ASSESMENT OF RESTRICTED ANTIBIOTICS UTILISATION IN A TERTIARY CARE HOSPITAL IN NORTHERN MAHARASHTRA: AN OBSERVATIONAL STUDY

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ABSTRACT

Background: The purpose of this study was to evaluate the use of limited antibiotics in a Northern Maharashtra tertiary care hospital. The study, which took place at Apollo Hospital Nashik over a period of eighteen months, from January 2023 to June 2024, examined antibiotic use, culture sensitivity testing, prescription appropriateness, and the usage of escalation and de-escalation protocols. The patients Included were 493 who were on restricted antibiotics for longer than 48 hours. The findings showed that 22% of patients were tested for culture sensitivity after receiving antibiotics, 21% had no culture testing, and 57% of patients had testing for cultural sensitivity performed prior to the administration of antibiotics. Of the patients, 76% underwent empirical therapy and 18% received definitive therapy. According to clinical criteria, 90% of prescriptions were found to be appropriate in this study, with 10% being declared to be unjustified. Additionally, 96% of patients showed de-escalation, indicating that antibiotics were being used effectively, while 4% of cases necessitated escalation to broader-spectrum antibiotics. These results highlight the significance of antimicrobial resistance management initiatives, which emphasize enhanced diagnostic tests and de-escalation tactics to maximize antibiotic utilization.

Objectives:

- To determine the consumption of restricted antibiotics.
- To assess the culture sensitivity status along with the type of therapy.
- To evaluate appropriateness of their prescribing.
- To monitor escalation and de-escalation policies.

INTRODUCTION

Antimicrobial resistance (AMR) is one of the biggest dangers to human public health, according to the World Health Organization (WHO) globally as an essential part of AMS. [1]As a result, AMR has a disastrous worldwide effect on both developed and developing nations. Antimicrobial-resistant diseases are thought to be the cause of 1.27 million fatalities each year.[2]

In order to lessen the selection pressure on antibiotics and the establishment of multidrug resistant (MDR) organisms, antibiotic de-escalation (ADE) is a method that involves stopping one or more combination empirical antimicrobials or switching out a broad-spectrum antibiotic for one with a narrower spectrum. Physicians find it challenging to strike a balance between a conservative strategy and early, aggressive therapy. One effective strategy for preventing antimicrobial resistance is to switch to a narrower range or to stop using antibiotics when not necessary. Prescription practice modifications can reduce resistant pathogens. [3] Assessing expensive medicines can improve treatment outcomes, save expenses, and stop antimicrobial opposition. [4] Eravacycline is one of the new antibiotics that is essential to fighting colistin resistance.By choosing the appropriate medication, dose, and duration, antimicrobial stewardship seeks to maximize the use of antimicrobials.[5] The two most important tactics are preauthorization and limited usage of expensive antibiotics. Monitoring is vital to monitor antimicrobial use and resistance, pinpoint areas in need of improvement, and establish a correlation with programs for monitoring resistance. Global programs like the WHO Global Action Plan on Antimicrobial Resistance seek to improve antimicrobials for human, animal, and environmental health, lower the incidence of infections, and improve surveillance and research. [6]However, for these strategies to be implemented effectively, there needs to be strong commitment from all relevant sectors and international collaboration.[7]

MATERIALS AND METHODS
Subjects
An observational study was carried out for a period of one and half year from Jan 2023 to Jun 2024 after the approval from Institutional Ethics Committee of Apollo Hospital, Nashik. A total 493(n)Patients were included in this study. The patients admitted as inpatient in various department of Apollo Hospital, Nashik. During study period patient who are prescribed with at least one restricted antibiotic for more than 48 hours were included in this study. The pregnant, lactating women, outpatients and patients prescribed with restricted antibiotics for less than 48 hours were excluded from this study.

