



## Original Research Article

## Drug utilization study in acute febrile illnesses in a tertiary care hospital of central India

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## ABSTRACT

**Background:** Acute febrile illness (AFI) can be caused by various aetiologies. Different antimicrobials are available to be used depending on the cause. Also, there are interpersonal variations in the prescription of these antimicrobials. Antibiotic stewardship programs frequently employ antibiotic policies to reduce the needless use of drugs and improve management. As a result, the purpose of this study is to examine current patterns in the use of antibiotics in patients with acute febrile illness.

**Materials and Methods:** It is an observational study based on records that were conducted at a tertiary care hospital. 300 patient case files with acute febrile illnesses were admitted to the Department of Medicine after analysing numerous etiologies for antibiotic usage. Antibiotics for different aetiologies of febrile sickness were noted in a case record form. Data collected were analysed for proportion to find the prescription pattern of antimicrobials.

**Results:** Respiratory tract infections, especially upper respiratory tract infections (URTI) (26.6%) are frequent clinical diseases for which antibiotics were administered followed by acute gastroenteritis (16%), urinary tract infection (UTI) (12.3%) and lower respiratory tract infection (LRTI) (9.6%), dengue fever (9%) & viral fever (8.3%). Ceftriaxone (20%) was one of the most frequently prescribed antibiotics and Piperacillin+ Tazobactam (16.25%) was followed by Amoxycillin + clavulanic acid (10.5%), Clarithromycin (8.5%), Cefuroxime (7.25%).

**Conclusions:** According to our analysis, respiratory tract infections and gastrointestinal infections were the two conditions for which antibiotics were most frequently administered. Third-generation cephalosporins, particularly ceftriaxone and cefixime, were the most frequently used antibiotics.

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## 1. Introduction

Any sickness that is linked with a fever of two weeks or less in length, fast in onset, and brought on by a variety of pathogens is referred to as acute febrile illness or brief febrile illness.<sup>1</sup> Fever is one of the most common symptoms that bring patients to the healthcare system where it may or may not occur in association with other common symptoms

such as cough or diarrhoea.<sup>2,3</sup> Fever which does not present with pointing features for a particular cause poses a challenge to arrive at a diagnosis as it may be due to various aetiologies like bacterial, fungal, parasitic, and viral. Most of these illnesses have fairly similar clinical symptoms, and specific diagnostic tests are required to arrive at a diagnosis. There are various causes of febrile illness that are acute in tropical nations like Dengue, Malarial fever, Typhoid fever, urinary tract infections, hepatitis, rickettsial

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infections, leptospirosis, chikungunya, and Meningitis.<sup>1</sup>

In the paediatric population, respiratory tract infections and stomach illnesses are common. For children under the age of five, lower respiratory tract infections (LRTI) are the main cause of death. Children frequently suffer from viral fever, respiratory infections, and Gastrointestinal infections, which make up the majority of paediatric visits. According to several studies, both in wealthy and developing nations, 50% to 85% of youngsters receive antibiotics. In this population, it is important to take into account both the developmental stage of the kid and the etiopathogenesis of the medical conditions.<sup>4</sup>

Due to a lack of laboratory confirmation especially in rural areas acute febrile illness aetiologies are underreported in India. Region-specific diagnosis, treatment, and control strategies must be founded on a rigorous examination of the causes of human febrile disease. It is essential to understand the local prevalence of infections for clinical workup and treatment.<sup>5</sup> When it comes to identifying bacterial and viral infections and instructing medical professionals on how to administer antibiotics appropriately in patients with respiratory tract infections in high-income countries, biomarkers like C-reactive protein (CRP) and procalcitonin can be useful.<sup>6</sup>

In the case of people with acute febrile illness (AFI) sometimes try self-treatment before seeking professional medical attention. Local drug dealers who supply antibiotics without a doctor's prescription frequently promote self-treatment techniques, including the usage of antibiotics. Antibiotic resistance is a major global problem. Frequent and without consult consumption of antibiotics are responsible for the emergence and spread of antibiotic resistance. Higher consumption is not only associated with antibiotic resistance at the individual level but also at the community, national and regional levels, with broad implications.<sup>7</sup>

