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## OVERVIEW ON ANTIBIOTIC RESISTANCE- EMPHASIS ON ITS AWARENESS

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### ABSTRACT

**Background:** Healthcare practitioners at all levels must take a cooperative, interdisciplinary approach to combating antimicrobial resistance (AMR), a serious worldwide issue. By influencing infection control protocols, patient education, and antibiotic prescribing practices, physicians, pharmacists, nurses, and healthcare students all play crucial roles in managing antimicrobial resistance (AMR).

**Method:** A comprehensive narrative review was conducted, drawing upon primary research articles, systematic reviews, and policy documents published between 2014 and 2024. The search was carried out using electronic databases.

**Results:** Over Thirty research studies in all, published between 2021 and 2024, were chosen for this review. Studies include various population, involving students, healthcare workers, and the general public. Despite widespread awareness of antimicrobial resistance (AMR), analysis showed that there are still significant disparities in behaviours and knowledge. Common problems found were self-medication, early antibiotic course cessation, overprescribing of antibiotics, and misunderstandings regarding the use of antibiotics for viral illnesses. To counter the growing threat of AMR, there is a need for ongoing education and focused awareness campaigns.

**Conclusions:** To reduce overprescribing, physicians need to get a deeper understanding of AMR causes, they are essential in assisting with infection prevention and encouraging treatment adherence. Improving the awareness that healthcare workers, especially students, need to combat antimicrobial resistance (AMR) effectively requires education, training, and thorough research. Ultimately, lowering the threat of AMR necessitates a coordinated, proactive approach that includes ongoing education and the active involvement of healthcare professionals.

**Keywords:** Antimicrobial resistance (AMR), Antibiotic prescribing practices, Overprescribing, Infection control protocols, Patient Education

## INTRODUCTION:

Antibiotic resistance remains one among the most important problems facing globally today. Previously treatable infections are getting harder to control as microbes change and become resistant to medications meant to eradicate them [1]. Medical employees, such as physicians, nurses, pharmacists, and other medical specialists, are essential in controlling and reducing the spread of antibiotic resistance [2]. Implementing infection control measures, creating treatment regimens, and using antibiotics responsibly are all directly impacted by their behaviour, attitudes, and knowledge.

Healthcare workers and students have direct control over antibiotic prescribing habits and infection control procedures and are at the heart of these campaigns. However, these individual's awareness and comprehension of antibiotic resistance can differ based on several criteria, including access to current research, clinical experience, and educational attainment [3]. Antibiotic prescribing trends are

significantly influenced by healthcare professionals who have already started using their knowledge in practical settings and students who are just beginning their careers. Developing successful interventions depends on how well these organizations understand the mechanisms behind antibiotic resistance, its causes, effects, and remedies [4, 5].

Among the leading healthcare professionals, pharmacists give prescriptions for antibiotics, teach patients about their medications, and ensure that antibiotics are used responsibly by implementing pharmaceutical therapy management and sustainability programs [6, 7]. They play a vital role in reducing antibiotic abuse and misuse, two significant causes of antibiotic resistance, thanks to their knowledge of drug interactions, side effects, dose, and delivery. Furthermore, especially in community pharmacies, pharmacists are usually the first people patients contact when they need advice about antibiotics.

As the leading prescribers of antibiotics, doctors are primarily responsible for establishing treatment plans and ensuring antibiotics are used sparingly. Their experience with antibiotic resistance, its origins, and the effects of excessive prescribing is essential in the global battle against antimicrobial resistance since they have a direct say in how antibiotics are prescribed [6, 7]. Studies indicate that there may be significant disparities in physicians' knowledge and awareness regarding the mechanisms of resistance, the long-term effects of antibiotic misuse, and the best preventative measures, even though they are expected to base their decisions on clinical guidelines, patient needs, and resistance patterns [8].

Nurses often administer antibiotics, keep track of patients' reactions, and ensure that they adhere to treatment plans. Likewise, they are essential in educating patients and their families about the potential risks of antibiotic misuse, the importance of adhering to prescribed dosages, and proper antibiotic usage. As patient advocates, nurses can help lower the needless demand for antibiotics by regulating patient expectations and reiterating the significance of effective treatment [9].

