

Antibiotic Consumption among Patients in the Urology Department

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Abstract

Introduction: Urinary tract infections are the most common healthcare-associated infections. Monitoring antibiotic consumption is essential for rationalizing the use of these drugs in order to limit the emergence of antibiotic resistance. **Objectives:** The primary objective of our study was to determine antibiotic consumption for urinary tract infections. **Materials and Methods:** This was a retrospective study conducted at the Urology Department of the Ibn Rochd University Hospital in Casablanca over a 10-day period. **Results:** The study included 59 patients; men accounted for 77% of the cohort and women for 23%, with elderly patients predominating among those admitted to the department. Bladder tumors were the most common condition among the patients, and bladder tumor resection was the most frequently performed procedure. Ceftriaxone was prescribed for 50% of the patients, while patient expenditure on antibiotics was significantly higher than hospital expenditure. Nearly 52% of the patients admitted to the department resided in Casablanca. **Conclusion:** Given the increasing resistance of pathogens involved in urological infections, it is essential to manage the prescribing of all classes of antibiotics effectively.

Keywords: Antibiotics, Urology, Infections, Outline, Introduction, Objectives, Materials and methods, Results, Discussion, Conclusion.

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INTRODUCTION

Urinary tract infections are the most common healthcare-associated infections. They constitute a significant public health issue due to the excess mortality and additional costs they entail [1]. According to current definitions, they account for approximately 40% of healthcare-associated infections [2].

Monitoring antibiotic consumption is crucial for rationalizing the use of these drugs in order to limit the emergence of antibiotic resistance [3].

We examined trends in antibiotic consumption within the urology department at the Ibn Rochd University Hospital in Casablanca.

Objectives

The primary objectives of our study were to determine antibiotic consumption patterns for urinary

tract infections and to describe the antibiotics used and their side effects. We also aimed to assess the direct and indirect costs of patient care, including antibiotic procurement, hospitalizations, and patient travel.

PATIENTS AND METHODS

This was a retrospective study conducted in the Urology Department of the Ibn Rochd University Hospital in Casablanca over a 10-day period [December 1 to 10, 2023].

The study population consisted of patients who developed a urinary tract infection following an invasive urological procedure.

Data collection was based on patient medical records and the Urology Department's laboratory results platform, in accordance with the following data extraction form: [Table 1]

Table 1

Sex and age	Origins	Pathologies	procedures performed	Bacteriological examinations	Antibiotics	Lengths of hospital stay
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Data entry and analysis were based on Microsoft Access Professional Plus 2016 and Microsoft Word Professional Plus 2016.

RESULTS

- **Number of patients enrolled:** A total of 59 patients were enrolled in our study.
- **Distribution of patients by gender:** Men accounted for 77% of the patients, versus 23% for women. [Figure 1]

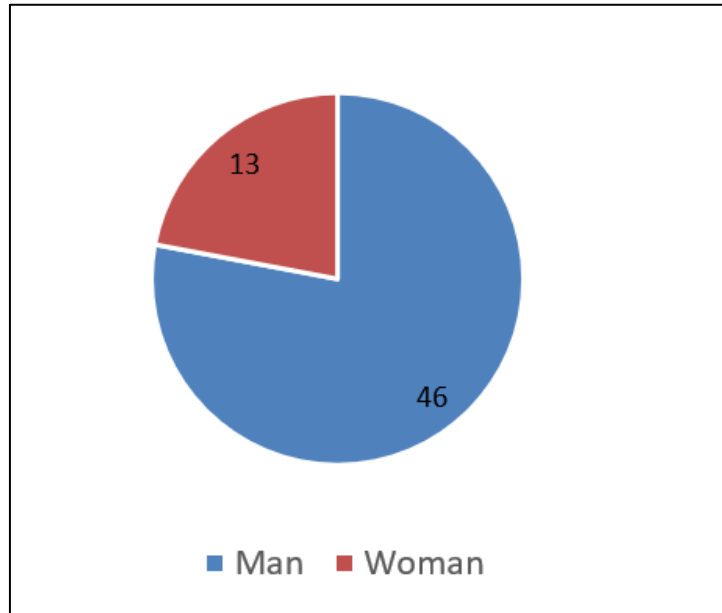


Figure 1:

