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Temporal trends in hospitalizations due to infectious diseases: A comparative analysis

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ABSTRACT

Objective: This study aimed to examine the causes of hospitalizations in the infectious diseases department of a tertiary institutional hospital in Zanjan, Iran, during the first 6 months of 2019 and 2022, focusing on the impact of coronavirus disease 2019 (COVID-19).

Methods: Medical records of 429 patients hospitalized with confirmed infectious diseases in the first 6 months of 2019 (pre-COVID) and 2022 (post-COVID) were reviewed. Data included cause of hospitalization, underlying conditions, laboratory tests, antibiotics, length of hospital stay, and mortality rates. IBM SPSS 24.0 was used for analysis, and $p<0.05$ was considered statistically significant.

Results: A total of 214 and 215 records from 2019 and 2022 were surveyed, respectively. Comparison of gender distribution between 2022 and 2019 showed a significant increase in male (61.08% *vs.* 52.33%) and a decrease in female (38.13% *vs.* 47.66%) hospitalizations ($p<0.05$). Respiratory tract infections were the most frequent cause of hospitalization, with pneumonia accounting for 29.9% of cases in 2019 and 21.4% in 2022 ($p<0.05$). The frequency of skin and soft tissue infections showed a significant increase (27% *vs.* 15.4%) in 2022 ($p<0.05$). Positive urine and blood cultures were significantly more frequent in 2022, while CRP levels and neutrophil counts were markedly higher in 2019 ($p<0.05$). Use of ceftriaxone, cefazolin, ciprofloxacin, clindamycin, and meropenem increased significantly in 2022 ($p<0.05$). ICU transfer and mortality rates were 3.7% and 1.4% in both periods, respectively.

Conclusions: Respiratory diseases remain a major cause of hospitalization. Public education on controlling respiratory infections should be enhanced.

Keywords: infectious diseases, respiratory infections, covid-19, antibiotics, hospitalization

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INTRODUCTION

Infectious diseases continue to pose a significant global health threat, contributing to substantial morbidity and mortality despite advancements in prevention and treatment. These diseases remain a leading cause of death, with a complex burden that varies widely by region, age, and pathogen. In 2019, infectious diseases were associated with an estimated 1.3 million deaths in China, accounting for 12.1% of the country's total deaths. Bloodstream infections, lower respiratory infections, and intra-abdominal infections were particularly lethal, with pathogens such as *Staphylococcus aureus, Acinetobacter baumannii, Escherichia coli,* and *Streptococcus pneumoniae* being the most frequent culprits [1]. Moreover, Antimicrobial Resistance (AMR) exacerbates this burden, contributing to over 600,000 deaths annually. Globally, infectious diseases were responsible for 704 million Disability-Adjusted Life-Years (DALYs), representing 27.7% of the total DALYs from all causes, with children under 5 bearing 43.9% of this burden. Regions such as sub-Saharan Africa experience disproportionately high impacts, with 61.5% of the total regional burden attributed to infectious diseases. Leading pathogens, including *Mycobacterium tuberculosis, Plasmodium spp.* (Malaria), and HIV, account for significant DALYs, highlighting the ongoing need for targeted interventions and research investments. Additionally, other pathogens like *Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Helicobacter pylori* also contribute significantly to the disease burden, often leading to severe complications and higher healthcare costs [2].