Study design.
- This study made advantage of a well-designed patient data entry form that was created. The patient's demographic information (name, age, gender, diagnosis, length of stay, treatment plan, etc.) as well as an investigational requirements like culture sensitivity reports were included. Patients were kept informed of restricted antimicrobial prescriptions.
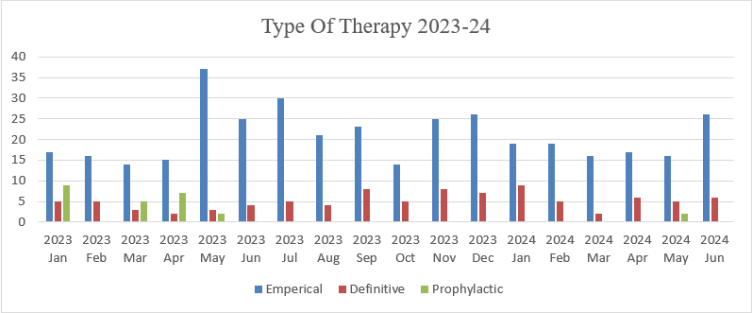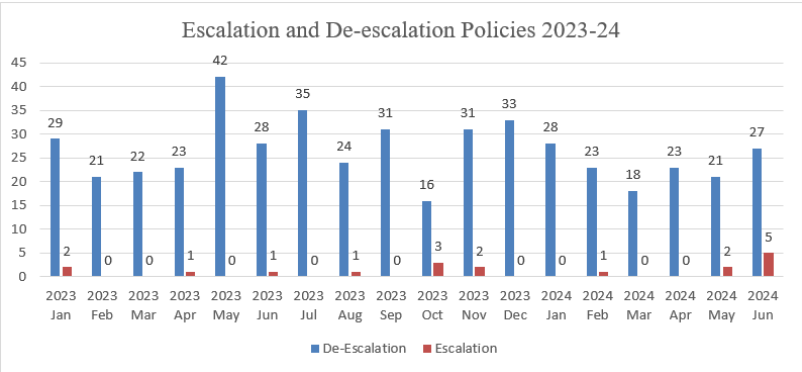
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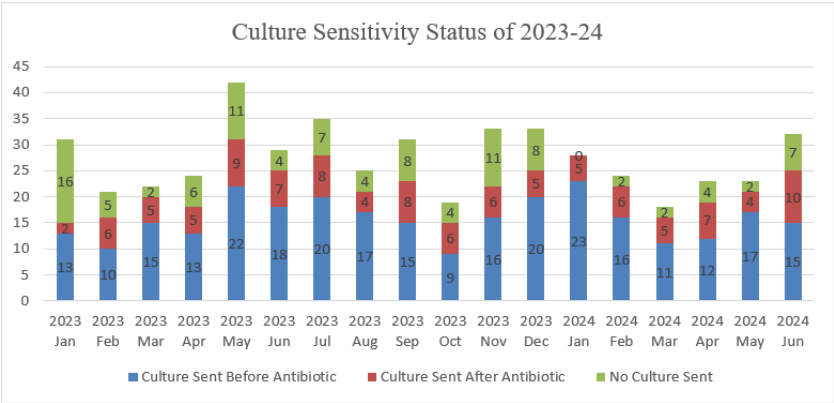
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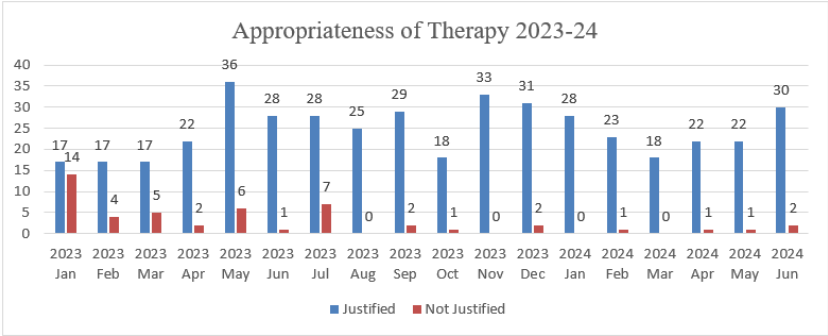
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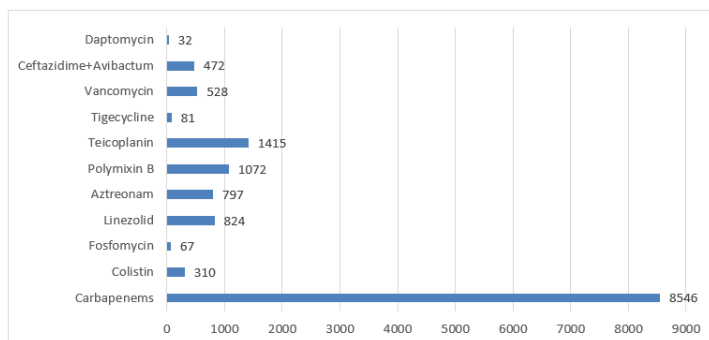

GRAPH NO.: 4

RESULTS

Figure 1: (Utilization of Antibiotics).

A total of 493 (n) patients were prescribed witDh the restricted antibiotics in the IPD. As Fig. No. 1 represents the extent of prescription of major classes of restricted antibiotics. Carbapenem antibiotics were the most commonly used followed by the Teicoplanin and Polymixin B, then the lesser extent of usage has been observed in case of linezolid followed by the Aztreonam and then further the other classes to the very lesser extent.