#### **METHODOLOGY:**

This is a descriptive cross-sectional survey design in which at the particular study location, Participants were given

questionnaires to complete on their own to assess their awareness and knowledge of antibiotic resistance. This study was conducted at multiple institutions targeting health care students and professionals. The study was carried out online. All of the data that meets the inclusion criteria has been included and evaluated.

#### **DISCUSSION:**

Antibiotic resistance has serious hazard to public health, which has the potential to trigger another pandemic if left uncontrolled. Global health solutions that address this issue must be taken into consideration. Information from many geographical areas concentrates on creating constructive social norms, directing behaviour, and increasing public awareness. Antibiotic resistance makes clinical therapy more complex, making the guidelines difficult to follow. Genetic components are crucial in evolution, and microbes have intricate transfer processes. Resistance is caused by various circumstances outside heredity, including delayed diagnosis, exposure to broad-spectrum antibiotics, and misdiagnosis [10].

The general people in Saudi Arabia seemed to understand antibiotic resistance well, but their real usage habits revealed otherwise. Many people openly stated that they were aware of the risks associated with antibiotic overuse, yet this understanding frequently did not convert into appropriate behaviour.

Despite the concerns, common practices continued, such as stopping medication as soon as symptoms eased or getting antibiotics without a doctor's prescription. Researchers pushed for more than passive information sharing after realizing this gap. They suggested engaging and culturally aware educational initiatives that sought to change actions rather than only opinions. Future research using larger samples, long-term observation, and behaviour-focused analysis was also suggested by the study in order to completely comprehend and address the reasons causing improper antibiotic usage. This work provided this perceptive analysis of knowledge versus action [11].

Dentists in Europe deal with a confusing issue. Many are aware of the risks associated with antibiotic resistance, yet their prescribing practices, especially when it comes to dental implant operations, speak for themselves. The study found that antibiotics are commonly provided at high rates despite this awareness, which raises questions regarding how knowledge and clinical behaviour connect. One primary problem identified by the survey was the absence of precise, uniform norms among nations. To guarantee that antibiotics are used sparingly in implant dentistry, standardized procedures, improved cooperation amongst dental experts, and additional study into the availability of

national guidelines were all identified as essential future steps [12].

Modern medicine has long relied on antibiotics, but overuse of these drugs has created a new threat, resistant germs that make therapy less effective. Strict commitment to antibiotic stewardship and precise diagnosis are necessary to address this problem. Researchers are investigating cutting-edge treatments including bacteriophages, stem cells, and delivery systems based on nanotechnology in addition to traditional medications. Disrupting bacterial communication and biofilm development are potentially promising strategies. Even though some combinations are successful in the beginning, resistance keeps changing, necessitating further study. This thorough and creative method was described by [13]. Antibiotic resistance in Uganda has steadily and concerningly increased over the past four years, impacting both gram-positive and gram-negative bacteria. Once-frontline medications like ciprofloxacin and ceftriaxone are becoming less effective. This tendency makes it more difficult to follow the WHO's AWaRe framework, particularly when it comes to keeping important "Watch" and "Reserve" medicines on hand. To prevent additional resistance, the study recommends greater drug oversight [14].

Antimicrobial resistance in India needs a coordinated and all-encompassing approach rather than discrete measures. This systematic analysis found that insufficient education and a lack of diagnostic infrastructure present major obstacles for healthcare staff. The study emphasized how critical it is to incorporate strong training programs and enhance diagnostic capabilities, particularly in environments with limited resources. Communities, educators, and legislators must work together to close the pervasive gaps in healthcare professionals' knowledge, attitudes, and practices. These results offer a strong basis for developing evidence-based strategies to improve antibiotic stewardship and reduce the rate of resistance development in the nation [15].

Hospital physicians in Medina City, Saudi Arabia, frequently prescribed antibiotics more than twice a week, although many of them lacked thorough understanding of appropriate prescribing procedures. Even while the majority agreed that AMR is a problem on a national and international level, their daily routines did not always align with optimal practices. In order to encourage responsible antibiotic usage, the study underlined the critical necessity for organized training and ongoing professional development. Access to focused teaching initiatives could greatly improve

prescription practices and aid in the fight against increasing resistance [16].