The epidemiology of infections and infectious diseases in Iran reveals a diverse landscape influenced by demographic, environmental, and healthcare factors. In northern Iran, a study by Jahani et al. (2021) highlighted gastroenteritis (60.5% in men and 39.47% in women), leptospirosis, brucellosis, and sepsis as prevalent infectious diseases, with a significant rising trend in gastroenteritis and pulmonary tuberculosis. The study emphasized the need for targeted training, preventive strategies, and enhanced hospital infrastructure to manage these infections effectively [3]. In contrast, Ramezanzadeh et al. (2019) focused on the elderly population in Birjand, reporting a high incidence of pneumonia (52.4%), urinary tract infections (15%), and septicemia (13.7%) among hospitalized patients. This study highlighted the importance of addressing underlying conditions such as hypertension (36.1%), diabetes (11.5%), and chronic pulmonary diseases (9.7%) to mitigate infection risks [4]. Similarly, research by Habibinejad et al. (2010) in Qom identified gastroenteritis (57.6%), pneumonia (11%), and urinary tract infections (7.1%) as the most common pediatric infections, recommending improved water hygiene and vaccination programs to reduce disease burden [5]. Sharifi-Mood et al. (2007) in Southeast Iran found tuberculosis (46%) and bronchopulmonary infections (27.9% combined for pneumonia and bronchitis) to be predominant among the elderly, stressing the critical role of vaccinations in preventing these conditions [6]. Despite these insights, the number of epidemiological investigations in Iran remains low, warranting further research to develop comprehensive public health interventions and improve infectious disease management across the country.

The corona virus disease 2019 (COVID-19) pandemic has significantly impacted the prevalence, incidence, and trends of infectious diseases in Iran, highlighting shifts in hospitalization patterns. Zand et al. (2023) observed a notable decrease in the incidence of Ventilator-Associated Pneumonia (VAP) from 23.5 to 17.2 cases per 1000 device-days, particularly due to a reduction in VAP caused by *Acinetobacter baumannii*. The incidence of Central Line-Associated Bloodstream Infections (CLABSI) and Catheter-Associated Urinary Tract Infections (CAUTI) also declined during the pandemic, with rates dropping from 7.3 to 6.5 and 2 to 1.4 cases per 1000 device-days, respectively [7]. Similarly, Jabrodini et al. (2023) reported an increase in Superficial-Cutaneous-Fungal Infections (SCFIs) during the pandemic, with positive cases rising from 44.45% to 55.54% among suspected patients. This increase was attributed to the extensive use of personal protective equipment and frequent use of disinfectants [8]. Jabarpour et al. (2021) found a 19.75-point reduction in nosocomial infection rates during the pandemic, with a dramatic 39.12-point decrease in CCU/ICU infections and significant reductions in medical-surgical unit infections, except for hematogenic infections, which increased by 40 points [9].

Notwithstanding these findings, the impact of COVID-19 on hospitalization trends due to infectious diseases in Iran has not been adequately addressed. The observed shifts in infection rates and the advent of new infection patterns underscore the prerequisite for further comprehensive studies to understand the long-term effects of the pandemic on infectious disease epidemiology. Accordingly, the present study aimed to evaluate the trends of hospitalization in the infectious diseases department of an institutional tertiary hospital in Zanjan during the first six months of 2019 (pre-COVID) and 2022 (post-COVID). Understanding these trends is crucial for developing effective public health strategies and improving infectious disease management in the post-pandemic era.

MATERIALS AND METHODS

Study settings

The current investigation was a retrospective cohort study on the medical records of 429 patients with definite diagnoses of infectious diseases who were hospitalized in the infectious diseases department of a tertiary hospital in Zanjan, Iran, during two distinct time periods: the first six months of 2019 (pre-COVID) and the first six months of 2022 (post-COVID).

Eligibility criteria

A set of inclusion and exclusion criteria were defined and adopted to recruit potentially eligible participants. Patients were considered eligible if their medical records indicated the presence of sepsis in the absence of a definite diagnosis of infectious disease. Sepsis was defined based on at least two of the following criteria:

- White cell count >12,000 cells/μL
- Fever >38°C
- Tachypnea or respiratory rate >20
- Tachycardia or hear rate >90
- Signs of organ failure (i.e., loss of consciousness, oliguria, acidosis, etc.)

Additionally, all patients with a definite diagnosis of infectious disease including infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue and musculoskeletal system were included in the study.

Patients hospitalized without a confirmed diagnosis of infectious diseases or those with unclear infection foci were excluded from the study. This included patients initially transferred to the infectious diseases department with suspected sepsis syndrome, who were later determined to have systemic inflammatory response syndrome without an infectious agent, as well as cases of poisoning, drug side effects, pancreatitis, and similar conditions.