Antimicrobial resistance (AMR) is linked to antibiotic use. According to a comprehensive analysis, the risk of isolating bacteria that are resistant to antibiotics increases with the amount or length of antibiotics that were provided in the previous 12 months. So it's crucial to use antibiotics wisely in both humans and animals.<sup>8</sup> There aren't many studies that emphasize the value of treating these individuals in the emergency room according to a standardized methodology. The burden on the healthcare system grows as a result of the indiscriminate and inappropriate use of antibiotics, which also contributes to the emergence of drug resistance, drug interactions, and severe drug responses.<sup>9,10</sup> There hasn't been much research in this area up to this point. As a result, this study is being conducted to examine current patterns in the use of antibiotics in patients with febrile illnesses.

## 2. Materials and Methods

### 2.1. Study design and site

It is an observational research based on records. The study was conducted for six months at a tertiary care facility in central India. The clearance from the institutional ethics committee mandated the start of the study.

### 2.2. Study duration

The investigation lasted for six months starting in August 2022 up to January 2023.

### 2.3. Sample size

We have analysed case record files of patients admitted to the department of Medicine diagnosed as having an acute febrile illness because of different etiologies. A sample size of 300 was selected for the study. The patient's demographic information, provisional and final diagnoses, and the antibiotics they received for a variety of acute febrile illnesses, including respiratory tract infections, urinary tract infections, acute gastrointestinal infections, malarial infections, urinary tract infections, septicaemia, meningitis, and pyrexia of unknown origin, were recorded using data extraction forms. The data was gathered, and proportion was examined.

## 3. Results

All 300 patients who presented with febrile illness were analysed for the prescription of antibacterial agents (AMA). Respiratory tract infections, upper respiratory tract infection (26.6%) and lower respiratory tract infection (9.6%), acute gastroenteritis (16%), and urinary tract infection (12.3%), dengue fever (9%) & viral fever (8.3%), are the most frequent clinical conditions for which antibiotics were prescribed, followed by others as shown in Table 1.

Ceftriaxone was one of the most frequently prescribed antibiotics in (20%) and Piperacillin+ Tazobactam (16.25%) followed by Amoxycillin + clavulanic acid (10.5%), Clarithromycin (8.5%), Cefuroxime (7.25%), followed by others as shown in Table 2.

## 4. Discussion

Antimicrobial medications (AMA) were prescribed to 300 individuals for febrile illnesses with a variety of etiologies. In our analysis, respiratory tract infections (upper respiratory tract infection, 26.6%, and lower respiratory tract infection, 9.6%), acute gastroenteritis (16%), and urinary tract infection (12.3%) were the most frequent etiologies for which antibiotics were recommended. (12.3%) followed by dengue fever (9%), viral fever (8.3%) and others. These infectious conditions are commonly seen in developing countries. The antibiotic

**Table 1:** Prescriptions for antimicrobials of various etiologies.

| Diseases                          | Patients (in number) | Percentage |
|-----------------------------------|----------------------|------------|
| Upper Respiratory Tract Infection | 80                   | 26.6       |
| Lower Respiratory Tract Infection | 29                   | 9.6        |
| Acute gastroenteritis             | 48                   | 16         |
| Urinary tract infection           | 37                   | 12.3       |
| Dengue fever                      | 27                   | 9          |
| Viral fever                       | 25                   | 8.3        |
| Pyrexia of Unknown Origin         | 17                   | 5.6        |
| Malaria                           | 14                   | 4.6        |
| Bacterial sepsis                  | 9                    | 3          |
| Rickettsial infection             | 9                    | 3          |
| Hepatitis A                       | 3                    | 1          |
| Meningitis                        | 2                    | 0.6        |

**Table 2:** Commonly prescribed antimicrobial agents (AMA).

| Antimicrobial agents          | Patients (in number) | Percentage |
|-------------------------------|----------------------|------------|
| Ceftriaxone                   | 84                   | 20         |
| Piperacillin+ Tazobactam      | 65                   | 16.25      |
| Amoxycillin + clavulanic acid | 42                   | 10.5       |
| Clarithromycin                | 34                   | 8.5        |
| Cefuroxime                    | 29                   | 7.25       |
| Cefixime + clavulanic acid    | 27                   | 6.75       |
| Doxycycline                   | 25                   | 6.25       |
| Nitrofurantoin                | 24                   | 6          |
| Ofloxacin + Ornidazole        | 22                   | 5.5        |
| Artesunate                    | 15                   | 3.75       |
| Levofloxacin                  | 14                   | 3.5        |
| Meropenem                     | 8                    | 2          |
| Artemether and lumefantrine   | 7                    | 1.75       |
| Acyclovir                     | 4                    | 1          |

