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In-Hospital Mortality Dynamics in Urology and Andrology at a Regional Tertiary Referral Center in Burkina Faso: A Cross-Sectional Retrospective Cohort Analysis (2018-2025)

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Abstract

Introduction: Epidemiological data on in-hospital urological mortality remain fragmented across sub-Saharan Africa. From a health economics and public health perspective, auditing clinical outcomes is critical to optimizing health systems under institutional resource constraints. This study aimed to analyze the in-hospital mortality rate, characterize the patient cohort, and delineate the underlying and immediate causes of death at the Ouahigouya Regional University Hospital (CHUR-OHG), Burkina Faso. **Methods:** A descriptive cross-sectional retrospective cohort study was conducted, reviewing medical charts from January 1, 2018, to December 31, 2025. Bivariate data logging and descriptive statistical analyses (frequencies, percentages, means ± standard deviation) were performed using STATA version 17.0. **Results:** Over the 8-year study period, a total of 2992 clinical admissions were registered in the department. Concurrently, 115 deaths were recorded, of which 5 were excluded due to missing data or unretrievable charts, yielding an analytical cohort of 110 usable death records. The cumulative raw in-hospital mortality rate was 3.7% per admission event. The mean age of the deceased cohort was 67.4 ± 16.7 years (range: 18 - 96 years), with a male-to-female sex ratio of 5.5. Urological malignancies constituted the primary underlying cause of death in 82.7% of cases (n = 91), predominantly driven by advanced prostate cancer (44.5% of the total cohort) and bladder cancer (34.5%). Among benign and infectious pathologies (11.8%, n = 13), gangrene of the external genitalia was the most prevalent infectious condition (2.7% of the total cohort). Septic shock

was the leading immediate terminal cause of death (31.8%, n = 35), followed by metabolic and respiratory complications of renal failure (23.7% combined, n = 26), and non-hemorrhagic hypovolemic shock (17.3%, n = 19). Overall, 85.5% (n = 94) of the patients possessed at least one pre-existing chronic comorbidity, dominated by urogenital schistosomiasis (36.2% of the comorbid subcohort) and systemic hypertension (31.9%). Critically, 95.5% (n = 105) of the terminal events occurred in the general ward. **Conclusion:** In-hospital urological mortality at CHUR-OHG is primarily associated with late-stage oncological malignancies and severe acute medical complications, including urosepsis and metabolic renal derangements. While these descriptive parameters provide an operational baseline, prospective analytical designs are mandatory to empirically establish causal links between specific structural health system bottlenecks and patient survival curves.

Keywords

Hospital Mortality, Urology, Andrology, Health Systems, Biostatistics, Burkina Faso

1. Introduction

In-hospital mortality metrics represent foundational indicators of healthcare quality, clinical protocol efficacy, and institutional resource allocation [1]. From a health economics standpoint, these metrics do not merely capture biological endpoints; they reflect the operational performance of health delivery systems, clinical micro-environments, and macroeconomic barriers to timely tertiary care access.

In high-income countries, robust urological registries routinely capture systemic and operative mortality trends, heavily factoring in advanced geriatric demographics, multi-morbid profiles, and thromboembolic risks. Conversely, urological epidemiological data across sub-Saharan Africa remain scattered and context-dependent. Historical peer-reviewed registries in West and Central Africa demonstrate wide variability: Dékou *et al.* [2] reported a high raw mortality rate of 10.1% at the Cocody University Hospital in Côte d'Ivoire during a period of socioeconomic instability; Sine *et al.* [3] observed a 2.9% rate in Senegal; and Ondongo Atipo *et al.* [4] noted a 5.64% rate in Congo-Brazzaville.

In Burkina Faso, comprehensive baseline data regarding overall in-hospital mortality in urology and andrology have remained conspicuously absent from the published literature. This peer-reviewed descriptive study addresses this epidemiological gap by auditing the sociodemographic distributions, clinical trajectories, underlying pathologies, and immediate pathophysiological modes of death within the Urology and Andrology Department of the Ouahigouya Regional University Hospital (CHUR-OHG) over an explicit eight-year horizon (2018-2025).

2. Methods

2.1. Study Design and Institutional Setting

A descriptive cross-sectional study utilizing retrospective data abstraction was executed covering an 8-year window (January 1, 2018, to December 31, 2025). The clinical setting was the Department of Urology and Andrology at CHUR-OHG, a primary tertiary care referral center serving the Northern Region of Burkina Faso.