Distribution of patients by age group

Elderly patients predominated among those admitted to our department, accounting for 52%,

followed by the 40–50 age group [20%], then the 50–60 group [18%] and the 30–40 group [7%], with a single case in the 20–30 age range. [Figure 2]

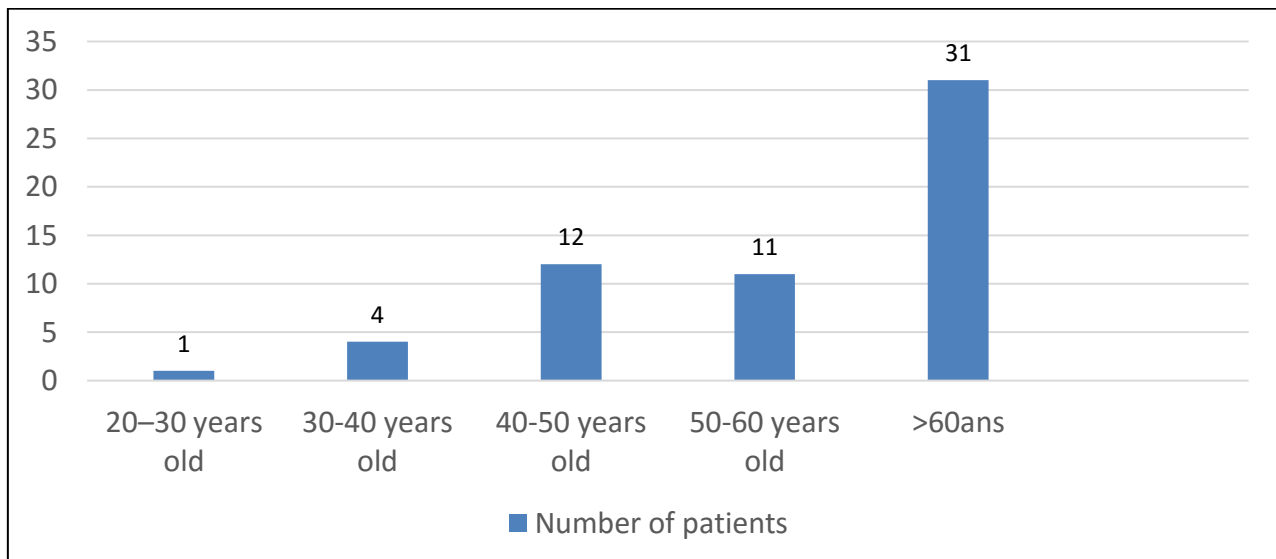


Figure 2

Urological conditions presented by the patients

Bladder tumors topped the list of conditions presented by our patients, followed by multidrug-resistant urinary tract infections, prostatic disorders,

acute pyelonephritis, urinary stone disease, gynecological malignancies, renal trauma, urethral disorders, renal tumors, fractures of the corpora cavernosa, and gastrointestinal tumors. [Figure 3]