Sample size estimation

The minimum sample size was estimated according to the method described by Charan et al., using the epidemiological characteristics reported by Holman et al. for infectious diseases [10, 11]. Accordingly, assuming a confidence level of 95%, a power of 90%, a hospitalization rate of 0.20, and an accuracy level of 0.038, a minimum number of 429 samples was estimated for the present study. Samples were selected according to the simple random sampling method, using a table of random numbers. Ultimately, a total of 429 patients were selected, of whom 214 and 215 were hospitalized in pre-COVID and post-COVID periods, respectively.

Study protocol

After sample selection, the medical records of the included patients were surveyed for qualitative and quantitative data including age, gender, cause of hospitalization, laboratory test results (i.e., blood cell counts, serum pro-inflammatory markers, blood and urine culture), antibiotics, length of hospital stay, and ICU transfer and mortality rates. This data was collected using a structured checklist, and then considered for statistical analysis.

Statical analysis

After collecting the relevant data, they were entered into SPSS24 software. Initially, descriptive statistics were reported for qualitative data (frequency and relative frequency) and quantitative data (mean ± SD). For analytical analysis, the Kolmogorov-Smirnov test was first used to assess the normality of the variable distributions. In the condition that the test indicated normal distribution, the independent sample T-test or one-way Analysis of Variance (ANOVA) was employed to compare the means of these variables across 2 or more groups. If the normality assumption was not met, the Mann-Whitney U test or the nonparametric Kruskal-Wallis test was used. To compare qualitative variables, the Chi-squared test or Fisher's exact test was applied. A significance level of less than 0.05 (p-value <0.05) was considered for the statistical analysis.

Ethical considerations

The present investigation was a retrospective cohort study on patient medical records. Measures were taken to ensure patient confidentiality and data anonymization during the extraction and analysis processes. Ethical approval for the study protocol was obtained from the Institutional Review Board (IRB), affirming compliance with ethical principles outlined in the Declaration of Helsinki and local regulations (Approval ID: IR.ZUMS.REC.1401.372).

RESULTS

In this study, a total of 429 patients, assigned to pre-COVID (N=214) and post-COVID (N=215) groups, were retrospectively surveyed. Based on age, the patients were classified in three subgroups. In both time periods, the most prevalent age subgroup was 25-65, followed by patients aged >65 and 12-25, with no statistically significant difference. In contrast, gender distribution was found to be significantly different between the 2 groups, with the pre-COVID group involving a markedly higher number of female patients compared to the post-COVID group (47.66% vs. 38.13%), suggesting that the COVID-19 might have resulted in declining and growing trends in hospitalization of female and male patients in the infectious diseases department (p<0.05). The most frequent underlying health condition was hypertension (29.80% vs. 30.80%) followed by diabetes mellitus (22.80% vs. 20.60%). Length of hospital stay was slightly different between the 2 groups, with the post-COVID group showing a marginally higher mean duration of hospital stay (Table 1).

Tab. 1. Demographic information of patients including age and gender distribution, and length of hospital stay

Variable			Group (N = 429)		p-value
			Pre-COVID (N=214)	Post-COVID (N=215)	
Age (n, %)		12-25	25(11.68%)	22(10.2%)	0.881
		25-65	117(54.67%)	116(53.95%)	
		>65	72(33.60%)	75(34.80%)	
Gender (n, %)		Female	102(47.66%)	82(38.13%)	0.046
		Male	112(52.33%)	133(61.08%)	
Underlying Condition	HTN	Yes	66(30.80%)	64(29.80%)	0.809
		No	148(69.20%)	151(70.20%)	
	DM	Yes	44(20.60%)	49(22.80%)	0.575
		No	170(79.40%)	166(77.20%)	
Length of Stay (day)			7.18 ± 5.510	7.24 ± 4.795	0.889

Site-specific distribution of infections is reported in table 2. Collectively, five distinct systems of the body were found to be affected in the patients, of which the integumentary system was observed to be significantly affected by the COVID-19 pandemic among patients hospitalized in the infectious diseases department. As shown in table 2, skin infections (27.00% *vs.* 15.40%) were significantly more prevalent in the post-COVID group compared to the pre-COVID group (p<0.01).

