Original Research Article

Acute Undifferentiated Febrile Illness in Emergency Care: Clinical Profile and Outcomes

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Abstract:

Background: Acute undifferentiated febrile illness (AUFI) is a frequent presentation in emergency departments in tropical regions, posing diagnostic and management challenges due to its diverse etiologies and nonspecific presentation.

Aim: To evaluate the clinical profile, etiological spectrum, organ involvement, and short-term outcomes of patients presenting with AUFI.

Methodology: A hospital-based observational study was conducted on 100 adult patients presenting to the emergency department of nmch,patna in Bihar, India, with fever without an identifiable focus. Detailed clinical evaluation, relevant laboratory investigations, and etiological work-up were performed. Patients were followed until discharge or in-hospital outcome.

Results: The majority of patients were aged 31–45 years, with male predominance. Dengue (32%) was the most common etiology, followed by malaria (24%) and scrub typhus (18%). Headache, myalgia, and vomiting were frequent symptoms. Hepatic involvement was the most common organ dysfunction. Most patients (82%) recovered and were discharged, while mortality was low (1%).

Conclusion: AUFI presents with varied clinical and etiological patterns, predominantly due to vector-borne diseases. Early syndromic assessment and supportive management result in favorable outcomes.

Keywords: Acute Undifferentiated Febrile Illness, Emergency Department, Dengue, Malaria, Clinical Outcomes.

Introduction

Acute undifferentiated febrile illness (AUFI) is a common and challenging clinical presentation encountered in emergency departments, particularly in tropical and subtropical regions [1]. It is characterized by the sudden onset of fever, usually of short duration (less than two weeks), without an identifiable focus of infection after initial clinical evaluation. AUFI represents a heterogeneous group of conditions caused by a wide spectrum of infectious and, less commonly, non-infectious etiologies. The absence of localizing signs or symptoms at presentation often complicates early diagnosis and management, placing a significant burden on emergency care services and healthcare systems.

In developing countries, including India, AUFI constitutes a major proportion of emergency department visits and hospital admissions [2]. The etiological profile of AUFI varies widely depending on geographic location, seasonal trends, vector prevalence, and local epidemiology [3]. Common infectious causes include viral illnesses, malaria, dengue fever, chikungunya, scrub typhus, enteric fever, leptospirosis, and early bacterial sepsis. However, many patients present during the early phase of illness when characteristic clinical features and laboratory markers are not yet evident, making differentiation between these conditions difficult at the point of emergency care. This diagnostic uncertainty often leads to empirical treatment, increased use of broad-spectrum antimicrobials, and potentially avoidable hospital admissions [4].

The clinical spectrum of AUFI ranges from mild self-limiting febrile illnesses to severe, life-threatening conditions associated with multi-organ dysfunction [5]. Patients may present with non-specific symptoms such as headache, myalgia, arthralgia, nausea, vomiting, or malaise, while others may rapidly deteriorate with complications such as shock,

acute respiratory distress syndrome, acute kidney injury, hepatic dysfunction, or altered sensorium. Early identification of patients at risk of poor outcomes is therefore critical in the emergency department, where timely triage, initiation of supportive care, and appropriate referral can significantly influence morbidity and mortality.

Emergency physicians often face the challenge of balancing the need for rapid decision-making with limited diagnostic information. Laboratory investigations and imaging studies may not be immediately available or may yield non-specific results in the early stages of illness. Moreover, overlapping clinical features among different febrile illnesses further complicate the diagnostic process [6]. As a result, understanding the common clinical profiles, presenting features, and initial laboratory abnormalities associated with AUFI can aid clinicians in forming rational differential diagnoses and management strategies. Identifying patterns associated with disease severity can also assist in early risk stratification and optimal utilization of emergency and intensive care resources.