Research of 161 people in Bangkok examined the effects of money, work, and education on antibiotic use and awareness. The survey, which used a questionnaire created by the WHO, found that more than half of respondents thought antibiotics could cure the flu and colds. There were still many misconceptions, even though 54.7% of respondents recognized that resistance may hurt their family. Higher educated people and healthcare professionals knew more about antibiotic use and resistance, according to statistical study. Increased use of antibiotics was also associated with higher income. These results provide useful baseline information to direct Thailand's stewardship and public health initiatives [17].

In the West Bank, a cross-sectional study evaluated pharmacists' behaviours, attitudes, and knowledge of antibiotic resistance. A troubling 60% of the 152 pharmacists polled between 2021 and 2022 acknowledged giving out antibiotics without a prescription. Although most people were aware of the dangers of abuse, there were some misconceptions—17.1% of respondents thought antibiotics should be used regularly to treat upper respiratory infections. These results highlight the critical need for ongoing educational initiatives and stricter regulatory

enforcement to encourage the pharmaceutical industry's ethical use of antibiotics. [18].

Antibiotic self-medication is still a concerning common practice in the Aseer region of Saudi Arabia. Over-the-counter antibiotics were used by almost one-third of the participants to treat viral flu symptoms, and they frequently stopped taking the drug as soon as they felt better. Many people used antibiotics that were left over from previous infections. Many respondents continued to hold the notion that antibiotics could heal viral illnesses and that higher dosages would result in a quicker recovery, even though some respondents demonstrated a good awareness of antibiotic resistance. Higher education levels, prior healthcare experience, and knowledge of the dangers of self-medication were all connected with increased awareness, according to the study this highlights the significance of focused educational initiatives to dispel myths and encourage ethical antibiotic use, particularly for groups with lower levels of education [19].

After the COVID-19 epidemic, Malaysia saw one of the first national surveys of the general public's understanding of antibiotic resistance. The results showed that the general public, especially younger people, those with less education, and those from lower-income households, had a poor understanding of how antibiotics work and

the risks of resistance, despite the widespread usage of antibiotics. The disparities in awareness show the urgent need for extensive public education initiatives to assist people comprehend their part in reducing resistance. Raising awareness could lessen the strain on healthcare systems and maintain the efficacy of currently available antibiotics. In order to investigate the fundamental elements influencing public attitudes and actions, the study also recommended more in-depth qualitative research [20].

In Nigeria, a survey of college students studying medicine found a significant correlation between academic status and knowledge of antibiotic resistance. According to the study, students in higher academic years were more knowledgeable about the proper use of antibiotics and stewardship guidelines. The authors suggested adding seminars, workshops, and symposiums to the academic program in order to advance knowledge at an earlier level. They also suggested tightening rules and launching media-driven efforts to limit antibiotic access and stop abuse. When combined, these tactics may be extremely effective in lowering antibiotic resistance and encouraging future medical professionals to use antibiotics responsibly [21].

Community pharmacists in Saudi Arabia were assessed on their knowledge of

antibiotic dispensing procedures and antimicrobial resistance. According to the report, new Ministry of Health regulations greatly reduced the abuse of antibiotics and enhanced prescribing practices. The majority of pharmacists showed a high level of AMR awareness, which is essential for patient education and for making sure that medications are distributed responsibly. It is anticipated that these insights will direct future training initiatives and assist public health authorities, especially the AMR National Committee, in making decisions. The study provides a road map for lowering antibiotic abuse at the community level by enhancing professional and policy knowledge [22, 23].

A poll of undergraduate students in Quito, Ecuador, found that somewhat more than 64 percent knew something about antibiotic resistance. Applied science students outperformed their social science counterparts, but misconceptions persisted—many people thought that the human body, not germs, developed antibiotic resistance. The majority of pupils stated that their primary information sources were teachers and medical professionals. The study emphasized the significance of focused educational initiatives to dispel these myths and raise young adults' awareness [24].