Tab. 2. Comparison of site-specific distribution of infections among patients

Site of Infection		Group (N = 429)		p-value
		Pre-COVID (N=214)	Post-COVID (N=215)	
Gastrointestinal tract	Yes	22(10.30%)	31(14.40%)	0.193
	No	192(89.70%)	184(85.60%)	
Genitourinary tract	Yes	34(15.90%)	35(16.30%)	0.912
	No	180(84.10%)	180(83.70%)	
Bones and joints	Yes	30(14.00%)	26(12.10%)	0.554
	No	184(86.00%)	189(87.90%)	
Respiratory tract	Yes	68(31.80%)	52(24.20%)	0.08
	No	146(68.20%)	163(75.80%)	
Skin	Yes	33(15.40%)	58(27.00%)	0.003
	No	181(84.60%)	157(73.00%)	

A total of 12 different infectious diseases were recorded as final diagnoses for the patients, which are summarized in table 3. Of these infectious diseases, only pneumonia (21.40% *vs.* 29.90%) and meningitis/encephalitis (0.50% *vs.* 3.30%) were found to be significantly different between the 2 groups, with both diseases being less frequently diagnosed in the post-COVID period compared to the pre-COVID period (p<0.05).

Tab. 3. Comparison of the prevalence of different infectious diseases (final diagnosis) among patients

Final Diagnosis		Group (N = 429)		p-value
		Pre-COVID (N = 214)	Post-COVID (N = 215)	
Pneumonia	Yes	64 (29.90%)	46 (21.40%)	0.044
	No	150 (70.10%)	169 (78.60%)	
Gastroenteritis	Yes	21 (9.80%)	28 (13.00%)	0.296
	No	193 (90.20%)	187 (87.00%)	
Epididymo-orchitis	Yes	7 (3.30%)	12 (5.60%)	0.25
	No	207 (96.70%)	203 (94.40%)	
Sepsis	Yes	23 (10.70%)	15 (7.00%)	0.169
	No	191 (89.30%)	200 (93.00%)	
Diabetic foot	Yes	14 (6.50%)	12 (5.60%)	0.667
	No	200 (93.50%)	203 (94.40%)	
Septic arthritis	Yes	3 (1.40%)	3 (1.30%)	0.995
	No	211 (98.60%)	212 (98.70%)	
Osteomyelitis	Yes	13 (6.10%)	13 (6.00%)	0.99
	No	201 (93.90%)	202 (94%)	
Brucellosis	Yes	16 (7.50%)	10 (4.70%)	0.22
	No	198 (92.50%)	205 (95.30%)	
Tuberculosis	Yes	1 (0.50%)	4 (1.9%)	0.179
	No	213 (99.50%)	211 (98.10%)	
Herpes zoster infection	Yes	9 (4.20%)	15 (7.00%)	0.212
	No	205 (95.80%)	200 (93.00%)	
Meningitis/Encephalitis	Yes	7 (3.30%)	1 (0.50%)	0.030
	No	207 (96.70%)	214 (99.50%)	
Urinary tract infection	Yes	34 (15.9%)	35 (16.30%)	0.912
	No	180 (84.10%)	180 (83.70%)	

Table 4 shows the mean values of blood cell counts and pro-inflammatory markers between the 2 groups. Patients in the post-COVID group showed a significantly reduced mean level of CRP compared to the pre-COVID group ($p<0.01$). Similarly, a significantly lower proportion of neutrophils was observed in the post-COVD group compared to the pre-COVID group ($p<0.05$).