trend that is seen in our study is ceftriaxone in (20%) and Piperacillin and Tazobactam (16.25%) followed by Amoxycillin + clavulanic acid (10.5%), Clarithromycin (8.5%), Cefuroxime (7.25%), followed by others. Rangdal et al in their study found respiratory tract infection (36%) followed by GIT disorders (24%), zoonotic disease (10%), urinary tract infection (19%), and viral fever (11%), as the most frequent causes of febrile illness. The antibiotic pattern observed in their study was ceftriaxone (40%) in the most number of patients, followed by piperacillin (26%).<sup>11</sup> Meher et al in their study found that the most frequent clinical disorders for which antibiotics are prescribed are gastroenteritis (18%), urinary tract infection (18%), respiratory tract infection (24%), Septicemia (13%), typhoid fever (16%), Meningitis (8%), unknown pyrexia (3%), while ceftriaxone (30.03%) was the most frequently given antibiotic, followed by co-amoxiclav (22.6%), amikacin

(16.33%), ciprofloxacin (13.41%).<sup>12</sup> In a study conducted by Ahmed et al respiratory tract infection accounts for the most hospital admissions followed by viral illness (12%), urinary tract infection (8.5%), and acute gastroenteritis (7.5%). In monotherapy prescriptions, ceftriaxone was most commonly prescribed and in polytherapy prescriptions, Amoxicillin with clavulanic acid and amikacin were most frequently prescribed together.<sup>13</sup> In research by Kaur et al, prescriptions for 29 different antibiotics were made for a variety of etiologies, with 12 medicines accounting for more than 80% of those prescriptions. The two most commonly utilized medications were ceftriaxone (19.2%) and amoxicillin-clavulanic acid (16.9%). followed in 41 (11.4%) patients with piperacillin-tazobactam.<sup>14</sup> The majority of conditions for which antibiotics were recommended in retrospective research conducted in the general medicine department included COPD, pneumonia, LRTI, UTI, PUD, URTI, viral fever, tuberculosis, acute bacterial dysentery, GERD, rheumatoid arthritis, and surgery. The majority of them took antibiotics from the cephalosporin class, which were then followed by penicillin, fluoroquinolones, and aminoglycosides.<sup>15</sup> These findings are in accordance with our study.

In a research project by Kapure et al. The majority of patients (71.42%) received cephalosporin prescriptions, which were then followed by quinolone (39.68%), aminoglycoside (28.57%), antiamoebic (24%), penicillins (19.04%), etc. Cefuroxime was the most commonly used cephalosporin (33.33%), followed by cefotaxime (25.39%), ceftriaxone (6.32%), and Cefoperazone.<sup>16</sup> Khan et al in their study  $\beta$ -lactams were mostly prescribed of which amoxicillin with clavulanic acid is the most commonly prescribed followed by ceftriaxone, levofloxacin, nitroimidazoles, aminoglycosides and the macrolides.<sup>17</sup> These findings are inconsistent with our study in which ceftriaxone was the most commonly used drug. To increase the rational use of antimicrobials and to solve the resistance issue, antimicrobial protocol and recommendations as well as formulary-based antimicrobial usage might be employed. For the best antimicrobial medication, a multidisciplinary strategy can be used in the ICU and IPD setting, involving specialists in intensive care, infectious disease control, pharmacy, and microbiology.<sup>16</sup>

## 5. Conclusion

Febrile illness can have various etiologies. Our study concludes that respiratory tract infections, gastrointestinal infections, and urinary tract infections were the three conditions for which antibiotics were most frequently recommended. Ceftriaxone, Piperacillin-Tazobactam and Coamoxyclav were the most commonly given antimicrobials. As a component of the medical audit, the study of prescribing patterns aims to monitor, assess, and, if necessary, advise modification in prescribing practices to

make medical care reasonable and cost-effective.

## 6. Source of Funding

None.

## 7. Interest of Conflicts

None.

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