Scientific Research Publishing

Open Journal of Internal Medicine, 2026, 16(1), 76-83
https://www.scirp.org/journal/ojim
ISSN Online: 2162-5980
ISSN Print: 2162-5972

Overview of Infectious Diseases in the Internal Medicine Department of the Bouaké University Hospital Center (UHC) (Côte d'Ivoire)

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How to cite this paper: Keny, Y.G.S., Salifou, K., Gontran, L.Y., Renaud, K.K.G., Kevin, A.J., Famoussa, K., Landry, G.K.K., Mauriane, D.P., Valentin, T.S., Lauret, K., Kadidiata, T., Aichata, B., Ubrich, A. and Bouraima, O. (2026) Overview of Infectious Diseases in the Internal Medicine Department of the Bouaké University Hospital Center (UHC) (Côte d'Ivoire). *Open Journal of Internal Medicine*, **16**, 76-83.
https://doi.org/10.4236/ojim.2026.161008

Received: January 13, 2026
Accepted: February 24, 2026
Published: February 27, 2026

Abstract

Background: Infection is a public health problem due to is high morbidity and mortality rate worldwide and his economic cost. Data on infection is available at the national level, but less known from the department of internal medicine of Bouaké University Hospital. The objective of our study was to determine the epidemiological aspects and mortality rates of infections in the Internal Medicine Department. **Material and Methods:** We conducted a cross-sectional analytical study over a period of six months, including all patients over the age of 15 with any type of infection. **Results:** Over a period of six months, 695 patients were hospitalized in the department and 211 of them had infection, representing a prevalence of 30.35%. The average age was 46.67 ± 18.41 years, with a sex ratio of 1.29. Bacterial infections were observed in 64.92% of cases, dominated by sepsis (14.69%). Parasitic infections (13.27%) were dominated by cerebral toxoplasmosis (7.58%) and malaria (5.68%), and viral infections (21.32%) were dominated by chronic viral hepatitis discovered at the complication stage (16.58%). There was no history of disease and/or comorbidities in 77.72% of cases. The outcome was favorable in 45.50% of cases and death was observed in 26.54% of cases. Mortality fell from 33.04%

in the first quarter to 18.75% in the second quarter of the year, with a statistically significant difference. **Conclusion:** The prevalence of infections is high in the internal medicine department. They are dominated by sepsis and are responsible for high mortality with early death, particularly in the elderly.

Keywords

Infection, Mortality, Internal Medicine, West Africa

1. Introduction

Infection is a public health problem due to his high morbidity and mortality rate worldwide and his significant economic cost on health systems. It is estimated that in 2022, approximately 4.8 million healthcare-associated infections in 14 sub-Saharan African countries caused around 500,000 deaths and health-related economic losses of US$13 billion per year [1]. Infection also has a significant negative impact on productivity and education, which is a major obstacle to development, particularly in Africa and Southeast Asia [2].

The main infections involved are HIV, malaria, and bacterial resistance [3]. In sub-Saharan Africa, these infections are more lethal, because they occur in vulnerable patients and their treatment is sometimes hampered by inadequate technical facilities and difficulty in accessing treatment [4].

The results of studies carried out in Côte d'Ivoire are not fundamentally different from those of other regions of sub-Saharan Africa. In these studies, malaria and tuberculosis are predominant, followed by non-tuberculous bacterial infections [5]. However, the epidemiology of infections varies depending on the department [6].

It seems useful to study the epidemiology of infectious diseases, particularly in the Internal Medicine Department, which is responsible for patients with multiple comorbidities and a high risk of severe infection.

The objective of our study was to determine the epidemiological aspects and infectious mortality in the Internal Medicine Department.

2. Material and Methods

We conducted a cross-sectional analytical study over a six-month period from January 1 to June 30, 2021, using patient hospitalization records as data source. The study was conducted in the city of Bouaké located in the center of Côte d'Ivoire. UHC is the only tertiary center in the region. The laboratory of UHC is a specialized microbiology laboratory able to perform bacterial, viral, fungal, and parasitic identification, specialized cultures (fastidious organisms, anaerobes, mycobacteria), antimicrobial susceptibility testing, molecular biology testing as conventional and real-time PCR, serology for HIV, rubella, and toxoplasmosis using the ELISA technique and other serologies (viral hepatitis B and C and syphilis).

