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ANTIBIOTIC RESISTANCE: AN ETHICAL RESPONSIBILITY FOR ALL MEDICAL PROFESSIONALS

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Abstract
Antibiotic resistance (AMR) is a global health crisis that threatens the efficacy of treatments for infections, leading to increased morbidity, mortality, and healthcare costs. Driven by overuse and misuse of antibiotics, AMR challenges medical professionals to balance individual patient care with societal obligations, adhering to ethical principles of beneficence, non-maleficence, justice, and stewardship. This review explores the ethical responsibilities of medical professionals in combating AMR through prudent prescribing, patient education, robust infection control, and advocacy for systemic change. Globally, unethical practices such as overprescribing, inadequate regulation, and non-therapeutic antibiotic use in agriculture and animal husbandry exacerbate AMR, with severe implications in low- and middle-income countries (LMICs). In India, rampant over-the-counter antibiotic sales, lack of diagnostic tools, and inappropriate prescribing practices amplify resistance, undermining public health efforts. Medical professionals must navigate dilemmas such as patient pressure and resource constraints, which contribute to unethical prescribing. Effective antibiotic stewardship programs (ASPs) are critical to curbing inappropriate use, while infection control measures prevent the spread of resistant pathogens. Globally, equitable access to antibiotics and international collaboration, as outlined in the World Health Organization's Global Action Plan, are vital for addressing disparities in AMR burden. In India, initiatives like the National Action Plan on AMR aim to strengthen regulation and surveillance, yet implementation gaps persist. By fostering continuous education, advocating for policy reforms, and promoting ethical practices, medical professionals can mitigate AMR's impact. This article aims to assess the status of antimicrobial susceptibility testing (AST) practices across microbiology laboratories in Prayagraj District in Uttar Pradesh, India by administering a comprehensive questionnaire, with the goal of evaluating the adherence to standardized protocols, highlight the gaps in laboratory practices, identifying potential malpractices by medical professionals contributing to increasing AMR.

Introduction

Antibiotic resistance (AMR) is a critical global health challenge, driven by the overuse and misuse of antibiotics, which erodes the effectiveness of treatments for bacterial infections. The World Health Organization (WHO) projects that AMR could lead to 10 million deaths annually by 2050 if not addressed, surpassing deaths from cancer and posing significant economic burdens [1]. Medical professionals, as key decision-makers in antibiotic prescribing and infection management, are central to this crisis. Their choices directly influence resistance patterns, impacting both current and future patient outcomes. Ethically, they face the complex task of balancing immediate patient needs with the long-term preservation of antibiotic efficacy, guided by principles of beneficence (promoting patient well-being), non-maleficence (avoiding harm), justice (ensuring equitable resource distribution), and stewardship (responsible management of shared resources). Unethical practices, such as prescribing antibiotics for viral infections or yielding to patient pressure, exacerbate AMR, particularly in settings with weak regulations. In countries like India, unregulated antibiotic sales and inadequate diagnostics further fuel resistance. Medical professionals must navigate these challenges while advocating for systemic changes, such as robust antibiotic stewardship programs and global cooperation, to mitigate AMR's impact. Their ethical responsibility extends beyond individual care to safeguarding public health for future generations [1].

Aim and objectives:

To evaluate the status of AST practices in microbiology laboratories across Prayagraj District through a questionnaire-based survey, aiming to identify malpractices and assess the contribution of improper practices by medical professionals to AMR.

Objectives:

1. To collect data on the current AST protocols and methodologies employed by microbiology laboratories in Prayagraj District.
2. To assess the adherence of laboratories to Clinical and Laboratory Standards Institute (CLSI) guidelines.
3. To identify instances of malpractice or deviations from best practices in AST procedures.
4. To investigate the role of improper AST practices by medical professionals in contributing to antimicrobial resistance.
5. To highlight gaps in laboratory practices and propose recommendations for improving antimicrobial stewardship and reducing AMR in the district.

