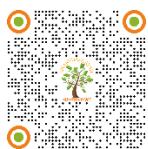


# THE RISE OF ANTIMICROBIAL RESISTANCE IN 2023: A GLOBAL AND INDIAN HEALTHCARE PERSPECTIVE"- A SHORT COMMUNICATION

Dr. C. Madhavi <sup>1</sup>✉

<sup>1</sup> Department of Microbiology, Govt. College (A), Anantapur, Andhra Pradesh, India



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## Corresponding Author

Dr. C. Madhavi, [chavva88@gmail.com](mailto:chavva88@gmail.com)

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## ABSTRACT

Antimicrobial resistance (AMR) has reached alarming levels globally, and India is at the forefront of this crisis. In 2023, Indian hospitals are witnessing an increase in multidrug-resistant bacterial infections. This short communication highlights key examples of AMR from Indian hospitals, exploring common resistant bacterial strains, underlying causes, and strategies for mitigation. Data from tertiary care hospitals, national reports, and the Indian Network for Surveillance of Antimicrobial Resistance (INSAR) are reviewed to understand the depth of the issue and potential solutions.

**Keywords:** Antimicrobial resistance, 2023, Indian hospitals, common resistant bacterial strains. Key examples, INSAR

## 1. INTRODUCTION

Antimicrobial resistance (AMR) is a major public health threat, especially in countries like India [Shah et al. \(2023\)](#) where antibiotic misuse, poor infection control, and high infection rates compound the issue. According to the Indian Network for Surveillance of Antimicrobial Resistance (INSAR), resistant strains of bacteria such as *Klebsiella pneumoniae*, *Escherichia coli*, and *Staphylococcus aureus* have become prevalent in hospitals, especially in critical care units [Laxminarayan et al. \(2016\)](#) This short communication provides insight into the trends observed in Indian hospitals and highlights the importance of coordinated interventions.

### **1.1. AMR TRENDS IN INDIAN HOSPITALS IN 2023**

Data from hospitals across India has revealed the prevalence of resistant bacterial infections, particularly in intensive care units (ICUs) [Mukherjee et al. \(2022\)](#).

#### **Examples of AMR Cases in Indian Hospitals:**

### **1.2. CARBAPENEM-RESISTANT KLEBSIELLA PNEUMONIAE**

AIIMS, New Delhi reported that 20-30% of ICU patients with infections due to *Klebsiella pneumoniae* were resistant to carbapenems. These resistant strains have contributed to severe complications in post-surgical patients and individuals on ventilators, leading to extended hospital stays and increased mortality rates. Effective treatment often requires the use of last-line antibiotics like colistin, which further raises the risk of developing resistance to these drugs as well.

### **1.3. ESBL-PRODUCING ESCHERICHIA COLI**

PGIMER, Chandigarh reported a high prevalence of extended-spectrum beta-lactamase (ESBL), producing *Escherichia coli* in patients with urinary tract infections (UTIs). These strains were resistant to third-generation cephalosporins, commonly used as first-line treatments. The data indicate that nearly 50% of UTI cases in hospital settings are due to resistant *E. coli* strains, limiting treatment options to carbapenems or other higher-tier antibiotics.

### **1.4. MULTIDRUG-RESISTANT ACINETOBACTER BAUMANNII**

At KEM Hospital, Mumbai, *Acinetobacter baumannii* has emerged as one of the most problematic pathogens in ICUs, particularly among ventilated patients. Nearly 35-40% of ventilator-associated pneumonia (VAP) cases are caused by multidrug-resistant strains, which are resistant to most available antibiotics, including carbapenems. This pathogen has been associated with high mortality and morbidity rates due to the limited effectiveness of treatment options.

### **1.5. METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)**

CMC, Vellore has reported MRSA rates of 40-50% in patients with skin and soft tissue infections, particularly among surgical patients and those with catheter-associated infections. MRSA strains are resistant to most beta-lactam antibiotics, including methicillin, necessitating the use of vancomycin or linezolid. However, growing resistance to these antibiotics has been observed as well, posing a severe challenge to infection management.