Tab. 4. Comparison of blood cell counts and serum pro-inflammatory markers between the two groups

Laboratory Test	Group (N = 429)		p-value
	Pre-COVID (N = 214)	Post-COVID (N = 215)	
ESR (mm/h)	36.58 ± 25.08	38.83 ± 28.80	0.497
CRP (mg/dL)	114.94 ± 86.50	34.74 ± 34.22	0.001
WBC (10^6 cells/μL)	9.70 ± 6.62	9.70 ± 4.78	0.999
Lymph (%)	22.26 ± 14.75	21.08 ± 12.06	0.369
Neut (%)	64.04 ± 24.33	57.06 ± 32.27	0.013

Table 5 shows the frequency of positive and negative microbiological laboratory tests between the pre-COVID and post-COVID group. As can be seen, a significant increase in the frequency of positive blood cultures (2.30 *vs.* 0%) and urine cultures (20.00% *vs.* 3.30%) was noticed in the post-COVID group, indicating significantly higher rates of systemic and genitourinary infection is post-COVID period ($p<0.01$).

Tab. 5. Comparison of microbiological laboratory test results between the two groups

Laboratory Test		Group (N = 429)		p-value
		Pre-COVID (N = 214)	Post-COVID (N = 215)	
Blood culture (n, %)	Positive	–	5 (2.30%)	0.001
	Negative	8 (3.70%)	87 (40.50%)	
	Not Reported	206 (96.30%)	123 (57.20%)	
Urine culture (n, %)	Positive	7 (3.30%)	43 (20.00%)	0.001
	Negative	149 (69.60%)	99 (46.00%)	
	Not Reported	58 (27.10%)	73 (34.00%)	

Stool culture (n, %)	Positive	1 (0.50%)	–	0.582
	Negative	23 (10.70%)	25 (11.60%)	
	Not Reported	190 (88.80%)	190 (88.40%)	

Frequency of the administration of 28 antimicrobial agents were compared between the pre-COVID and post-COVID time periods (Table 6). Of these agents, 6 antibiotics were found to have been differentially administrated when comparing the two groups of patients. As reported in table 6, ceftriaxone (30.20% *vs.* 17.30%), ciprofloxacin (33.50% *vs.* 23.80%), clindamycin (35.80% *vs.* 26.20%), cefazolin (9.3% *vs.* 2.3%) and meropenem (23.70% *vs.* 12.10%) were found to be more frequently administrated in the post-COVID group compared to pre-COVID group to a significant extent (p<0.05). Conversely, the administration frequency of levofloxacin (19.50% *vs.* 28.00%) was found to be significantly reduced in the post-COVID group compared to the pre-COVID group (p<0.05).

Tab. 6. Frequency of antibiotics administration among different groups of patients

Antibiotic		Group (N = 429)		p-value
		Pre-COVID (N = 214)	Post-COVID (N = 215)	
Ceftriaxone	Yes	37 (17.30%)	65 (30.20%)	0.002
	No	177 (82.70%)	150 (69.80%)	
Cefepime	Yes	27 (12.60%)	16 (7.40%)	0.074
	No	187 (87.40%)	199 (92.60%)	
Ciprofloxacin	Yes	51 (23.80%)	72 (33.50%)	0.027
	No	163 (76.20%)	143 (66.50%)	
Levofloxacin	Yes	60 (28.00%)	42 (19.50%)	0.039
	No	154 (72.00%)	173 (80.50%)	
Ofloxacin	Yes	3 (1.40%)	–	0.0.81
	No	211 (98.60%)	215 (100%)	
Clindamycin	Yes	56 (26.20%)	77 (35.80%)	0.031
	No	158 (73.80%)	138 (64.20%)	
Ceftazidime	Yes	6 (2.80%)	13 (6.00%)	0.1
	No	208 (97.20%)	202 (94%)	
Vancomycin	Yes	64 (29.90%)	60 (27.90%)	0.648
	No	150 (70.10%)	155 (72.10%)	
Gentamicin	Yes	9 (4.20%)	9 (4.10%)	0.9
	No	205 (95.80%)	206 (95.90%)	
Azithromycin	Yes	12 (5.60%)	28 (9.10%)	0.106
	No	202 (94.40%)	194 (90.20%)	
Cefazolin	Yes	5 (2.30%)	20 (9.30%)	0.002
	No	209 (97.70%)	195 (90.70%)	
Doxycycline	Yes	12 (5.60%)	10 (4.70%)	0.6
	No	202 (94.40%)	205 (95.30%)	
Amoxicillin/clavulanic Acid	Yes	3 (1.40%)	1 (0.40%)	0.08
	No	211 (98.60%)	214 (99.60%)	
Metronidazole	Yes	12 (5.6%)	17 (7.9%)	0.3
	No	202 (94.40%)	198 (92.10%)	
Imipenem	Yes	59 (27.6%)	44 (20.5%)	0.085
	No	155 (72.4%)	171 (72.5%)	
Meropenem	Yes	26 (12.10%)	51 (23.70%)	0.002
	No	188 (87.90%)	164 (76.30%)	
Rifampin	Yes	10 (4.70%)	10 (4.70%)	0.991
	No	204 (95.30%)	205 (95.30%)	
Linezolid	Yes	8 (3.70%)	4 (1.90%)	0.2
	No	206 (96.30%)	211 (98.10%)	