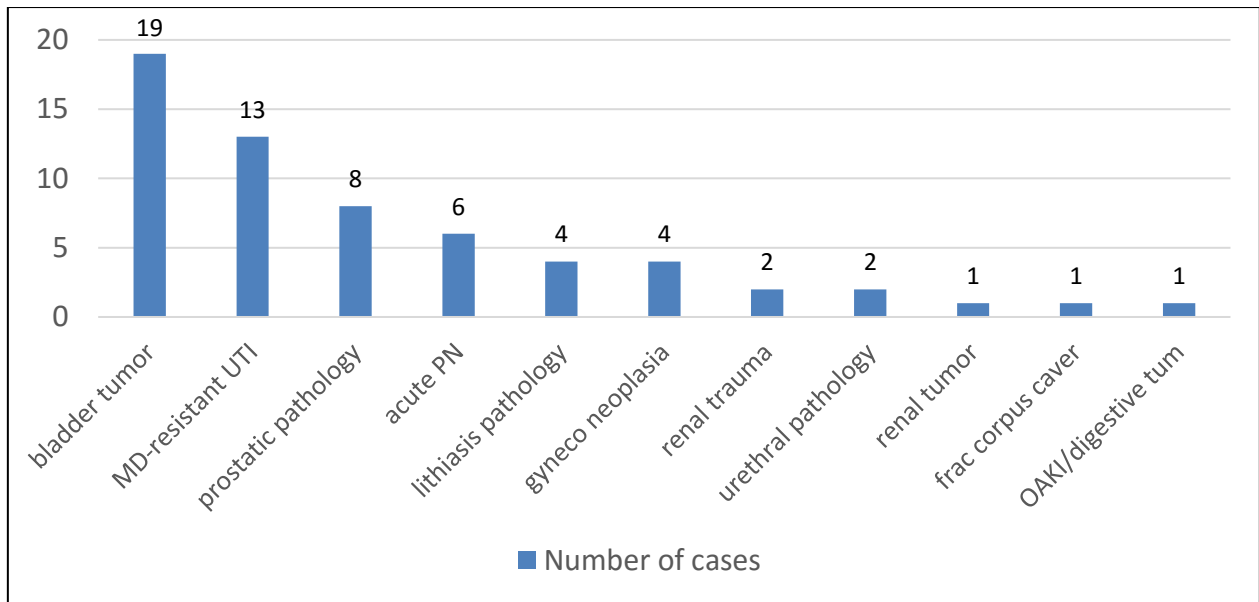


Figure 3

Type of procedure

Bladder tumor resection was the most frequently performed procedure during our study [32%], followed by prostate resection and double-J [JJ] stent placement [13% each]. Other procedures associated with a risk of urinary tract infection included laser stone fragmentation [6%], nephrostomy [6%], urethrotomy [3%], and nephrectomy [1%].

Uropathogens

The most frequently isolated organism in urine cultures from patients admitted to our department during the study period was *Escherichia coli* [38%], followed by *Klebsiella pneumoniae* [24%], *Enterococcus faecalis* [10%], *Pseudomonas aeruginosa* [10%], *Enterobacter cloacae* [10%], *Enterobacter pneumoniae* [3%], and *Citrobacter freundii* [3%]. [Figure 4]

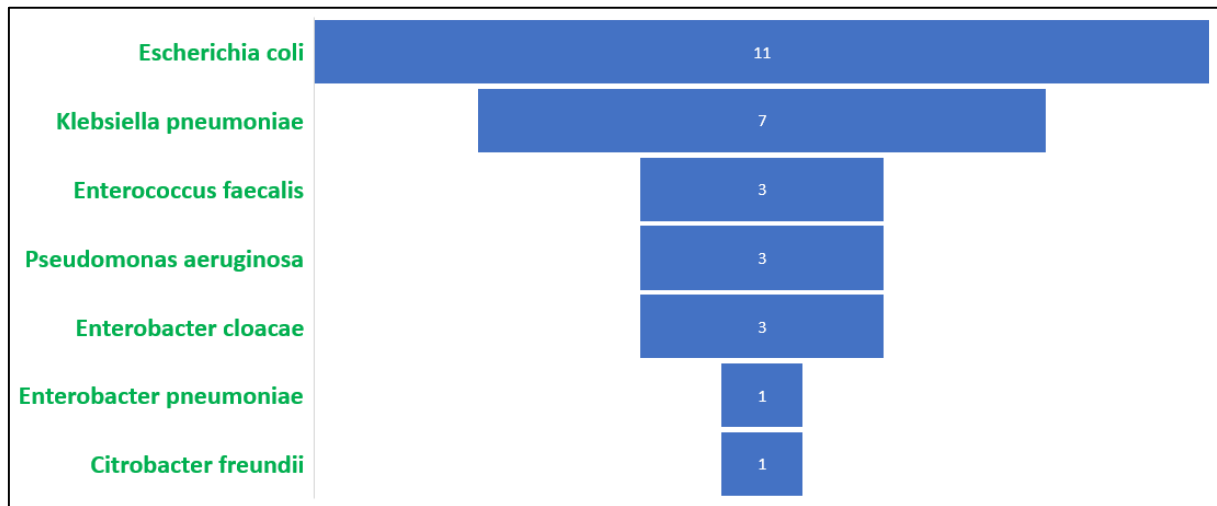


Figure 4

Types of antibiotics prescribed

Ceftriaxone was prescribed for 50% of patients, followed by gentamicin [13%], amikacin [10%],

imipenem [7%], antifungals [5%], colistin [5%], ciprofloxacin [5%], and finally the amoxicillin-clavulanate combination [3%]. [Figure 5]