Despite being essential to patient care, many nurses, according to this study, do not know

enough about antibiotic resistance and how to prevent it. Despite having a significant impact on antibiotic practices, there were still knowledge gaps and a lack of clarity on stewardship tactics. In order to tackle this issue, the authors advocated for customized educational initiatives that would enhance nurses' understanding and promote proactive approaches to resistance prevention. The importance of providing nursing staff with accurate, practical knowledge was clearly emphasized by [25]. Antibiotics significantly improved the treatment of infectious diseases and increased human life expectancy, revolutionizing world health. However, as a post-antibiotic era approaches, this medical progress is now in jeopardy due to the inability of institutions, businesses, farmers, and individuals to maintain the effectiveness of these medications. Even before the COVID-19 pandemic, the World Health Organization identified antimicrobial resistance (AMR), which happens when once-effective medications no longer function against infections, as a serious global health concern. According to a concerning UK government assessment on antimicrobial resistance (AMR), by 2050, resistant diseases may cause 10 million deaths a year, or one every three seconds [26].

A bicentral study looked at household habits related to the use and storage of

antibiotics in Pakistani post-conflict areas. Families were found to frequently maintain a large range of antibiotics without fully comprehending their proper usage, dose, or associated hazards. There was widespread ignorance about when and how to use leftover medications, as well as misconceptions about antibiotic resistance. These risky behaviours and a lack of knowledge made it clear how urgently household education is needed to prevent self-medication and abuse [27].

A survey of 324 rural households in the Ha Nam Province of Vietnam found very little were known about antibiotic use and resistance. Although most people had heard of antibiotics, very few were able to name particular drugs or characterize antibiotic resistance. According to the study, awareness levels were considerably lower among those who lived further away from medical facilities. On the other hand, people who used private pharmacies were less knowledgeable than those who relied on friends and family for health information. Better understanding was associated with access to official media, health insurance, and public health information sources [28]. A cross-sectional research of Bangladeshi university students sought to determine knowledge gaps about self-medication and antibiotic resistance. The findings demonstrated a modest level of understanding, with 66% of students having

a general awareness of antibiotic resistance. Many, meanwhile, found it difficult to understand the underlying causes and practical repercussions of resistance. This disparity highlighted the necessity of focused instructional initiatives in academic contexts to elucidate the mechanisms of resistance development and the part that overuse plays in sustaining it [29].

A qualitative study conducted in Vietnam investigated the opinions of doctors regarding the underlying causes of antibiotic resistance. The study looked at hospital antibiotic policies, prescribing practices, and knowledge gaps on resistance and hospital-acquired infections through focus groups with 34 physicians from public and private hospitals. Despite the fact that many physicians reported following national and WHO guidelines, there were substantial obstacles due to systemic problems, such as inconsistent prescribing standards and confusing hospital procedures [30].

A cross-sectional study carried out in public hospitals in the Amhara Regional State of Northwestern Ethiopia found significant gaps in patients' antibiotic-related knowledge, attitudes, and practices. Antimicrobial resistance (AMR) was largely caused by these shortcomings, which included misconceptions about when and how to take antibiotics. According to the study, awareness efforts should be launched in order to raise public awareness and

promote behaviour change. It also suggested that laws be put in place to ban the sale of antibiotics without a prescription, as this is still a big source of abuse [31].

A study conducted in Puducherry, India, to find out how the general population and medical experts felt about antibiotic use and resistance found a wide range of opinions. Some showed that they understood the risks of usage, while others lacked even the most basic awareness. The findings made clear how urgently tailored intervention initiatives are needed to inform the public and encourage the prudent use of antibiotics. These initiatives could be extremely important in reducing the rate at which resistance spreads by raising public awareness [32].

Prior to the COVID-19 epidemic, Myanmar's first nationwide mobile phone panel poll offered crucial baseline information on public attitudes and behaviours about drugs and AMR. The findings showed significant knowledge shortages, with many respondents not knowing how antibiotics function or when to use them. Myanmar's practices lagged well behind those of other countries. The study underlined how crucial it is to keep an eye on public awareness in order to direct efficient AMR action. In order to create tailored solutions, it suggested that future studies concentrate on particular groups, such as pharmacists, healthcare

professionals, and different socioeconomic categories [33].

A community-based survey conducted in Dessie City, Northeast Ethiopia, found that adults there had little awareness and understanding of antibiotic resistance. Better comprehension was highly correlated with characteristics including being male, having more education, getting professional advice on the use of antibiotics, and actively seeking out information. The study also discovered that many people used antibiotics without a prescription, which increased resistance. The findings led the researchers to emphasize the necessity of public education initiatives to close these gaps and encourage the community's appropriate use of antibiotics [34].