Outcomes of AUFI are influenced by several factors, including the underlying etiology, host immune status, presence of comorbidities, timeliness of presentation, and adequacy of initial management. While many patients recover with supportive care, a subset progresses to severe disease requiring intensive monitoring, organ support, or prolonged hospitalization. Mortality, though variable, remains a concern, particularly in cases complicated by delayed diagnosis, inappropriate therapy, or rapid disease progression. Therefore, evaluating short-term outcomes such as need for hospital admission, intensive care unit transfer, length of hospital stays, complications, and in-hospital mortality is essential to assess the burden of AUFI on emergency and inpatient services [7].

Despite the high prevalence of AUFI, there is limited region-specific data describing the comprehensive clinical profile and outcomes of patients presenting to emergency departments. Most available studies focus on specific etiologies of fever rather than AUFI as a syndromic presentation. However, a syndromic approach is particularly relevant in emergency settings, where the primary concern is early stabilization and outcome prediction rather than definitive etiological diagnosis at presentation. Generating evidence on the demographic characteristics, clinical features, laboratory parameters, and outcomes of AUFI can help inform clinical guidelines, improve diagnostic algorithms, and guide empirical treatment protocols tailored to local epidemiology.

In this context, studying the clinical profile and outcomes of patients with acute undifferentiated febrile illness presenting to the emergency department is of considerable importance. Such an evaluation can provide insights into the common presenting patterns, identify predictors of severe disease, and highlight gaps in current management practices. Furthermore, it can contribute to better preparedness of emergency departments, facilitate early recognition of potentially serious conditions, and ultimately improve patient outcomes. Understanding AUFI from an emergency medicine perspective is therefore essential for optimizing care delivery in resource-limited and high-burden settings.

Methodology

Study Design: This study was designed as a hospital-based observational study aimed at evaluating the clinical profile and outcomes of patients presenting with acute undifferentiated febrile illness (AUFI) to the emergency department. The observational design was chosen to systematically record presenting features, investigation patterns, organ involvement, etiological diagnosis, and short-term outcomes without intervention beyond standard clinical care.

Study Area: The study was conducted in the Department of Medicine, Nalanda Medical College and Hospital, Patna, Bihar, India from April 2024 to March 2025.

Study Participants: The study population comprised adult patients presenting to the emergency department with complaints of fever without any obvious localizing signs of infection.

Inclusion Criteria

- Patients aged more than 18 years.
- Patients presenting to the emergency department with fever.
- Fever with no identifiable localizing focus of infection on initial clinical evaluation.
- Acute undifferentiated febrile illness defined as fever of more than two weeks' duration without signs suggestive of specific organ system involvement.

Exclusion Criteria

- Patients with a clear-cut diagnosis of sepsis or septic shock at presentation.
- Patients who did not give informed consent to participate in the study.
- Patients presenting with fever of less than two days' duration, as they were not investigated according to the study protocol.

Sample Size: A total of 100 patients fulfilling the inclusion criteria were enrolled in the study.

Procedure: A detailed clinical history and thorough physical examination were conducted for all patients presenting with fever. Patients with a history of fever for less than two days were neither investigated nor prescribed antibiotics. Patients presenting with three or more days of fever underwent routine and

diagnostic investigations, including complete blood count, urine analysis, and peripheral blood smear with thick film examination for malaria using Leishman stain. Rapid diagnostic testing for scrub typhus was performed and confirmed using IgM enzyme-linked immunosorbent assay (ELISA). Dengue infection was diagnosed based on positive IgM serology. Additional biochemical investigations included liver function tests and kidney function tests. Acute malaria was diagnosed by smear positivity, dengue fever by IgM serology positivity, and scrub typhus by positive IgM ELISA.

Patients with a history of fever exceeding five days were subjected to blood culture investigations. Renal impairment was defined by the presence of oliguria with metabolic acidosis and/or elevation in blood urea nitrogen and serum creatinine beyond laboratory reference values. Respiratory involvement was identified by the presence of tachypnea (respiratory rate >20/min) along with a decrease in oxygen saturation to less than 90%. Liver dysfunction was defined as a two-fold rise in serum alanine transaminase levels or isolated hyperbilirubinemia in the presence of normal transaminase values. Central nervous system dysfunction was identified by altered sensorium, unconsciousness, or one or more episodes of generalized tonic-clonic seizures.

