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An Observational Study of the Clinical Spectrum, Microbiological Etiology, and Treatment Outcomes of Infectious Conditions in a Tertiary Care Hospital

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ABSTRACT

Background: Infectious conditions continue to account for substantial morbidity, antimicrobial consumption, and hospital utilization in tertiary care settings, particularly in resource-constrained regions where local microbiological surveillance is essential for rational empirical therapy. Objectives: To describe the clinical spectrum, microbiological etiology, and treatment outcomes of infectious conditions managed in a tertiary care hospital. **Methods**: This hospital-based observational study was conducted at Azeezia Institute of Medical Sciences and Research, Adichanalloor, Kerala, India, from January 2025 to June 2025. One hundred patients with clinically diagnosed infectious conditions were included. Demographic details, comorbidities, site of infection, presenting features, microbiological findings, treatment modifications, intensive care requirement, duration of stay, and in-hospital outcomes were recorded and analyzed descriptively. **Results**: The mean age was 46.3 ± 16.8 years, and 58% were males. Respiratory tract infections were the commonest infectious category (27%), followed by urinary tract infections (21%) and skin and soft tissue infections (17%). Fever was the predominant symptom (84%). Culture positivity was observed in 72% of cases, with gram-negative organisms predominating (68.1%). Escherichia coli was the most frequent isolate (27.8%), followed by Staphylococcus aureus (16.7%) and Klebsiella pneumoniae (15.3%). Antimicrobial therapy was modified according to culture sensitivity in 39% of patients. Intensive care support was required in 16%, and 84% improved and were discharged, while in-hospital mortality was 8%. **Conclusion**: Infectious conditions in this tertiary care setting showed a broad clinical spectrum with predominance of respiratory and urinary infections, frequent gram-negative etiology, and generally favorable outcomes with timely treatment. Continued microbiological surveillance and antimicrobial stewardship remain central to optimizing empirical therapy and reducing adverse outcomes.

Keywords*: infectious conditions; clinical spectrum; microbiological etiology; tertiary care hospital; treatment outcome; antimicrobial therapy.*

INTRODUCTION

Infectious conditions remain a major cause of morbidity, hospitalization, prolonged antibiotic exposure, and preventable mortality across low- and middle-income countries. In tertiary care hospitals, the burden is particularly complex because

patients often present with diverse syndromic patterns, overlapping comorbidities, prior antimicrobial exposure, and varying illness severity[1]. Such settings receive community-acquired infections, referral cases with diagnostic uncertainty, and healthcare-associated infections that demand early clinical recognition and microbiological confirmation for appropriate management [2-5]. The consequences of delayed diagnosis or inappropriate empirical therapy include progression to sepsis, longer hospital stay, higher intensive care utilization, and emergence of antimicrobial resistance [4,5,9].

The epidemiology of infectious diseases in hospitals is dynamic and strongly influenced by local patient mix, healthcare practices, referral patterns, and antimicrobial prescribing behavior. Respiratory tract infections, urinary tract infections, skin and soft tissue infections, bloodstream infections, and postoperative wound infections together constitute a substantial proportion of adult infectious morbidity in routine hospital practice [6-9]. Although standard international guidelines provide broad diagnostic and therapeutic frameworks for common infectious syndromes, they cannot substitute for institution-specific data on prevalent pathogens and local susceptibility trends [6-9]. For this reason, hospital-level observational studies continue to play an important role in informing empirical treatment policies and infection-control measures.

A further concern is the growing predominance of multidrug-resistant organisms in hospital settings, especially among gram-negative bacilli. Studies from Indian tertiary care institutions have documented changing antimicrobial susceptibility patterns, substantial resistance among nosocomial isolates, and adverse outcomes in severe infections and sepsis [10-14]. These reports highlight the practical value of continuous surveillance, culture-guided treatment, and stewardship-driven revision of empirical antibiotic protocols. Local data are also needed to understand the contribution of comorbid states such as diabetes, hypertension, chronic kidney disease, and chronic respiratory disease, which often modify both presentation and prognosis of infectious illnesses.