Routine biochemical, hematological and anatomopathological examination can also be performed. Regarding morphological examination, only standard radiography and ultrasound are available. Computed tomography (CT) and magnetic resonance imaging (MRI) cannot be performed in our center and are realized in private healthcare centers. Bouaké UHC has many specialties involved in the treatment of infections. However, Internal Medicine Department particularly treats patients with multiple pathologies. The study population consisted of patients hospitalized in the department for infection. We included all patients who met the following criteria:

-age 15 years or older, regardless of the type of infection;

-availability of complete data for the study parameters.

In order to assess properly the lethality while limiting the risk of confusion, the exclusion criteria were the coexistence in the same patient of two acute severe infections.

The parameters studied were age, sex, type of infection, underlying disease, and patient condition. The sampling was exhaustive. Patients aged 65 years old or more were considered as elderly subjects "Sepsis", referred only to patients with acute bacterial infection without identified pathogens and a qSOFA score ≥ 2. Known chronic infections prior to hospitalization were considered comorbidities, unlike those discovered during hospitalization.

Depending on the conditions of application, the Chi-2 or Fisher test was used to compare qualitative variables, setting a significance threshold of 5%. For multiple comparisons, the Bonferroni formula (p value = α/n), where ά corresponds to the initial p value (5%) and n corresponds to the number of statistical tests performed, was used to determine the significance threshold. Confidentiality was respected by assigning an anonymous number to each patient. The approval of the medical and scientific director and the head of department was obtained before conducting this study.

3. Results

Over a period of six months, 695 patients were admitted to the department and 211 of them had infection, representing a prevalence of 30.35%. The average age was 46.67 ± 18.41 years, with a sex ratio of 1.29. Bacterial infections were observed in 64.92% of cases, dominated by sepsis (14.69%), meningitis (13.27%), and tuberculosis (11.84%) diagnosed in 25 patients, which was multifocal (44%), pulmonary (20%), spinal (16%), meningeal and peritoneal in 8% of cases each, and pericardial in 4% of cases. Parasitic infections (13.27%) were cerebral toxoplasmosis (7.58%) and malaria (5.68%), Viral infections (21.32%) were dominated by viral hepatitis (16.58%) and fungal infections in 0.47% of cases, as mentioned in Table 1.

No medical history and/or comorbidities were present in 77.72% of cases, HIV infection (13.25%), diabetes (4.74%), heart failure (2.37%), hypertension, chronic renal failure, benign prostatic hypertrophy, and polycystic kidney disease in 0.47%

of cases each. After an average hospital stay of 5.36 ± 4.54 days, 45.50% of patients were discharged after receiving favorable medical advice. Death was observed in 26.54% of cases and discharge against medical advice in 21.33%. In 6.64% of cases, patients were transferred to the intensive care unit. Mortality fell from 33.04% in the first quarter to 18.75% in the second quarter of the year, with a statistically significant difference ($p = 0.01$) as shown in Figure 1. Mortality was significantly associated with age ($p = 0.002$) on the one hand, and with sepsis ($p = 7.10^{-7}$) and hospitalization duration of less than 5 days ($p = 0.01$) on the other. However, no link was found between mortality and gender ($p = 0.14$), medical history or comorbidities ($p = 0.40$), or tuberculosis ($p = 0.20$).

Table 1. Distribution of 211 patients according to type of infection.