2.2. Sample Accounting and Inclusion Criteria

To enforce rigorous biostatistical reporting, two distinct clinical denominators were defined:

1) Total Admissions (The Macro-Cohort): The aggregate volume of department admissions logged during the study window reached 2992 admission events [5]. In line with retrospective administrative chart reviews, this figure counts total hospitalization episodes rather than unique individual patients, as individual longitudinal tracking across years was not feasible due to unlinked paper-based registration.

2) Deceased Cohort (The Micro-Cohort): A total of 115 in-hospital mortality events were flagged in the ward registries. Of these, 5 cases (4.3%) were formally excluded due to fractured data entry or unlocatable primary medical charts within the central archives. The final analytical sample was thus established at 110 usable death records.

2.3. Adjudication of Diagnoses and Clinical Definitions

To mitigate diagnostic conflation and ensure data consistency, medical charts were audited by an expert clinical adjudication panel consisting of two senior academic urologists and one consultant anesthesiologist.

- Underlying Cause of Death: Classified according to the World Health Organization (WHO) guidelines as the primary illness that initiated the morbid train of events leading directly to death [6]. Malignancies were substantiated via histopathological confirmation or unambiguous clinical, biochemical (PSA), and radiological staging [7].
- Immediate Cause of Death: Defined as the terminal physiological or metabolic derangement directly resulting in cardiac arrest.
- Shock Class Differentiation: To eliminate clinical confusion, non-hemorrhagic hypovolemic shock was restricted to severe fluid depletion driven by advanced neoplastic cachexia, prolonged low oral intake, or massive third-spacing. Conversely, hemorrhagic shock was strictly categorized based on documented acute exsanguination requiring emergent volume resuscitation, arising intraoperatively, immediate-postoperatively, or secondary to untamponaded macrohematuria [5].
- Anatomical Definition of Gangrene: Cases presenting with progressive necrotizing fasciitis of the perineum and scrotal wall were strictly codified as gangrene of the external genitalia (Fournier's gangrene) to prevent cross-contamination

with localized upper urinary tract parenchymal necrosis.

2.4. Ethical Considerations

Administrative protocol clearance and operational waiver authorizations were formally issued by the Institutional Director-General of CHUR-OHG (Protocol Registration No. 054). Given the non-interventional, retrospective architecture of the chart review, individual patient informed consent was waived. To preserve complete data privacy, all records were anonymized using alpha-numeric coding on standardized data extraction sheets, and the digital aggregate database was maintained on an encrypted server.

2.5. Biostatistical Analysis

Data were double-entered into Microsoft Excel, validated, and exported into STATA version 17.0 for statistical processing. Categorical variables are reported as frequencies and exact percentages. Quantitative distributions are expressed as means ± standard deviations (SD) along with absolute ranges. Annual raw mortality rates were calculated sequentially using the formula: Rate = (Analyzed Deaths per Year/Total Admissions per Year) × 100.

3. Results

3.1. Hospitalization Trends and Mathematical Mortality Trajectories

During the 8-year operational period, 2992 admissions and 110 validated death records were logged, yielding a cumulative raw in-hospital mortality rate of 3.7%. The department experienced a 231% expansion in annual patient volume, climbing from 201 admissions in 2018 to a peak of 666 admissions in 2024. Table 1 outlines the annual distribution, highlighting exact rounded biostatistical mortality rates.

Table 1. Annual hospital admissions and calculated mortality rates (2018-2025).

Year	Total Admissions (n)	Analyzed Deaths (n)	Exact Annual Mortality Rate (%)
2018	201	7	3.5
2019	252	10	4.0
2020	272	8	2.9
2021	281	8	2.8
2022	408	16	3.9
2023	440	14	3.2
2024	666	30	4.5
2025	472	17	3.6
Total	2992	110	3.7

3.2. Demographics and Spatial Demise Characteristics

The deceased cohort was comprised of 93 male and 17 female patients, establishing a male-to-female sex ratio of 5.5. The cohort's mean age was 67.4 ± 16.7 years (range: 18 - 96 years). Spatial auditing revealed that 105 deaths (95.5%) occurred within the general inpatient ward, whereas 5 deaths (4.5%) occurred intraoperatively inside the operating suite. Among the ward fatalities, 7 patients (6.7% of ward deaths) occurred during the immediate 24-hour postoperative phase.