Despite the clinical importance of this topic, many centers still lack consolidated data that simultaneously describe the clinical spectrum, microbiological profile, therapeutic modification, and early outcomes of patients with infectious conditions treated in everyday practice. Such information is useful not only for clinicians and microbiologists but also for hospital administrators planning diagnostic support, intensive care requirements, and antimicrobial policy. Therefore, the present study was undertaken at Azeezia Institute of Medical Sciences and Research, Adichanalloor, Kerala, India, to evaluate the demographic profile, spectrum of infectious conditions, microbiological etiology, and treatment outcomes among patients managed in a tertiary care hospital. The objectives were to describe the clinical presentation of infectious conditions, identify the predominant microbial isolates and resistance patterns, and assess short-term treatment outcomes including intensive care requirement, duration of hospital stay, and in-hospital disposition.

METHODOLOGY

Study design and setting

This hospital-based observational study was conducted at Azeezia Institute of Medical Sciences and Research, Adichanalloor, Kerala, India, over a six-month period from January 2025 to June 2025. The study included 100 consecutive patients diagnosed with infectious conditions during the study period. Adult patients aged 18 years and above with a clinical diagnosis of infection, supported by history, physical examination, and relevant laboratory or radiological findings, were considered eligible. Patients with noninfectious inflammatory conditions, uncertain diagnosis after evaluation, or incomplete essential records were excluded from the analysis. The manuscript was prepared in accordance with the STROBE guidance for observational studies [1].

Data collection and case classification

Demographic details, comorbidities, presenting complaints, clinical diagnosis, site of infection, microbiological findings, antimicrobial therapy, intensive care requirement, source-control procedures, duration of hospital stay, and in-hospital outcome were recorded using a structured data collection format. Infectious syndromes were categorized into respiratory tract infection, urinary tract infection, skin and soft tissue infection, gastrointestinal infection, bloodstream infection or sepsis, surgical site infection, central nervous system infection, and bone or joint infection on the basis of clinical findings and available standard diagnostic criteria [2,6-9]. Comorbid illnesses such as diabetes mellitus, hypertension, chronic kidney disease, chronic lung disease, and immunocompromised states were documented from patient history and case records.

Microbiological evaluation

Relevant microbiological specimens, including blood, urine, sputum, pus, wound swab, and other site-specific samples, were collected before initiation of definitive antimicrobial therapy whenever feasible and processed in the microbiology laboratory according to standard procedures. Organisms were identified by conventional microbiological methods, and antimicrobial susceptibility testing was interpreted using the standardized disk diffusion method described by Bauer et al.

[3]. Where applicable, resistance patterns were interpreted using internationally accepted interim standard definitions for acquired resistance [4]. Culture-positive and culture-negative cases were recorded separately.

Treatment and outcome assessment

All patients received antimicrobial treatment as decided by the treating clinical team. Initial therapy was empirical and later modified based on culture and sensitivity reports, clinical response, and source of infection. Requirement for intensive care admission and source-control procedures such as drainage or debridement was noted. Outcome assessment was limited to the index hospital stay and categorized as improved and discharged, referred, left against medical advice, or death. Patient confidentiality was maintained throughout data handling, and no personally identifiable information was included in the analytical dataset or manuscript tables.

Statistical analysis

Data were entered into a spreadsheet and analyzed using descriptive statistics. Continuous variables were summarized as mean with standard deviation, and categorical variables were expressed as frequency and percentage. Results are presented in a clinically interpretable format to support local surveillance and stewardship planning.

RESULTS

A total of 100 patients diagnosed with infectious conditions were included in the observational study conducted at the tertiary care hospital. The age of the participants ranged from 18 to 75 years, with a mean age of 46.3 ± 16.8 years. The highest proportion of patients belonged to the 46-60 years age group (30%), followed by 31-45 years (28%). Males constituted 58% of the study population, while females accounted for 42%. Comorbid conditions were present in 56% of patients, with diabetes mellitus (32%) and hypertension (24%) being the most frequently documented associated illnesses (Table 1).