Type of infection	Number	Percentage (%)
Bacterial infection	137	64.92
Sepsis	31	14.69
Purulent meningitis	28	13.27
Tuberculosis	25	11.84
Acute pneumonia	18	8.53
Tetanus	11	5.21
Pyogenic abscess	9	4.26
Salmonellosis	5	2.36
Lower urinary tract infection	3	1.42
Arthritis	3	1.42
Liver abscess	2	0.94
Spleen abscess	1	0.47
Ascitic fluid infection	1	0.47
Parasitic infection	28	13.27
Cerebral toxoplasmosis	16	7.58
Malaria	12	5.68
Viral infection	45	21.32
Viral hepatitis B/C	35	16.58
COVID-19	9	4.26
Rabies encephalopathy	1	0.47
Fungal infection (cryptococcosis)	1	0.47
Total	211	100.00

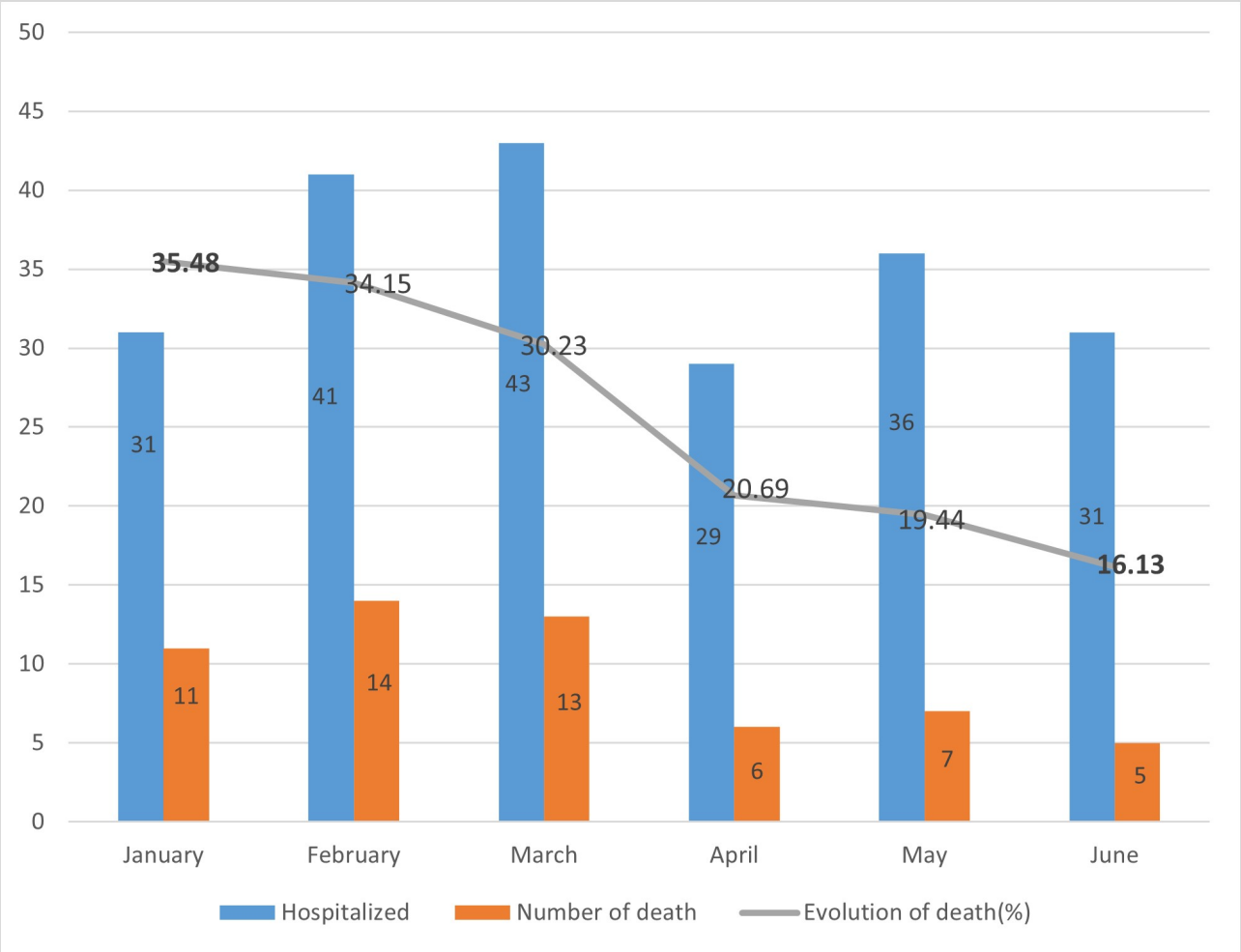

Figure 1. Mortality trends over 6 months among the 211 patients hospitalized during the study period.