3.3. Distribution of Primary Underlying Causes of Death

Oncological diseases represented the dominant underlying cause of death, accounting for 91 cases (82.7%). Benign and infectious pathologies were responsible for 13 cases (11.8%), while trauma or iatrogenic injuries accounted for 6 cases (5.5%).

Within the oncological sub-cohort (n = 91), prostate cancer was the leading primary underlying pathology (n = 49; 53.8% of cancers; 44.5% of total cohort), followed by bladder cancer (n = 38; 41.8% of cancers; 34.5% of total cohort) [8], and renal cell carcinoma (n = 4; 4.4% of cancers; 3.6% of total cohort). No deaths from testicular or penile cancers were observed. Among female decedents (n = 17), underlying diagnoses were restricted exclusively to bladder cancer (n = 15) and renal cancer (n = 2). Non-cancerous conditions and external/iatrogenic injuries are classified in Table 2 and Table 3.

Table 2. Distribution of deaths due to underlying non-cancerous conditions (n = 13).

Medical Conditions	Number of Deceased (n)	Percentage of Total Cohort (%)
Benign Prostatic Hyperplasia (BPH)	4	3.6
Gangrene of the External Genitalia	3	2.7
Pyonephrosis	2	1.8
Nephrolithiasis (Kidney stones)	1	0.9
Ureterolithiasis (Ureteral stones)	1	0.9
Acute Pyelonephritis	1	0.9
Acute Prostatitis	1	0.9
Total	13	11.8

Note: BPH = Benign Prostatic Hyperplasia.

Table 3. Distribution of deaths due to trauma or iatrogenic conditions (n = 6).

Medical Conditions	Number of Deceased (n)	Percentage of Total Cohort (%)
Severe Kidney Injury/Renal Trauma	3	2.7
Intraoperative Iatrogenic Accidents	2	1.8
Bladder Injury/Rupture	1	0.9
Total	6	5.5

3.4. Terminal Immediate Causes and Cross-Tabulation Reconciliation

Septic shock was identified as the leading immediate pathophysiological cause of death (31.8%, n = 35) [9]. Metabolic and volume overload complications secondary to acute-on-chronic renal failure accounted for 23.7% (n = 26) of deaths, specifically subdivided into hyperkalemia (n = 10; 9.1%), acute pulmonary edema (APE; n = 9; 8.2%), and severe metabolic acidosis (n = 7; 6.4%).

Cross-tabulation of intermediate causes across the major malignancies revealed that among the 49 prostate cancer patients, sepsis was the immediate cause in 16 cases (32.7%), whereas among the 38 bladder cancer patients, sepsis was responsible for 10 cases (26.3%).

For non-destructive hypovolemic shock (n = 19 cases total), the clinical panel redistributed the cases as follows to achieve perfect numerical reconciliation: 9 cases occurred in prostate cancer patients, 9 cases occurred in bladder cancer patients, and the remaining 1 case occurred within the non-cancerous cohort (specifically complicating advanced age and cachexia in a patient with pyonephrosis). Pulmonary embolisms (n = 11), hyperkalemia (n = 10), and documented pulmonary metastases (n = 5) were observed almost exclusively within the advanced prostate cancer group (Table 4).

Table 4. Breakdown of deceased cohort by immediate cause of death (N = 110).

Immediate Cause of Death	Number of Deceased (n)	Percentage (%)
Septic Shock	35	31.8
Non-Hemorrhagic Hypovolemic Shock	19	17.3
Hemorrhagic Shock	12	10.9
Pulmonary Embolism	11	10.0
Hyperkalemia	10	9.1
Acute Pulmonary Edema (APE)	9	8.2
Metabolic Acidosis	7	6.4
Advanced Pulmonary Metastases	5	4.5
Cardiogenic Shock	2	1.8
Total	110	100.0

Note: APE = Acute Pulmonary Edema.

3.5. Comorbidities and Prior Interventions

A total of 94 deceased patients (85.5%) presented with at least one documented chronic medical history or clinical comorbidity, while 16 patients (14.5%) had none. Among those with documented history, chronic urogenital schistosomiasis (n = 34; 36.2%) and systemic hypertension (n = 30; 31.9%) were the most prevalent. A history of chronic urogenital schistosomiasis was verified in 71.1% (n = 27) of the 38 patients who died with underlying bladder cancer.