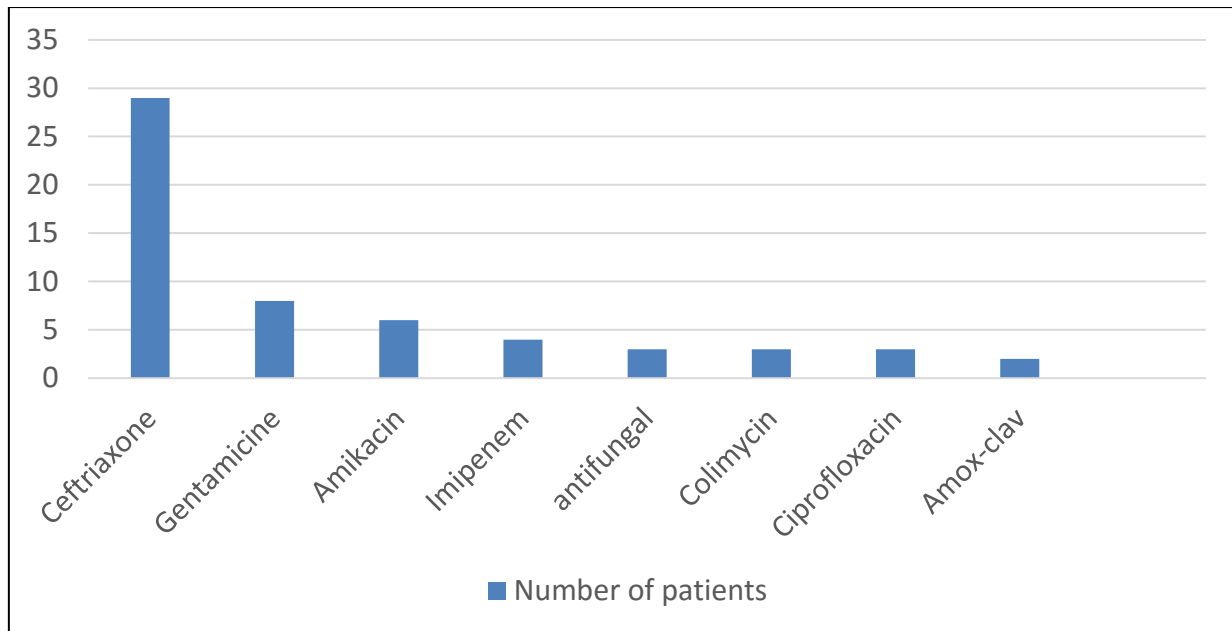


Figure 5

Procurement of each antibiotic [hospital or patient]

During our study, ceftriaxone and the amoxicillin-clavulanate combination were procured by

both the hospital and the patient at equal rates, whereas the other antibiotics were procured solely by the patient. [Figure 6]