Table 1. Demographic characteristics and comorbidities of the study population (N = 100)

Variable	Category	n	%
Age group (years)	18-30	20	20
	31-45	28	28
	46-60	30	30
	>60	22	22
Sex	Male	58	58
	Female	42	42
Presence of comorbidity	Yes	56	56
	No	44	44
Common comorbidities*	Diabetes mellitus	32	32
	Hypertension	24	24
	Chronic kidney disease	9	9
	Chronic lung disease	8	8

**Some patients had multiple comorbidities.*

Respiratory tract infections represented the most common clinical category (27%), followed by urinary tract infections (21%), skin and soft tissue infections (17%), and gastrointestinal infections (13%). Bloodstream infections or sepsis accounted for 10% of cases, while surgical site infections, central nervous system infections, and bone and joint infections contributed smaller proportions. Fever was the predominant presenting symptom, followed by generalized weakness, cough or dyspnea, dysuria, and localized pain or swelling (Table 2).

Table 2. Clinical spectrum of infectious conditions (N = 100)

Type of infection	n	%
Respiratory tract infections	27	27
Urinary tract infections	21	21
Skin and soft tissue infections	17	17
Gastrointestinal infections	13	13

Type of infection	n	%
Bloodstream infections/sepsis	10	10
Surgical site infections	7	7
Central nervous system infections	3	3
Bone and joint infections	2	2
Total	100	100

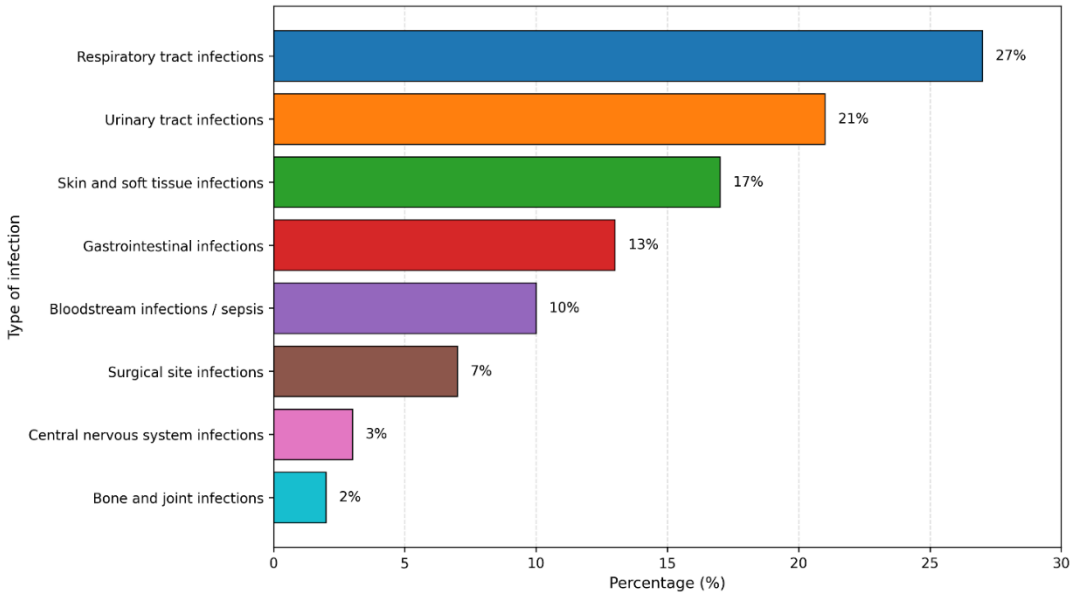

Figure 1: Clinical spectrum of infectious conditions

Microbiological confirmation was achieved in 72% of cases. Among culture-positive isolates, gram-negative bacteria predominated (68.1%), followed by gram-positive organisms (26.4%) and fungal isolates (5.5%). Escherichia coli was the most frequently isolated pathogen (27.8%), followed by Staphylococcus aureus (16.7%), Klebsiella pneumoniae (15.3%), and Pseudomonas aeruginosa (12.5%) (Table 3).