All patients were managed according to standard institutional treatment protocols and were followed up until defervescence. Morbidity parameters were recorded but not compared between groups. Relevant data, including duration of fever, investigations performed, antibiotic administration, evidence of multi-organ involvement, and final diagnosis at discharge, were collected retrospectively from hospital medical records and systematically tabulated.

Statistical Analysis: The collected data were entered into a Microsoft Excel spreadsheet and analyzed using appropriate statistical software. Descriptive statistics were used to summarize demographic characteristics, clinical features, laboratory findings, and outcomes. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean and standard deviation. Results were interpreted in the context of clinical presentation and outcome patterns among patients with acute undifferentiated febrile illness.

Result

Table 1 summarizes the sociodemographic characteristics of the 100 study participants. The largest proportion of participants belonged to the 31–45 years age group (34.0%), followed by those aged 46–60 years (28.0%) and 18–30 years (22.0%), while individuals above 60 years constituted the smallest group (16.0%). Males formed a clear majority of the study population (62.0%), with females accounting for 38.0%. In terms of residence, more than half of the participants were from rural areas (58.0%), whereas 42.0% resided in urban areas, indicating a predominance of rural representation in the study sample.

Table 1: Sociodemographic Characteristics of Study Participants (n = 100)		
Variable	**Frequency (n)**	**Percentage (%)**
Age group (years)		
18–30	22	22.0
31–45	34	34.0
46–60	28	28.0
>60	16	16.0
Gender		
Male	62	62.0
Female	38	38.0
Residence		
Rural	58	58.0
Urban	42	42.0

Table 2 depicts the clinical presentation of patients with acute undifferentiated febrile illness (AUFI), wherein fever was universally present in all patients (100%), underscoring its defining feature. Among associated symptoms, headache was the most common (56%), followed by myalgia (48%) and vomiting (40%), indicating a predominance of systemic and gastrointestinal manifestations. Respiratory involvement in the form of breathlessness was observed in 20% of patients, while rash was noted in 18%, suggesting possible infectious etiologies with systemic involvement. Abdominal pain was reported by 26% of cases, reflecting gastrointestinal system participation. Neurological involvement, as evidenced by altered sensorium, was present in 14% of patients, highlighting a smaller but clinically significant subset with severe disease presentation. Overall, the table illustrates the varied and multisystem clinical spectrum of AUFI among the study population.

Table 2: Clinical Presentation of Patients with AUFI (n = 100)		
Clinical Feature	Frequency (n)	Percentage (%)
Fever	100	100
Headache	56	56.0
Myalgia	48	48.0
Vomiting	40	40.0
Abdominal pain	26	26.0
Altered sensorium	14	14.0
Rash	18	18.0
Breathlessness	20	20.0

Table 3 depicts the etiological diagnosis of acute undifferentiated febrile illness among the 100 study participants. Dengue fever was identified as the most common cause, accounting for 32% of cases, followed by malaria in 24% and scrub typhus in 18% of patients. Viral fever without a definitive etiological agent was observed in 12% of cases, while enteric fever contributed to 10% of the total burden. Notably, a definitive diagnosis could not be established in 4% of patients despite evaluation. Overall, the table highlights the predominance of vector-borne infections as major contributors to acute undifferentiated febrile illness in the study population.

Table 3: Etiological Diagnosis of Acute Undifferentiated Febrile Illness (n = 100)		
Diagnosis	Frequency (n)	Percentage (%)
Dengue fever	32	32.0
Malaria	24	24.0
Scrub typhus	18	18.0
Enteric fever	10	10.0
Viral fever (undifferentiated)	12	12.0
No definitive diagnosis	4	4.0

Table 4 depicts the pattern of organ system involvement among the study participants. Hepatic involvement was the most common, observed in 30% of cases, indicating the liver as the frequently affected organ system. This was followed by renal involvement in 18% and respiratory involvement in 16% of participants, reflecting a substantial burden of kidney and pulmonary complications. Central nervous system involvement was noted in 12% of cases, highlighting neurological manifestations in a notable proportion of patients. Multi-organ involvement was present in 14% of participants, suggesting a significant severity of illness in this subgroup. Conversely, 10% of the study population did not show any organ system involvement, indicating a comparatively milder disease presentation in these individuals.