Materials and Methods

A cross-sectional survey was conducted to evaluate the status of AST practices in microbiology laboratories across Prayagraj District. The study targeted all microbiology laboratories, including those in private hospitals and stand-alone facilities, to assess adherence to CLSI guidelines, identify malpractices, and evaluate contributions to AMR.

A structured questionnaire was designed to collect data on AST practices, focusing on adherence to CLSI guidelines, primary AST methods, internal quality control (IQC) measures, specific AST methods for colistin, and participation in external quality control (EQC) programs.

Data Collection

A total of 126 questionnaires were distributed to all identified microbiology laboratories in Prayagraj District. The questionnaires were delivered in person with a stipulated response period of two weeks. Follow-up reminders were sent to maximize response rates. Incomplete responses were excluded.

The following parameters were evaluated based on questionnaire responses:

Adherence to CLSI Guidelines,Primary Method for AST,Internal Quality Control Testing ,AST Method for Colistin, Participation in External Quality Control Programs.

Limitations: The study relied on self-reported data, which may be subject to response bias. Non-responding laboratories (n=28) may differ in practices, potentially affecting the generalizability of findings. The sample size, while representative, was limited to [Your District Name], and results may not reflect practices in other regions.

Result measures violates the principle of non-maleficence, as it risks harm to vulnerable patients.

Table 1 - We designed questionnaire to identify Methodologies in laboratories reporting AST pattern. Data was collected from 126 laboratories in and around Prayagraj district.

Parameter	Value
Total Questionnaires Distributed	126
Total Questionnaires Returned	98
Responses Analyzed (Complete Questions Answered)	95
Respondent Distribution	
- Private Hospitals	46%
- Stand-alone Laboratories	54%
Adherence to CLSI Guidelines	39%
Primary Method for AST	
- Disc Diffusion	60%
Internal Quality Control Testing	56%
AST Method for Colistin	
- Broth Microdilution	12%
Participation in External Quality Control Programs	58%

The Ethical Imperative of Antibiotic Stewardship

Antibiotic stewardship programs (ASPs) are critical in reducing inappropriate antibiotic use. Ethically, medical professionals are obligated to prescribe antibiotics only when necessary, guided by evidence-based guidelines. Overprescribing, often driven by patient demand or diagnostic uncertainty, contributes significantly to AMR. For instance, studies show that up to 50% of antibiotic prescriptions in outpatient settings are inappropriate [2]. Prescribers must weigh the principle of beneficence—acting in the patient's best interest—against non-maleficence, ensuring that unnecessary prescriptions do not harm future patients by fostering resistant strains. Stewardship also involves educating patients about the risks of antibiotic misuse. Medical professionals have a duty to communicate clearly, dispelling myths such as the need for antibiotics in viral infections. This aligns with the principle of autonomy, empowering patients to make informed decisions [3].

Infection Control as an Ethical Duty

Preventing the spread of resistant infections is another ethical responsibility. Medical professionals must adhere to strict infection control practices, such as hand hygiene and isolation protocols, to limit nosocomial infections. The Centers for Disease Control and Prevention (CDC) reports that healthcare-associated infections, many caused by resistant pathogens, affect 1 in 31 hospital patients in the U.S. [4].

Indian and Global Scenario of AMR Pertaining to Unethical Practices

- Globally, unethical practices such as overprescribing antibiotics, inadequate regulation, and non-therapeutic use in agriculture and animal husbandry drive AMR. In high-income countries, patient pressure and defensive medicine often lead to unnecessary prescriptions, while in LMICs, weak regulatory frameworks allow unrestricted antibiotic access [5]. In India, the scenario is particularly alarming due to widespread over-the-counter antibiotic sales, often without prescriptions, and inappropriate prescribing by healthcare providers. Studies estimate that 58% of antibiotic