Table 3. Microbiological profile of culture isolates

Microbiological finding	n	%
Culture positive	72	72
Culture negative	28	28
Type of organism (n = 72)		
Gram-negative bacteria	49	68.1
Gram-positive bacteria	19	26.4
Fungal isolates	4	5.5
Common isolates		
Escherichia coli	20	27.8
Staphylococcus aureus	12	16.7
Klebsiella pneumoniae	11	15.3
Pseudomonas aeruginosa	9	12.5
Streptococcus pneumoniae	7	9.7
Acinetobacter species	5	6.9
Candida species	4	5.5

Microbiological finding	n	%
Others	4	5.5

All patients received antimicrobial therapy. Empirical antibiotic treatment was initiated initially, and therapy was later modified according to culture sensitivity in 39% of patients. Source-control procedures were required in 18% of cases. Intensive care support was required in 16% of patients. The mean duration of hospital stay was 7.1 ± 3.4 days. At discharge, 84% of patients improved and were discharged in stable condition, whereas 8% died during hospitalization; the remaining patients were either referred or left against medical advice (Table 4).

Table 4. Treatment and clinical outcomes (N = 100)

Variable	Category	n	%
Antibiotic therapy	Empirical therapy	61	61
	Modified after culture sensitivity	39	39
ICU admission	Yes	16	16
	No	84	84
Source control procedures	Required	18	18
	Not required	82	82
Final outcome	Improved and discharged	84	84
	Referred	4	4
	Left against medical advice	4	4
	Death	8	8

DISCUSSION

The present study provides a concise overview of the clinical and microbiological burden of infectious conditions in a tertiary care setting over a six-month period. The study population was predominantly middle aged, with a modest male predominance and a substantial burden of underlying comorbidity. This pattern is broadly consistent with hospital-based infection cohorts from India, where chronic diseases such as diabetes, hypertension, and renal dysfunction frequently coexist with acute infectious presentations and influence severity, treatment response, and recovery [10-14]. The high prevalence of comorbidity in the present series reinforces the need for early risk stratification at admission.

Respiratory tract infections formed the largest clinical category, followed by urinary tract infections and skin and soft tissue infections. This distribution is clinically plausible in tertiary care practice and aligns with the continuing importance of pneumonia, urinary infection, and soft tissue infection in adult hospital medicine [6-8]. Fever was the leading symptom, which is expected in mixed infectious cohorts, but the simultaneous presence of weakness, respiratory symptoms, urinary complaints, and local inflammatory features indicates the broad syndromic variation with which such patients present. From a clinical standpoint, these findings support the need for structured bedside assessment combined with focused microbiological evaluation.

Culture positivity was observed in nearly three fourths of patients, and gram-negative organisms predominated. Escherichia coli emerged as the most frequent isolate, followed by Staphylococcus aureus, Klebsiella pneumoniae, and Pseudomonas aeruginosa. This pattern is in agreement with reports from Indian tertiary centers and other hospital-based studies showing gram-negative dominance and a substantial contribution of E. coli and Klebsiella species to common infectious syndromes, particularly urinary, gastrointestinal, and bloodstream infections [10-14]. The microbiological yield observed in the present study also underscores the importance of collecting appropriate specimens before definitive antimicrobial escalation whenever clinically feasible [3,4].

Another clinically relevant finding was that antimicrobial therapy required modification according to culture sensitivity in 39% of patients. This proportion underlines the practical limitations of purely empirical treatment and highlights the value of culture-guided antibiotic optimization. Although 84% of patients improved and were discharged, 16% required intensive care support and 8% died during hospitalization, suggesting that a meaningful subset of patients had severe disease or organ dysfunction. These outcome figures are lower than those reported in focused sepsis cohorts, which is expected because the present study included a wider spectrum of infectious conditions rather than only critically ill patients [9,12,13]. Overall, the study emphasizes that locally generated epidemiological and microbiological data remain essential for strengthening empirical therapy, antimicrobial stewardship, and infection-control strategies in tertiary hospitals.