Table 4: Organ System Involvement among Study Participants (n = 100)		
Organ System Involved	Frequency (n)	Percentage (%)
Hepatic involvement	30	30.0
Renal involvement	18	18.0
Respiratory involvement	16	16.0
Central nervous system involvement	12	12.0
Multi-organ involvement	14	14.0
No organ involvement	10	10.0

Table 5 illustrates the clinical outcomes of patients with acute undifferentiated febrile illness (AUFI), showing that the majority of patients had a favorable outcome. Out of 100 patients, 82% recovered and were successfully discharged, indicating effective clinical management in most cases. A prolonged hospital stay was required in 10% of patients, suggesting the presence of complications or slower recovery in a subset. ICU admission was necessary for 5% of patients, reflecting severe disease requiring intensive care. Referral to a higher center was observed in 2% of cases, likely due to the need for specialized management. Mortality was low, occurring in only 1% of patients, highlighting an overall good prognosis among the study population.

Table 5: Clinical Outcomes of Patients with AUFI (n = 100)		
Outcome	Frequency (n)	Percentage (%)
Recovery and discharge	82	82.0
Prolonged hospital stays	10	10.0
ICU admission	5	5.0
Referral to higher center	2	2.0
Mortality	1	1.0

Discussion

Acute undifferentiated febrile illness (AUFI) continues to represent a diagnostic and therapeutic challenge for emergency physicians, particularly in tropical countries like India where multiple infectious etiologies coexist. The present study delineates the sociodemographic profile, clinical manifestations, etiological distribution, organ involvement, and outcomes of AUFI, and compares favorably with earlier hospital-based studies conducted across similar geographical settings.

In the present study, AUFI predominantly affected individuals in the economically productive age group of 31–45 years, followed by those aged 46–60 years. Similar age distributions have been reported by Chrispal et al. (2010) [8], where more than 60% of patients were between 20 and 50 years, and by Joshi et al. (2008) [9], who observed that AUFI disproportionately affected working-age adults in rural India. This pattern reflects increased occupational exposure, outdoor activity, and contact with vectors among adults, contributing to higher disease burden and socioeconomic impact. Male predominance observed in our study aligns with findings from Ahmad et al. (2016) [10], who reported male representation ranging from 58% to 65% in AUFI cases, possibly due to greater mobility and occupational exposure among men.

Fever was universally present in all patients in the present study, reinforcing its role as the defining feature of AUFI. Associated symptoms such as headache, myalgia, vomiting, and abdominal pain were frequently reported, consistent with earlier observations by Manock et al. (2009) [11] and Phuong et al. (2006) [12], where nonspecific constitutional symptoms predominated during early illness. These overlapping clinical features contribute to diagnostic ambiguity, particularly during the initial presentation in emergency settings. Altered sensorium, although less frequent, was observed in our study and indicates severe disease, consistent with findings from Chrispal et al. (2010), where neurological involvement was associated with increased morbidity and ICU admission.

The etiological spectrum in our study revealed dengue fever as the most common identifiable cause of AUFI, followed by malaria and scrub typhus. Similar trends have been observed in South Indian studies, although the relative proportions vary geographically. Chrispal et al. (2010) reported scrub typhus (47.5%) as the leading cause, while malaria and dengue accounted for 17.1% and 7% respectively. In contrast, Ahmad et al. (2016) documented dengue in 34% and malaria in 21% of cases. These differences underscore the importance of regional epidemiology in guiding diagnostic algorithms. The presence of undifferentiated viral fever and cases without definitive diagnosis in our study echoes findings by Joshi et al. (2008), who reported diagnostic uncertainty in nearly one-third of AUFI cases, highlighting limitations of available diagnostics and overlapping clinical profiles.