prescriptions in India are inappropriate, fueled by limited diagnostic access and economic incentives for pharmacies [6]. Out of 126 laboratories only 78% showed participation in External Quality Control Programs. It was found that only 5%(7) laboratories had Medical Microbiologists reporting the tests, rest 95% (119) did not follow the Clinical Establishments (Central Government) Amendment Rules 2018, drafted by Ministry of Health and Family Welfare.Almost all the labs use Human blood agar instead of sheep blood agar which gives better results. This is major contributor to the unethical prescription of high level antibiotics by the clinicians. Unethical practices, such as prescribing broad-spectrum antibiotics for viral infections or incomplete treatment courses, exacerbate resistance to critical drugs like carbapenems and colistin [7]. Globally, the use of antibiotics in livestock, accounting for approximately 70% of global consumption, contributes to resistance, with inadequate regulations in many countries, including India [8]. In India, the National Action Plan on AMR (2017) aims to address these issues through surveillance and regulation, but implementation remains inconsistent due to resource constraints and lack of awareness [9]. These practices violate ethical principles of justice and non-maleficence, as they disproportionately harm vulnerable populations and future generations by limiting treatment options.

Equity and Global Responsibility

AMR disproportionately affects low- and middle-income countries (LMICs), where access to antibiotics is often unregulated, and healthcare infrastructure is limited. Medical professionals in high-income countries have an ethical obligation to advocate for equitable access to antibiotics and support global initiatives to combat AMR. This reflects the principle of justice, ensuring fair distribution of medical resources. Initiatives like the WHO's Global Action Plan on Antimicrobial Resistance call for international collaboration, urging professionals to contribute to surveillance and policy development [10].

Challenges and Ethical Dilemmas

Medical professionals often face ethical dilemmas, such as pressure to prescribe antibiotics for non-bacterial conditions due to patient expectations or time constraints. In resource-limited settings, the lack of diagnostic tools may lead to empirical prescribing, exacerbating AMR. Balancing individual patient care with societal consequences requires moral courage and systemic support, such as access to rapid diagnostics and institutional ASPs [11].

The Role of Education and Advocacy

Continuous education on AMR is essential for medical professionals to stay updated on resistance trends and stewardship strategies. Beyond clinical practice, they must advocate for policies that restrict non-therapeutic antibiotic use, such as in agriculture, which accounts for significant antibiotic consumption globally [8]. By engaging in public health campaigns and interdisciplinary collaboration, professionals can amplify their impact on AMR mitigation.

Conclusion

The survey of 126 microbiology laboratories in Prayagraj District, with 95 complete responses analyzed, revealed significant insights into antimicrobial susceptibility testing (AST) practices. The poor adherence to CLSI guidelines (39%) indicate a lack of standardized AST practices in the district. Critical gaps were identified, including low utilization of broth microdilution for colistin testing (12%), inadequate internal quality control testing (56%), and external quality control testing 58% .These deficiencies may contribute to inaccurate AST results and exacerbate antimicrobial resistance (AMR). Additionally, a concerning finding was that only 5% laboratories had Medical Microbiologists reporting the tests, rest 95% did not follow the Clinical Establishments (Central Government) Amendment Rules2018, drafted by Ministry of Health and Family Welfare. These unauthorized personnel are reporting AST results is an important reason for misinterpretation, misreporting, and potential malpractices. This highlights the urgent need for stricter oversight, enhanced training, and enforcement of standardized protocols to ensure only qualified professionals

conduct and report AST. Addressing these gaps through targeted interventions, such as improved quality control measures, mandatory use of recommended testing methods, and regulatory measures to prevent unauthorized reporting, is essential to strengthen antimicrobial stewardship and mitigate AMR in Prayagraj. Antibiotic resistance is not merely a clinical challenge but an ethical one, demanding that medical professionals act as stewards of a shared resource. By embracing responsible prescribing, infection control, patient education, and advocacy, they uphold ethical principles while safeguarding public health. Systemic support, including robust ASPs and global cooperation, is crucial to empower professionals in this fight. In India and globally, addressing unethical practices is paramount to curbing AMR. The ethical responsibility to combat AMR extends beyond individual practice to a collective commitment to preserve antibiotics for future generations.

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