interests.

Conflict of interest
The authors affirm that they have no financial, personal, or institutional conflicts of interest that could have influenced the conduct, outcomes, or reporting of this study. All aspects of the research, including its design, data collection, analysis, interpretation, and manuscript preparation, were carried out independently and without any external influence.

Consent for publication
Not applicable.

Received: 31 December 2025 / Accepted: 30 April 2026
Published online: 06 May 2026

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