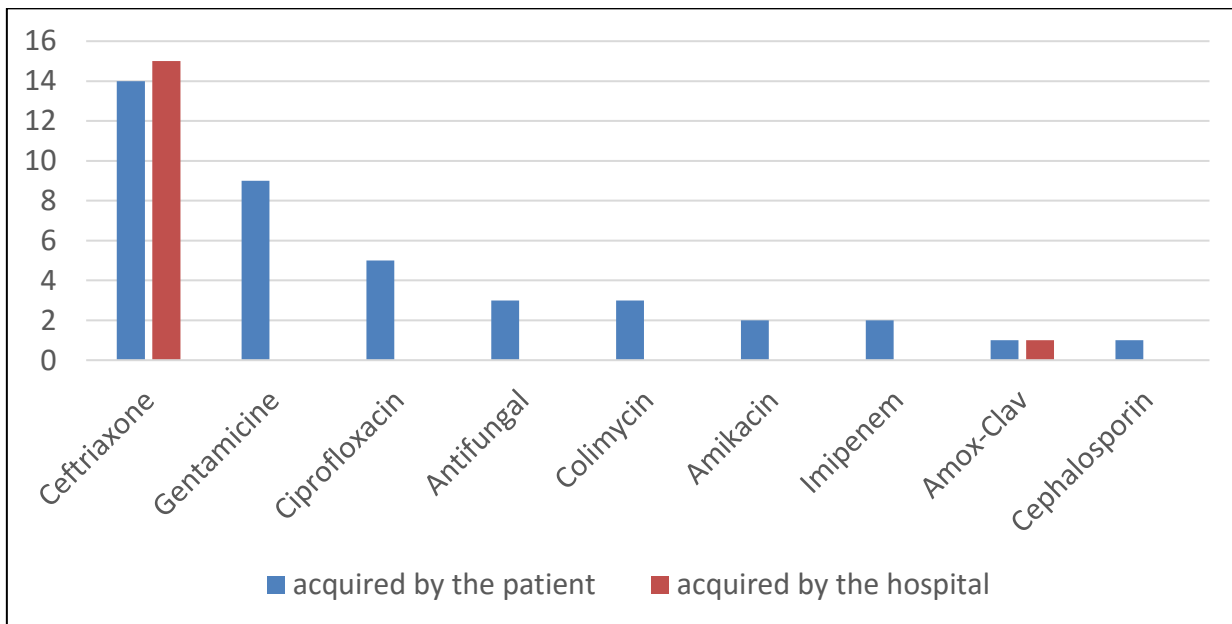


Figure 6

Side effects

The adverse effects most frequently reported by patients during our study were as follows: digestive disorders in nearly 18% of cases [including diarrhea, vomiting, or abdominal pain]; allergic reactions [hives or itching] in 7%; paresthesia [5%]; dizziness [3%]; and dyspnea [3%].

Antibiotic expenditures

Antibiotic expenditures during the 10-day study period were estimated at 6,166 MAD for the hospital versus 26,456 MAD for the patient; based on the calculated average length of stay, the estimated annual figures were approximately 225,095 MAD for the hospital versus 783,144 MAD for the patient. [Figure 7]

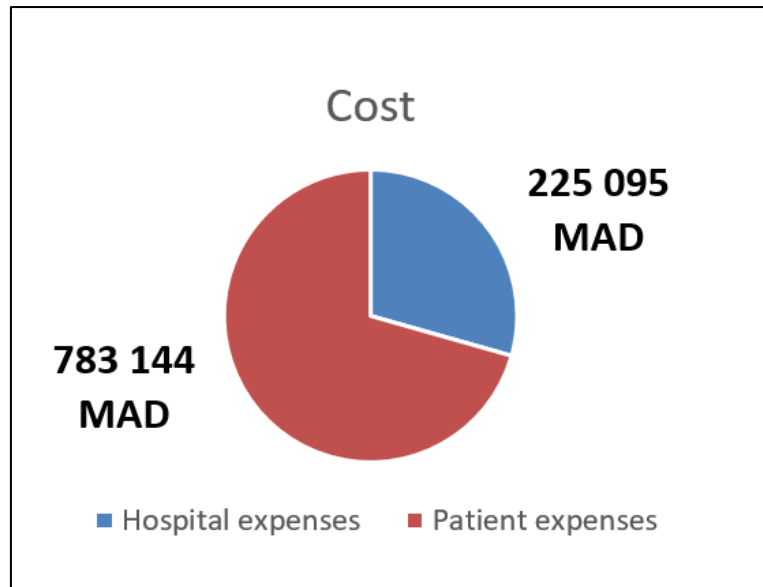


Figure 7

Duration of hospitalization

The majority of patients in our department who received antibiotics during the study period were treated

on an outpatient basis; for the others, the duration of hospitalization was less than 15 days. [Figure 8]