Organ system involvement was a prominent feature in our cohort, with hepatic involvement being the most frequent. Liver dysfunction was commonly observed in patients with dengue and scrub typhus, a finding consistent with Acharya et al. (2018) [13], who reported hepatic dysfunction in 62% of dengue patients, characterized by elevated transaminases and alkaline phosphatase. Similarly, Chrispal et al. (2010) observed hepatic involvement in over 70% of scrub typhus cases. Renal and respiratory involvement in our study further indicate the potential for severe disease, particularly in patients presenting late or with multi-organ dysfunction.

Hematological abnormalities formed an important diagnostic clue in differentiating etiologies. Thrombocytopenia was predominantly associated with dengue fever in our study, comparable to Mitra et al. (2017) [14], who reported thrombocytopenia in 98.7% of dengue patients. Malaria cases frequently demonstrated splenomegaly, consistent with observations by Ahmad et al. (2016). Leukocytosis and elevated alkaline phosphatase were more common in scrub typhus, as also described by Chrispal et al. (2010). These laboratory patterns emphasize the utility of basic investigations in early etiological differentiation.

Clinical outcomes in the present study were largely favorable, with the majority of patients recovering and being discharged. This high recovery rate parallels findings from Thangarasu et al. (2011) [15], where protocol-based management led to clinical improvement without antibiotics in nearly 70% of patients presenting within the first two days of fever. ICU admission and mortality rates in our study were low, reflecting effective early recognition and supportive care. However, the occurrence of severe complications such as ARDS and aseptic meningitis, though limited, highlights the need for vigilance,

particularly in scrub typhus and dengue, as previously reported by Chrispal et al. (2010).

Overall, the present study reinforces that AUFI encompasses a broad clinical and etiological spectrum with variable severity. A region-specific, protocol-driven approach incorporating clinical features, basic laboratory parameters, and early identification of organ dysfunction can significantly improve outcomes while reducing unnecessary antibiotic use. Strengthening diagnostic infrastructure and adherence to standardized protocols remain crucial in addressing the burden of AUFI in emergency care settings.

Conclusion

This study highlights that acute undifferentiated febrile illness is a common and clinically diverse presentation in the emergency department, predominantly affecting young and middle-aged adults from rural backgrounds. Dengue, malaria, and scrub typhus emerged as the leading etiologies, emphasizing the major contribution of vector-borne diseases in this region. Fever with nonspecific symptoms was the usual presentation, while a significant proportion developed hepatic, renal, respiratory, or multi-organ involvement, indicating potential severity. Despite diagnostic challenges at presentation, most patients had favorable outcomes with timely evaluation and supportive management, as reflected by high recovery and low mortality rates. These findings underscore the importance of a syndromic, region-specific approach with early risk stratification to optimize resource utilization, guide empirical therapy, and improve overall patient outcomes in emergency care settings.