Ampicillin/sulbactam	Yes	7 (3.30%)	5 (2.30%)	0.5
	No	207 (96.70%)	210 (97.70%)	
Cefotaxime	Yes	1 (0.50%)	1 (0.40%)	0.997
	No	213 (99.50%)	214 (99.60%)	
Cefuroxime	Yes	1 (0.50%)	1 (0.40%)	0.316
	No	213 (99.50%)	214 (99.60%)	
Amikacin	Yes	2 (0.90%)	1 (0.40%)	0.55
	No	211 (99.10%)	214 (99.60%)	
Streptomycin	Yes	1 (0.50%)	1 (0.40%)	0.318
	No	213 (99.50%)	214 (99.60%)	
Penicillin	Yes	1 (0.50%)	1 (0.40%)	0.318
	No	213 (99.50%)	214 (99.60%)	
Tetracycline	Yes	4 (1.90%)	1 (0.40%)	0.175
	No	210 (98.10%)	214 (99.60%)	
Fluconazole	Yes	4 (1.90%)	6 (2.80%)	0.527
	No	210 (98.10%)	208 (97.20%)	
Trimethoprim/sulfa-methoxazole	Yes	6 (2.80%)	7 (3.30%)	0.785
	No	208 (97.20%)	208 (96.70%)	
Acyclovir	Yes	12 (5.60%)	16 (7.40%)	0.442
	No	202 (94.40%)	199 (92.60%)	

Rates of transfer to intensive care unit (3.70% *vs.* 3.70%) and mortality (1.40% *vs.* 1.40%) were identical in both pre-COVID and post-COVID periods, indicating that the pandemic was not associated with poor prognosis of infectious diseases (Table 7).

Tab. 7. Rates of ICU transfer and mortality among different groups of patients

Variable		Group (N = 429)		p-value
		Pre-COVID (N = 214)	Post-COVID (N = 215)	
ICU Transfer (n, %)	Yes	8 (3.70%)	8 (3.70%)	0.992
	No	206 (96.30%)	207 (96.30%)	
Death (n, %)	Yes	3 (1.40%)	3 (1.40%)	0.995
	No	111 (98.60%)	112 (98.60%)	

DISCUSSION

In the present investigation, we analyzed data from 429 patients, split into pre-COVID (N=214) and post-COVID (N=215) groups. Patients were categorized by age into 3 subgroups, with no significant differences in age distribution between the two periods. However, gender distribution differed significantly: with the pre-COVID group demonstrating a higher percentage of female patients compared to the post-COVID group (47.66% *vs.* 38.13%), suggesting a shift in gender trends in hospitalization with regard to infectious diseases. The most common underlying health conditions were hypertension and diabetes mellitus, with similar rates across both groups. The length of hospital stay was slightly longer in the post-COVID group. Notably, skin infections increased significantly post-COVID (27.00% *vs.* 15.40%). Pneumonia and meningitis/encephalitis decreased in the post-COVID period. Changes in antimicrobial use were observed, with increased administration of several antibiotics in the post-COVID group and a decrease in levofloxacin use. Rates of ICU transfer and mortality remained unchanged, suggesting no significant impact on the overall prognosis of infectious diseases due to the pandemic.