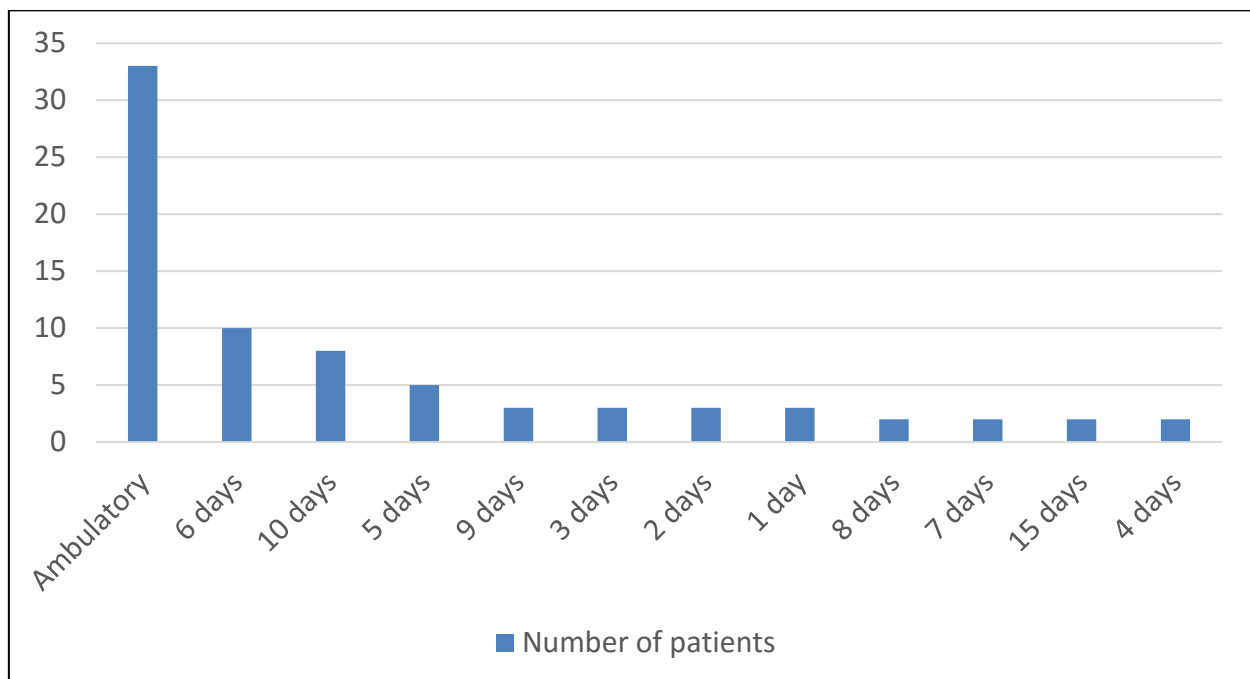


Figure 8

Origins of hospitalized patients

Casablanca was the place of residence for nearly 52% of the patients admitted to our department, followed primarily by the nearest regions, such as Settât [9%], Berrechid [9%], El Jadida [6%], Mohammedia

[4%], Ben Slimane [1%], Had Soualem [1%], Khouribga [1%], Beni Mellal [1%], Azemmour [1%], Nouaceur [1%], Marrakech [1%], Oued Zem [1%], and Agadir [1%]. [Figure 9]