References

1. Wangdi K, Kasturiaratchi K, Nery SV, Lau CL, Gray DJ, Clements AC. Diversity of infectious aetiologies of acute undifferentiated febrile illnesses in south and Southeast Asia: a systematic review. BMC infectious diseases. 2019 Jul 4;19(1):577.
2. Abhilash KP, Jeevan JA, Mitra S, Paul N, Murugan TP, Rangaraj A, David S, Hansdak SG, Prakash JA, Abraham AM, Ramasami P. Acute undifferentiated febrile illness in patients presenting to a tertiary care hospital in South India: clinical spectrum and outcome. Journal of global infectious diseases. 2016 Oct 1;8(4):147-54.
3. Veligandla G, Vanan E, Padmavathi E, Bhaskar M. Etiological spectrum and prevalence of Acute Undifferentiated Febrile Illness (AUFI) in fever cases attending our tertiary care centre. Int. J. Curr. Microbiol. App. Sci. 2017; 6(5): 954-62.
4. Brink AJ, Van Wyk J, Moodley VM, Corcoran C, Ekermans P, Nutt L, Mendelson M, Boyles T, Perovic O, Feldman C, Richards GA. Clinical practice-the role of appropriate diagnostic testing in acute respiratory tract infections: an antibiotic stewardship strategy to minimise diagnostic uncertainty in primary care: in practice. South African Medical Journal. 2016 Jun 1;106(6):554-61.
5. Ray A, Mohta S, Soneja M, Jadon R, Wig N, Sood R. Clinical spectrum and outcome of critically ill hospitalized patients with acute febrile illness and new-onset organ dysfunction presenting during monsoon season. Drug discoveries & therapeutics. 2019 Apr 30;13(2):101-7.
6. Craig JC, Williams GJ, Jones M, Codarini M, Macaskill P, Hayen A, Irwig L, Fitzgerald DA, Isaacs D, McCaskill M. The accuracy of clinical symptoms and signs for the diagnosis of serious bacterial infection in young febrile children: prospective cohort study of 15 781 febrile illnesses. Bmj. 2010 Apr 20;340.
7. Pokharel S, Karki M, Acharya B, Marasini B, Arjyal A. Outbreak of acute undifferentiated febrile illness in Kathmandu, Nepal: clinical and epidemiological investigation. BMC Infectious Diseases. 2020 Jan 30;20(1):89.
8. Chrispal A, Boorugu H, Gopinath KG, Chandy S, Prakash JA, Thomas EM, Abraham AM, Abraham OC, Thomas K. Acute undifferentiated febrile illness in adult hospitalized patients: the disease spectrum and diagnostic predictors–an experience from a tertiary care hospital in South India. Tropical doctor. 2010 Oct;40(4):230-4.
9. Joshi R, Colford Jr JM, Reingold AL, Kalantri S. Nonmalarial acute undifferentiated fever in a rural hospital in central India: diagnostic uncertainty and overtreatment with antimalarial agents. American Journal of Tropical Medicine and Hygiene. 2008 Mar 1;78(3):393.
10. Ahmad S, Dhar M, Mittal G, Bhat NK, Shirazi N, Kalra V, Sati HC, Gupta V. A comparative hospital-based observational study of mono-and co-infections of malaria, dengue virus and scrub typhus causing acute undifferentiated fever. European Journal of Clinical Microbiology & Infectious Diseases. 2016 Apr;35(4):705-11.
11. Manock SR, Jacobsen KH, Brito de Bravo N, Russell KL, Negrete M, Olson JG, Sanchez JL, Blair PJ, Smalligan RD, Quist BK. Etiology of acute undifferentiated febrile illness in the Amazon basin of Ecuador.
12. Phuong HL, De Vries PJ, Nagelkerke N, Giao PT, Hung LQ, Binh TQ, Nga TT, Nam NV, Kager PA. Acute undifferentiated fever in Binh Thuan province, Vietnam: imprecise clinical diagnosis and irrational pharmaco-therapy. Tropical Medicine & International Health. 2006 Jun;11(6):869-79.
13. Acharya A, Satyanarayana PV, Subrahmanyam V. A prospective study of pattern of hepatic dysfunction in dengue fever patient in coastal

Andhra Pradesh, India. Int J Adv Med. 2018 May; 5:663-7.

14. Mitra S, Gautam I, Jambugulam M, Abhilash KP, Jayaseeelan V. Clinical score to differentiate scrub typhus and dengue: A tool to differentiate scrub typhus and dengue. Journal of Global Infectious Diseases. 2017 Jan 1;9(1):12-7.

15. Thangarasu S, Natarajan P, Rajavelu P, Rajagopalan A, Seelinger Devey JS. A protocol for the emergency department management of acute undifferentiated febrile illness in India. International journal of emergency medicine. 2011 Sep 5;4(1):57.