## **2. CONTRIBUTING FACTORS TO AMR IN INDIA**

### **2.1. OVERUSE OF ANTIBIOTICS**

A major driver of AMR in India is the excessive and often inappropriate use of antibiotics. Patients frequently self-medicate, purchasing antibiotics without a prescription. In rural areas, where access to healthcare is limited, antibiotics are often used to treat viral infections, for which they are ineffective [Walia et al. \(2019\)](#) & [Chakraborty et al. \(2020\)](#)

## 2.2. POOR INFECTION CONTROL PRACTICES

Many hospitals in India, particularly in the public sector, face challenges such as overcrowding, inadequate sanitation, and limited infection control measures. These conditions facilitate the rapid spread of resistant bacteria among patients.

## 2.3. AGRICULTURAL USE OF ANTIBIOTICS

In India, antibiotics are widely used in agriculture, particularly in livestock farming. Antibiotics are added to animal feed to promote growth and prevent disease, [Kumarasamy et al. \(2010\)](#), which contributes to the development of resistant bacteria that can be transmitted to humans through the food chain.

## 2.4. STRATEGIES TO COMBAT AMR IN INDIAN HOSPITALS

### Antibiotic Stewardship Programs (ASP):

Hospitals like AIIMS and Apollo Hospitals have adopted ASPs to promote the rational use of antibiotics. These programs help healthcare professionals make informed decisions regarding antibiotic prescriptions, reducing the unnecessary use of broad-spectrum antibiotics.

### Strengthening Infection Control Measures:

Many hospitals, such as CMC Vellore, have implemented stringent infection control measures, including routine hand hygiene, patient isolation, and regular disinfection of hospital environments. These measures are crucial in preventing the spread of resistant bacteria.

### Public Awareness Campaigns:

The Indian Medical Association (IMA) and the Ministry of Health have launched public awareness campaigns to educate people about the dangers of antibiotic misuse. These initiatives aim to reduce the demand for antibiotics for non-bacterial infections and encourage patients to complete their prescribed courses.

### Research and Surveillance:

The Indian government, in collaboration with the World Health Organization (WHO), has strengthened surveillance systems such as the National Action Plan on Antimicrobial Resistance. These initiatives aim to monitor AMR trends and guide interventions [Paul et al. \(2023\)](#).

## 3. RESULTS AND DISCUSSION

The global health crisis of bacterial antimicrobial resistance (AMR) has significantly impacted India in 2023. The overuse and misuse of antibiotics, combined with challenges in healthcare infrastructure, have made India one of the most affected countries.

**Table 1**

**Table 1 Summary of Resistant Bacteria in Indian Hospitals (2023)**

Bacterial Pathogen	Type of Resistance	Prevalence in Indian Hospitals	Common Hospital Settings
Klebsiella pneumoniae	Carbapenem-resistant	20-30% of ICU infections	ICUs, Post-surgical wards

Escherichia coli	ESBL-producing, resistant to third-generation cephalosporins	45-50% of UTIs in hospital settings	General wards, ICUs
Acinetobacter baumannii	Multidrug-resistant (MDR), carbapenem-resistant	35-40% of ventilator-associated infections	ICUs, Neonatal ICUs
Staphylococcus aureus (MRSA)	Methicillin-resistant	40-50% of skin and soft tissue infections	General wards, Surgical units
Pseudomonas aeruginosa	Multidrug-resistant, resistant to fluoroquinolones	30-35% of hospital-acquired pneumonia infections	ICUs
Enterococcus faecium	Vancomycin-resistant (VRE)	10-15% of bloodstream infections	ICUs, Hematology wards

The data suggests that strengthening antibiotic stewardship programs (ASPs) is essential. These programs can help healthcare professionals prescribe antibiotics more judiciously, ensuring they are only used when necessary and based on culture sensitivity results. Hospitals across India have started to adopt ASPs, but expanding these efforts nationwide is crucial to reduce unnecessary antibiotic use.

#### 4. CONCLUSION

The global burden of AMR is particularly pronounced in India, where healthcare challenges and widespread antibiotic misuse have accelerated the emergence of resistant bacterial strains. Data from Indian hospitals highlight the urgent need for coordinated action to address this crisis. With a focus on antibiotic stewardship, infection control, public awareness, and research, India can curb the rise of AMR and improve patient outcomes. Data from Indian hospitals underline the urgent need for coordinated and sustained interventions to combat AMR.

Improving infection control practices, such as enforcing strict hand hygiene protocols, proper sterilization of medical equipment, and isolation of infected patients, is essential to curb the spread of resistant infections within hospitals. Additionally, better training for healthcare workers and consistent monitoring of infection control practices are necessary to ensure compliance.

#### CONFLICT OF INTERESTS

None.

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