4. Discussion

4.1. Epidemiological Aspects

The prevalence of infection in internal medicine was high. More than a third of patients were admitted during the study period for infection. In 2015, the prevalence of community-acquired infections in the same internal medicine department was 20.47% [7]. A recent study conducted in Senegal found a lower prevalence of infections (13.7%) in the internal medicine department [8]. These two studies only concerned bacterial infections, and that could explain the higher prevalence found in our study, which included both bacterial infections and other types of infections. These infections mainly affected men, young adults in more than 80% of cases, with an average age close to 45 years old. The epidemiology of infections remains highly variable, particularly depending on the location of the study or the type of infection.

In Bangui, the average age of patients with urinary tract infections was 35 years old, with a predominance of women [9], compared to an average age of 60 years old in Senegal for non-tuberculous bacterial infections, with a slight predominance of

men [8]. In addition, a meta-analysis on viral hepatitis B in Africa found a male predominance [10]. Although, the literature generally shows that infections mainly affect men, with a risk that increases with aging. Extreme ages and male gender have been identified as factors of susceptibility to infection through a less effective immune response due to immaturity or weakening of the immune system, although the mechanisms are not fully understood [11].

4.2. Main Infections

The main non-specific bacterial infections were dominated by sepsis and malaria. These results were confirmed in another study conducted in Côte d'Ivoire, based on molecular tests on blood samples, in which bacteremia and malaria were the main infections [12].

Viral hepatitis, which was the primary viral infection in our study, remains a major cause of morbidity and mortality in Africa [13]. In our study, it was discovered at cirrhosis stage. Other infections, rare but of public health interest, were also found [14]. These included COVID-19 infection diagnosed in our department during the pandemic. Its low frequency can be explained by the fact that, as in other African countries, few serious cases were reported in Côte d'Ivoire, which was also coming to the end of its third wave of coronavirus infection [15]. In addition, the Internal Medicine Department had not been designated as the department responsible for treating COVID-19 infection. Furthermore, one case of rabies encephalopathy was diagnosed in collaboration with the Institute of Public Health Department.

4.3. Risk Factors

In nearly 80% of cases, no comorbidity was found. These results do not necessary indicate the absence of immunosuppression factors, but rather reflect the difficulty to look properly for immunosuppression due to inadequate technical facilities and/or the low socioeconomic status of these patients, which is increasingly being offset by the effective implementation of universal health coverage. Indeed, cases of rare diseases have been described in this department [16].

4.4. Infectious Morbidity and Mortality

Death occurred early, within five days of hospitalization, particularly in elderly patients ($p = 0.002$) and in cases of sepsis ($p = 7.10^{-7}$).

The high lethality of sepsis was also found in Western studies. Indeed, a meta-analysis of 170 studies revealed a lethality rate of around 30% at 30 and 90 days [17].

Mortality was high and significantly associated with the length of hospital stay, with a downward trend during the study period, marked by a high rate of over 30% in the first quarter, which fell by half at the end of the second quarter. The gradual decline of the mortality rate could be explained by a better understanding of the bacterial ecosystem of our department over the months, which is useful for probabilistic antibiotic therapy.

5. Limitations of the Study

The study does not address the lethality of each infection in detail. However, it provides an overview of infections in the Internal Medicine Department of UHC of Bouake and establishes a link between death and sepsis, which is the most lethal infection in our practice. In addition, our exclusion criteria could be a source of selection bias.

6. Conclusion

The prevalence of infection is high in the internal medicine department. Infections are dominated by sepsis, responsible for high mortality and early death, particularly in the elderly. The management of these infections will help reducing this high mortality rate.

Conflict of Interest

The authors declare no conflicts of interest in relation to this article.

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