According to a global evaluation, a One Health approach is necessary since the emergence of antibiotic resistance poses concerns to the health of humans, animals, and the environment. In order to lessen the threats presented by antimicrobial resistance (AMR), this strategy calls for coordinated action across disciplines. Antibiotic-resistant diseases and the spread of resistance genes have been sped up by antibiotic abuse, inadequate sanitation, and lax regulatory oversight. The report promoted deeper international commitments to surveillance, antimicrobial stewardship, policy reform, and public education, all of

which were backed by agencies such as the WHO, OIE, and FAO [35].

A comprehensive multi-country study conducted across 30 EU/EEA nations assessed healthcare professionals' knowledge, attitudes, and behaviours regarding antibiotic use and resistance. This pioneering research uncovered several misconceptions among practitioners — many mistakenly believed that antibiotic-resistant infections primarily affect patients currently taking antibiotics, that only the ill are at risk, and that healthy individuals cannot carry resistant bacteria. These misunderstandings pose significant risks to clinical practices and infection control efforts. To address this, the study recommended that individual countries develop customized strategies to improve healthcare workers' understanding of antibiotic resistance, while broader EU/EEA initiatives could help tackle overarching issues [36].

In Nigeria, a national survey explored healthcare workers' awareness of antimicrobial resistance (AMR) and their prescribing habits. Although the findings showed a moderate awareness of AMR, this knowledge did not consistently translate into responsible prescribing behaviours. While many respondents expressed a willingness to reduce unnecessary antibiotic use, practices remained uneven. The study highlighted the urgent need for enhanced

training, support systems, and monitoring to promote more rational antibiotic use among healthcare providers [37].

In Perak, Malaysia, a focused intervention sought to improve public understanding of antibiotic use and resistance. Participants were provided with an educational leaflet, and within two weeks, notable improvements in knowledge were recorded. This study demonstrated the effectiveness of simple educational tools in bridging knowledge gaps and encouraging better behaviour. The researchers advocated for incorporating such resources into future public awareness campaigns to reduce antibiotic misuse [38].

A nationwide study in Italy used a clustering approach to examine healthcare professionals' knowledge, attitudes, and behaviours concerning antibiotic use and resistance. The study identified significant differences between professional groups and healthcare settings, pointing to gaps in knowledge and inconsistent practices. To remedy this, the researchers recommended targeted training sessions and awareness initiatives tailored to align healthcare workers' actions with best practices in antimicrobial stewardship [39].

#### **CONCLUSION:**

Managing AMR is a complicated and important global issue that requires the active participation of medical professionals at all levels. Since their behaviours,

expertise, and attitudes directly impact infection control procedures, patient education, and antibiotic prescribing practices, doctors, pharmacists, nurses, and healthcare students, all play a crucial part in managing AMR. A solid understanding of AMR, which varies depending on access to recent research, clinical experience, and education, is crucial to the success of these initiatives.

By managing medications, counselling patients, and making sure that prescriptions are written correctly, pharmacists play a pivotal role in encouraging the careful use of antibiotics. Since they are the main prescribers, doctors need to learn more about the mechanisms underlying AMR and the effects of overprescribing. In hospital settings, nurses contribute substantially by supporting infection prevention methods, maintaining treatment adherence, and speaking out for patients. Healthcare professionals including students are responsible for prescribing antibiotics and ensuring appropriate infection control procedures are followed. Developing successful therapies and public health initiatives to counteract this worldwide danger requires understanding the mechanisms behind antibiotic resistance, including its sources, impacts, and potential remedies.

The current problems among healthcare professionals understand and emphasize the

necessity of ongoing training and specialized treatments to raise their level of AMR awareness. Since they will shape future trends in antibiotic prescribing, educational programs should target experienced clinicians and medical students. Furthermore, managing AMR necessitates coordination between the various healthcare sectors, supported by international cooperation, public awareness initiatives, and regulatory changes. In the end, fighting AMR necessitates a managed, multidisciplinary strategy. Healthcare workers may substantially contribute to reducing the risk of AMR and protecting public health globally by improving education, raising awareness, and encouraging ethical antibiotic use.

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