Based on the inclusion and exclusion criteria, a total of 493 patients were included in the research between January 2023 and June 2024. At least one restricted antibiotic was given to these patients for longer than 48 hours when they were admitted to Apollo Hospital in Nashik. Outpatients, patients who were prescribed antibiotics for fewer than 48 hours, and women who were pregnant or breastfeeding were excluded from this study. The demographic research revealed that the patient population included a range of age ranges and a variety of conditions from different departments. Antibiotics were administered to most patients in order to treat high-risk illnesses such as sepsis, meningitis, pneumonia, and MRSA. One important step in the administering of antibiotics was the culture sensitivity test. figure 1 shows that 57% (n=282) of all culture sensitivity tests were sent out prior to the use of antibiotics. Clinicians were able to successfully customize therapies thanks to this technique. On the other hand, 22%(n=108) of the cultures were sent after antibiotics were given, usually in situations where urgent medical attention was required, like illnesses that could be fatal. Nevertheless, in 21%(n=103) of cases, no culture sensitivity test was carried out, indicating that antibiotic therapy was started right away based on clinical judgment even though it might have contributed to the development of antibiotic resistance (AMR). Based on an analysis of the appropriateness of antibiotic usage, 90%(n=444) of patients followed clinical standards figure 2. These examples showed how the patient's condition and diagnosis supported the use of antibiotics. 10%(n=49) of prescriptions, however, were found to be unnecessary, which raises questions about the improper use of antibiotics that are prohibited. These results highlight the necessity of ongoing initiatives to educate healthcare professionals about antibiotic stewardship. When it comes to the different kinds of therapy that were given, figure 3 demonstrates that 76%(n=76) of patients received empirical therapy, which was started based more on clinical suspicion than on validated culture results. Conversely, definitive therapy was used in 18%(n=92) of instances, in which the course of treatment was determined by confirmed culture results. In 6%(n=25) of instances, prophylactic antibiotic usage was noted, mostly. Majority of the prescriptions were de escalated that is 96%(n=475), while 4%(n=18) prescriptions were escalated to broad spectrum antibiotics.

DISCUSSION

The study's findings point to a number of significant patterns and opportunities for advancement in the use of antibiotic restrictions. A good trend toward evidence-based practice may be seen in the high percentage 57%(n=282) of culture sensitivity testing performed prior

to antibiotic administration, which enables doctors to administer targeted therapy and lower the risk of antimicrobial resistance (AMR). The 21% (n=103) of cases without a culture and the 22% (n=108) of cases where one was sent for a culture after receiving antibiotics, however, indicate that difficulties persist in obtaining prompt and adequate diagnostic testing, especially in cases of life-threatening infections where prompt empirical treatment is the first priority. The results highlight the significance of antibiotic stewardship as well 90%(n=444) of antibiotic prescriptions were justified, but 10%(n=49) were not, which raises questions about possible antibiotic overuse despite being a small percentage. This demonstrates the continued need for healthcare professionals to be educated and made aware of the importance of following clinical recommendations and minimizing the needless use of broad-spectrum antibiotics, which might exacerbate antimicrobial resistance (AMR). In 76%(n=376) of cases, empirical therapy predominated. This is a standard procedure in circumstances where postponing treatment could impair the prognosis for patients. Even when pathogen-specific treatment is available, there may be a preference for broader-spectrum antibiotics or delays in receiving culture results, as indicated by the relatively low rate of definitive therapy 18%(n=18). Because of its reliance on empirical therapy, antibiotic therapy needs to be more specifically targeted, which highlights the need for better access to quick diagnostic tests. Although moderate, the 6%(n=25) of cases that include the use of prophylactic antibiotics necessitate careful consideration to ensure that they are only administered when absolutely necessary, as misuse can also lead to AMR. In preoperative or immunocompromised patients, where the advantages may exceed the dangers, prophylactic antibiotics were generally employed. The data is encouraging in that it demonstrates a promising tendency toward de-escalation in 96%(n=475) of instances, wherein narrow-spectrum or more targeted treatments were substituted for broad-spectrum antibiotics in response to clinical response and culture results. This indicates a growing understanding of and commitment to stewardship concepts meant to minimize adverse drug reactions, avoid antimicrobial resistance, and save medical expenses. In contrast, patients who were critically ill usually needed intensive therapy to avert worsening outcomes, as evidenced by the 4%(n=18) of cases that required escalation to broader-spectrum antibiotics. In order to address the growing threat of antibiotic-resistant bacteria (AMR), this study emphasizes the necessity of ongoing efforts to optimize antibiotic use, improve diagnostic procedures, and expand antibiotic stewardship programs. Healthcare facilities can make a substantial contribution to maintaining the effectiveness of limited antibiotics and slowing the spread of resistance organisms by filling in the gaps in culture testing, lowering the reliance on empirical therapy, and encouraging de-escalation techniques.

CONCLUSION

The research findings indicate that the majority of the sample population received prescriptions for the limited antibiotics as an empirical therapy. Some serious suspected bacterial infections require a prompt therapy to minimize cost, length of stay and other health related parameters like morbidity and mortality. The majority of these medications were given intravenously (IV) to treat different infections and other pathological problems. The numerous definitive prescriptions for restricted antibiotics highlight the necessity of culture sensitivity testing to identify and treat life threatening infections. In the hospital, a stewardship program must be put in place to improve overall usage of the antibiotics in the hospital and to promote the rationale use of antimicrobials. It will significantly contribute to reduce the tragedy that is increasing Antimicrobial resistance and more effective therapies to combat MDR organisms and infectious diseases.

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