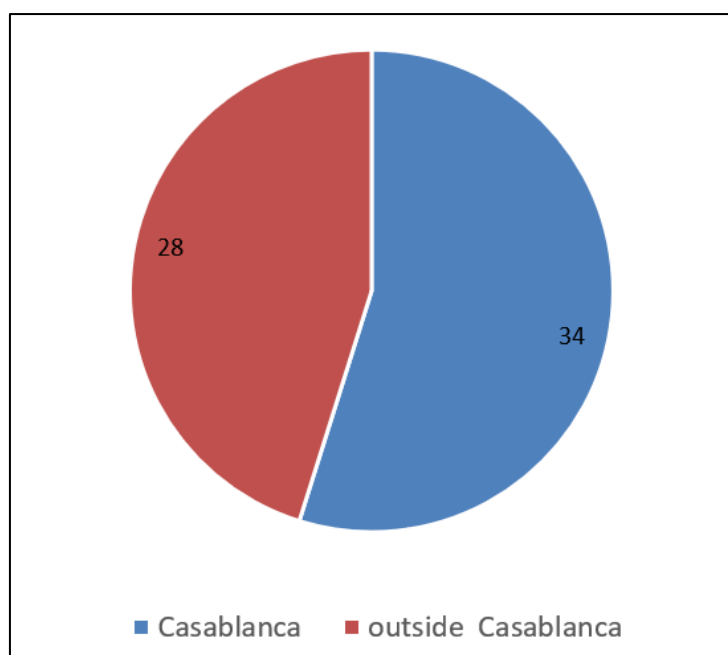


Figure 9

DISCUSSION

We will compare our findings with a study on urinary tract infections conducted in our urology department in 2019, as well as with other relevant scientific literature.

Distribution by sex and age

In both studies conducted in our department, there was a marked male predominance, and elderly patients constituted the largest group of admissions, with men accounting for 77% of cases in 2023 compared to 80.8% in 2019.

The male-to-female ratio was 20.32 in the emergency department of the National Hospital Center in Nouakchott [4].

Between January 1, 2016, and December 31, 2020, 375 patients were seen for urological emergencies at Douala General Hospital and Laquintinie Hospital in Douala; the mean patient age was 43 ± 8.34 years. 51% of patients were over 60 years old, with an age range of 1 to 91 years. 92.58% [n=337] of the patients were male [5].

Antibiotic consumption In 2019, the most frequently used antibiotics were, in order of frequency: Imipenem > Amikacin > Colimycin > Cephalosporin > Rifampicin.

In contrast, ceftriaxone and gentamicin were the most frequently used antibiotics in our study. Antibiotic consumption in a urology department according to the WHO [5-year study]: Cefotaxime was the most prescribed drug and showed a statistically significant upward trend over time. Amoxicillin, gentamicin, and

vancomycin showed a significant downward trend[3]. For sepsis of urinary origin, the use of amikacin should be the standard practice, given the lower resistance rates among commonly encountered microorganisms compared to gentamicin, for example[6].

Classically, amikacin is the preferred choice, as it offers a superior spectrum of activity against *Escherichia coli* as well as against suspected extended-spectrum beta-lactamase [ESBL]-producing Enterobacteriaceae [6].

Urine culture and microscopic examination

The three most frequently cultured organisms in Wing 5—both during our study and the 2019 study—are, in order of frequency:

***Escherichia coli* > *Klebsiella pneumoniae* > *Enterococcus faecalis*.**

Among the bacterial species involved in urinary tract infections, uropathogenic *Escherichia coli* is the most common [7].

In a study conducted at the Moulay Ismail Military Hospital in Meknès regarding extended-spectrum beta-lactamase [ESBL]-producing uropathogenic Enterobacteriaceae, *Escherichia coli* accounted for the majority [61%] of isolates; however, within the species group, *Klebsiella pneumoniae* showed the highest rate of ESBL production [25.8%] [8].

Cost

Estimated annual hospital expenditure on antibiotics in the urology department was 225,095 MAD in 2023, compared to 354,851 MAD in 2019.

Overall antibiotic consumption in the urology department increased by 20% between 2015 and 2019, rising from 430.607 to 515.138 DDD/1000 patient-days [WHO metrics] [3].

Factors to consider include the time required to bring a new drug to market, costly project failures, and the total financial investment required [9].

CONCLUSION

In Francophone African countries, an unregulated pharmaceutical supply chain—featuring over-the-counter antibiotic sales—exacerbates the problem of resistance [10].

This poses a significant challenge for biologists, surgeons, infection control specialists, and health authorities. Given the increasing resistance of pathogens involved in urological infections, it is essential to manage the prescribing of all classes of antibiotics [11].

Surveillance of antibiotic resistance must be regular and widespread across all healthcare facilities in order to define therapeutic and prophylactic strategies tailored to local epidemiology.

Declaration of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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