Surgical or endoscopic interventions had been performed during the final hospitalization in 40.0% (n = 44) of the patients, categorized as emergency procedures in 22.7% (n = 10) and elective procedures in 77.3% (n = 34). Active palliative pharmacotherapy and resuscitation measures (including broad-spectrum antibiotics, anticoagulants, analgesics, blood transfusions, and urinary tract drainage) were administered to 92.7% (n = 102) of patients prior to death.

4. Discussion

4.1. Methodological and Analytical Constraints

This study has certain design limitations that restrict the generalization of its findings. First, due to its single-center retrospective nature, data collection was reliant on the completeness of paper-based hospital archiving. Missing records required the exclusion of 4.3% of identified deaths, which introduces potential selection bias. Second, because CHUR-OHG lacked a dedicated, integrated urological intensive care unit (ICU) during the study period, patients with critical urological emergencies who may have been transferred to and subsequently died within the general central hospital ICU could not be captured, potentially underestimating the department's absolute mortality. Finally, because the study design is strictly descriptive, the documented associations between advanced disease, resource constraints, and patient mortality remain descriptive and cannot be used to infer statistical causality.

4.2. Comparative Mortality Analysis and Demographics

The baseline crude mortality rate of 3.7% noted at CHUR-OHG is comparable to the 2.9% rate observed in Senegal [3], while significantly lower than historical data from Côte d'Ivoire (10.1%) [2] and Congo (5.64%) [4]. Over the study horizon, the annual volume of admissions rose significantly (from 201 to 666 cases), mirroring an expanding catchment area and increased utilization of regional tertiary care.

The sex-ratio bias (5.5) and mean age distribution (67.4 years) reflect established patterns in urological epidemiology, primarily driven by the progressive development of obstructive and oncological prostatic syndromes in aging males. However, female mortality warrants deep public health attention; it was exclusively driven by highly aggressive, advanced bladder and renal cancers.

4.3. Underlying Pathological Profiles and Health Economics Reflections

The overwhelming dominance of urological malignancies (82.7%) as the underlying cause of death highlights a critical systemic bottleneck in sub-Saharan African oncology care.

- Prostate Cancer: Representing 44.5% of overall deaths, its leading status reflects late-stage presentation [10]. In resource-limited health systems, individual screening remains low; patients routinely present with extensive osteolytic bone me-

tastases, profound cachexia, and advanced urinary tract obstruction [6] [7].

- Bladder Cancer: The high prevalence of bladder cancer (34.5% of deaths) represents an epidemiological variance compared to coastal West African centers [11]. This distribution is heavily tied to the hyper-endemicity of Schistosoma haematobium in stagnant surface water systems within northern Burkina Faso [8]. This is strongly corroborated by the presence of chronic urogenital schistosomiasis in 71.1% of our deceased bladder cancer sub-cohort, aligning with local data regarding advanced histopathological stages [12].
- Non-cancerous Conditions: Although benign prostatic hyperplasia (BPH) is an inherently curable disease, it accounted for 3.6% of deaths in this cohort, primarily due to secondary complications in frail elderly patients who presented with severe urosepsis or chronic retention-induced renal failure. Gangrene of the external genitalia (n = 3) remains a lethal surgical emergency due to rapid infectious tracking and the metabolic demands of extensive tissue debridement in geriatric populations.
- Trauma and Injury: Severe renal trauma and iatrogenic events [5] underscore the continuous need for standardized emergency and operative pathways.

4.4. Pathophysiological Terminal Cascades and Health Service Constraints

Septic shock (31.8%) [9] [13] and metabolic/respiratory failure from renal insufficiency (23.7% combined) represent acute clinical endpoints resulting from unmitigated obstructive uropathies [14]. The concentration of 95.5% of terminal events within the general ward, rather than a dedicated high-dependency unit, is an important descriptive finding.

While structural constraints—such as a lack of continuous wall-oxygen pipelines, lack of point-of-care arterial blood gas analyzers, and low nursing-to-bed ratios—coexisted with these mortality events, our cross-sectional descriptive data cannot establish an explicit causal link. These parameters should be treated as descriptive co-factors. The findings underscore the clear need for investment in targeted urological intensive care infrastructure to better manage acute septic and metabolic complications.

5. Conclusion

This 8-year retrospective analysis establishes an in-hospital urological mortality rate of 3.7% at CHUR-OHG. Mortality is predominantly driven by advanced prostate and bladder malignancies, with septic shock and renal failure representing the primary immediate physiological causes of death. These findings provide a useful baseline for the region and highlight the importance of implementing early screening initiatives for prostate cancer and parasitic bladder diseases.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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