Limitations

This study was conducted in a single tertiary care center with a relatively small sample and short study duration, which limits wider generalization. Infection categories were analyzed together rather than as separate syndrome-specific cohorts. Molecular characterization of resistance mechanisms was not performed. Outcomes were restricted to the in-hospital period, and post-discharge recurrence, readmission, and long-term mortality were not assessed. systematically.

CONCLUSION

In conclusion, infectious conditions managed in this tertiary care hospital showed a broad and clinically relevant spectrum, with respiratory tract, urinary tract, and skin and soft tissue infections accounting for most cases. Culture positivity was high, and gram-negative bacteria were the dominant etiological group, with Escherichia coli as the leading isolate. The need to modify antibiotics in a considerable proportion of patients highlights the importance of early specimen collection, microbiological confirmation, and culture-directed therapy. Most patients improved with treatment, yet the observed ICU requirement and in-hospital mortality indicate persistent severity in a subset. Continuous local surveillance, stewardship practices, and timely source control are essential for improving patient outcomes.

REFERENCES

1. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453-7. doi:10.1016/S0140-6736(07)61602-X.
2. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control. 2008;36(5):309-32. doi:10.1016/j.ajic.2008.03.002.
3. Bauer AW, Kirby WM, Sherris JC, Turck M. Antibiotic susceptibility testing by a standardized single disk method. Am J Clin Pathol. 1966;45(4):493-6.
4. Magiorakos AP, Srinivasan A, Carey RB, Carmeli Y, Falagas ME, Giske CG, et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect. 2012;18(3):268-81. doi:10.1111/j.1469-0691.2011.03570.x.
5. Allegranzi B, Bagheri Nejad S, Combescure C, Graafmans W, Attar H, Donaldson L, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet. 2011;377(9761):228-41. doi:10.1016/S0140-6736(10)61458-4.
6. Metlay JP, Waterer GW, Long AC, Anzueto A, Brozek J, Crothers K, et al. Diagnosis and Treatment of Adults with Community-acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America. Am J Respir Crit Care Med. 2019;200(7):e45-e67. doi:10.1164/rccm.201908-1581ST.
7. Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, et al. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. Clin Infect Dis. 2010;50(5):625-63. doi:10.1086/650482.
8. Stevens DL, Bisno AL, Chambers HF, Dellinger EP, Goldstein EJ, Gorbach SL, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. Clin Infect Dis. 2014;59(2):e10-52. doi:10.1093/cid/ciu444.
9. Evans L, Rhodes A, Alhazzani W, Antonelli M, Coopersmith CM, French C, et al. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock 2021. Crit Care Med. 2021;49(11):e1063-e1143. doi:10.1097/CCM.0000000000005337.
10. Gopalakrishnan R, Sureshkumar D. Changing trends in antimicrobial susceptibility and hospital acquired infections over an 8 year period in a tertiary care hospital in relation to introduction of an infection control programme. J Assoc Physicians India. 2010;58 Suppl:25-31.
11. Kamat US, Ferreira AM, Savio R, Motghare DD. Antimicrobial resistance among nosocomial isolates in a teaching hospital in Goa. Indian J Community Med. 2008;33(2):89-92. doi:10.4103/0970-0218.40875.
12. Saravu K, Prasad M, Eshwara VK, Mukhopadhyay C. Clinico-microbiological profile and outcomes of nosocomial sepsis in an Indian tertiary care hospital--a prospective cohort study. Pathog Glob Health. 2015;109(5):228-35. doi:10.1179/2047773215Y.0000000026.
13. Nagarjuna D, Mittal G, Dhanda RS, Gaind R, Yadav M. Alarming levels of antimicrobial resistance among sepsis patients admitted to ICU in a tertiary care hospital in India - a case control retrospective study. Antimicrob Resist Infect Control. 2018;7:150. doi:10.1186/s13756-018-0444-8.
14. Verma V, Valsan C, Mishra P, Mund K, Dutta S, Anke G, et al. Antimicrobial Resistance Profile in ICU Patients Across India: A Multicenter, Retrospective, Observational Study. Cureus. 2024;16(4):e57489. doi:10.7759/cureus.57489.