Our study highlights notable changes in the demographics and disease patterns of patients hospitalized in the infectious diseases department pre- and post-COVID-19 pandemic. The observed significant gender shift, with a decrease in female patients and an increase in male patients post-COVID, may reflect behavioral or socio-economic factors influenced by the pandemic. This contrasts with the study by Yorita Christensen et al., which reported higher female hospitalization rates and a mortality rate of 4%, while our study found a consistent mortality rate of 1.4% across both periods. Age distribution in our study showed that patients over 65 were the largest group in 1401, similar to previous findings by Yorita Christensen et al. [12].

The most common cause of hospitalization was respiratory tract infections, with rates of 31.8% in pre-COVID and 24.3% in post-COVID groups. This is consistent with studies by Yorita Christensen et al. and Holman et al., which also identified respiratory infections as the leading cause of hospitalization due to infectious diseases [11, 12]. However, our study found a decrease in pneumonia cases from 29.9% in the pre-COVID group to 21.4% in the post-COVID group, differing from earlier studies. Urinary tract infections were the second most common cause in both periods of our study, aligning with Yorita Christensen et al., who reported a lower rate of 10% compared to our 15.9% in pre-COVID and 16.3% in post-COVID periods. Shichijo et al. (2023) similarly observed significant shifts in pediatric respiratory infection rates in Japan, with a marked re-emergence of RSV infections and an increased demand for hospital resources post-COVID, emphasizing the pandemic's impact on hospitalization dynamics [12, 13].

The increased prevalence of skin infections post-COVID in our study aligns with findings by Pan et al. (2022), who documented the sustained importance of dermatologic infections among neonatal patients during the pandemic [14]. These results suggest that while respiratory infections might have seen varied impacts due to non-pharmaceutical interventions, other types of infections persisted or even increased, as healthcare systems adapted to new challenges.

Our findings also differed from the report by Kim et al. on the high rate of negative cultures [15]. The study by Zhang et al. also noted a rise in sepsis diagnoses, which is partly in agreement with our results regarding the higher number of positive blood cultures in the post-COVID group [16]. Lastly, our study found a lower rate of negative urine cultures compared to Mostafavi et al., highlighting differences in culture results over time [17].

Our study also documented a differential administration of antibiotics, with a notable increase in the use of ceftriaxone, ciprofloxacin, clindamycin, cefazolin, and meropenem post-COVID, and a decrease in levofloxacin usage. This shift could be reflective of evolving microbial patterns and antibiotic resistance trends, paralleling findings by Gold et al. (2023), who reported an increased incidence and mortality of fungal infections during the COVID-19 pandemic, suggesting a need for rigorous antimicrobial monitoring [18].

Moreover, the unchanged rates of ICU transfers and mortality in our study indicate that while hospitalization patterns shifted, the overall prognosis for infectious diseases remained stable. This contrasts with Izu et al. (2023), who observed an increase in LRTI admissions post-pandemic, implying that while certain conditions like RSV returned to pre-pandemic levels, the broader impact on infectious disease mortality was perceptible [19]. These findings collectively highlight the varied impacts of the COVID-19 pandemic on infectious disease epidemiology, underscoring the importance of continuous monitoring and adaptation of healthcare practices to address emerging trends in patient demographics and infection patterns.

CONCLUSION

The present study indicated that the majority of patients hospitalized in the infectious disease department were male, and the most common cause of hospitalization was respiratory tract infections, aligning with global trends. Hypertension was the most prevalent underlying condition among these patients. The clinical indication for ICU admission and the mortality rate remained relatively stable across the study periods. However, there was a notable increase in the use of certain antibiotics and a higher rate of positive urine and blood cultures over time. These findings highlight the importance of enhanced public education on controlling respiratory infections and promoting vaccinations, particularly for high-risk groups. Early diagnosis and screening for hypertension should be prioritized. Additionally, addressing the low number of positive serological assays and the predilection for infrequent use of blood cultures is crucial for improving patient care.

DATA AVAILABILITY STATEMENT

All datasets will be made available upon reasonable request from the corresponding author.

COMPETING INTERESTS STATEMENT

The authors declare no competing interests.

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