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The nursing practice in prevention of antimicrobial resistance

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Abstract
The antimicrobial resistance is a global health threat with serious health and economic implications. Need attention towards prevention of resistance as well use of antibiotic. Nurses have major key contribution to prevent and control of antibacterial resistance through the implementation of infection control measures in hospital. Nurses to participate in evidence-based practices, involvement in decision making and antimicrobial stewardship.

Keywords: Antimicrobial resistance, infection control, role of nurse, antibiotic policy

Introduction
In May 2014, the World Health Assembly requested the development of a global action plan on antimicrobial resistance (AMR), in resolution reflecting a global consensus that antimicrobial resistance poses a profound threat to human health. Spontaneous natural development of antimicrobial resistance in the microorganisms in nature is a slow process. However, the frequent and inappropriate use of a newly discovered antimicrobial drug leads to the development of altered mechanisms in the pathophysiology of the concerned microbes as a survival strategy. Such antibiotic selection pressure kills the susceptible microbes and helps in selective replication of drug-resistant bacteria. It has become a matter of great public health concern. Antimicrobial resistance is well recognised as a global threat to human health. Infections caused by antimicrobial-resistant micro-organisms in hospitals are associated with increased morbidity, mortality and healthcare costs [1]. Antibiotic Resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause. This is compromising our ability to treat infectious diseases and undermining many advances in medicine. Antimicrobial resistance is an urgent global public health threat, killing at least 1.27 million people worldwide and associated with nearly 5 million deaths in 2019 [2]. In India in 2019, there were 297,000 deaths attributable to AMR and 1,042,500 deaths associated with AMR.[3] Nurses are a trusted source of advice on a range of health-related issues. They are often approached by handling of patients with crucial role to AMR preventing through infection control programme.

What is antimicrobial resistance?
Antimicrobial resistance (AMR), also known as drug resistance – occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective. When the microorganisms become resistant to most antimicrobials they are often referred to as “superbugs”. This is a major concern because a resistant infection may kill, can spread to others, and imposes huge costs to individuals and society [4].

What are the microbes in AMR?
The seven priority bacterial pathogens are Staphylococcus aureus, Enterococcus species, Escherichia coli, *Klebsiella* species, Pseudomonas species, Acinetobacter species Salmonella enterica serotype, Typhi and Paratyphi whereas Imipenem susceptibility of *E. coli* has dropped steadily from 81% in 2017 to 66% in 2022 and that of *Klebsiella pneumoniae* dropped steadily from 59% in 2017 to 42% in 2022 [5].

What are the drugs in AMR?

E. coli's to Ampicillin, Cefotaxime, Enterococcus species to Ampicillin, Erythromycin, *Klebsiella* species to third generation cephalosporins [6].

The Role of Nurse

The need for and benefit of, widening the participation of clinical stakeholder in antimicrobial stewardship programs is not, however, new. More than 10 years ago there were already calls advocating for the need to expand engagement in stewardship activities suggesting that the typical core of infectious diseases.

The following steps taken to prevent antimicrobial resistance

- Promoting and practising standard prevention precautions including hand washing.
- Hand hygiene is the most important hygiene practice that should be considered to prevent the spread of resistant microorganisms. In this context, Nurses do follow the recommended hand hygiene indicated by WHO to protect patients and other health care workers, and take responsibility for not miss indication of hand hygiene. Authentically fill the check list of hand hygiene as indicator for quality improvement.
- Recognising signs and symptoms of infection
- Nurse should monitor the sign and symptoms of infections and timely record and documented. Fever is early warning sign of infection and also correlated with Hospital acquired infection. Its most important use ICU / Critical care bundles to prevent infection. (Ex. VAP, CAUTI, CLABSI and SSI etc.) it helps to majority of HAI infections.
- Use of PPE and Isolation measures.
- Strictly adhere to wear of PPE during procedure and not to breach sterility of procedure. Carry out all the care and treatment procedures of the patients followed under isolation measures. Spread of resistant microorganisms within the hospital is prevented by care services carried out under appropriate conditions. In all these processes, nurses undertake the role of patient advocacy [7].
- Medication administration and management and ensure report of surveillance.
- Nurses include contributing to the regulation of the treatment by communicating with the physician prescribing the drug for switching antimicrobial treatment from a broad empirical treatment option to another less-comprehensive treatment (de-escalation) according to the culture result when microbiological sample examinations are concluded or for switching parenteral therapy of patients who are in good clinical condition and can tolerate oral therapy [8]. Report drug-resistant infections to surveillance to be monitored before any switching of change in antimicrobial treatment.
- Informing patients in this process, and administering the treatments prescribed to the patient according to the 8 right principles (right patient, right drug, right effect, right dose, right route, right drug form, right time, and good record) in drug administration [9].
- Ensuring that timely specimens for microbiology are collected correctly.
- Nurses collaboratively work with infection control team for collecting sample of culture or any microbial culture specimens. Define the frequency for collection of samples from high-risk area of hospital. It helps to isolation of microbes for further prevention of infection control strategies
- Promoting the use of prescribing guidelines.
- Nurses to make promoting of use of prescribing medication of antibiotics from registered medical practitioner or physician and avoid over counter medication.
- Using Standard communication tools (SBAR, IDRs, etc.) during communication, and using secure communication tools
- Administrative role of Nurse
- Ensure the Bed strength of organization and manpower of nurse to handle in critical care/ high risk area.
- Ensuring the Instruments & environment clean
- Nurses should get training in infection control policy as well of antibiotic policy .
- Awareness and understanding:
- Stakeholder activities and social media or campaign for AMR
- Talk to patients about how to take antibiotics correctly, antibiotic resistance & the dangers of misuse
- Talk to patients about preventing infections (e.g. vaccination, hand washing, safer sex, covering nose & mouth when sneezing.
- Providing information and support to patients and their families about their health condition, treatment options, and how and why to take medicines according to the doctor's instructions
- During hospitalization make awareness to patient families regarding infection control protocols

Ensuring treatments are recorded properly in the patient's health record

- Nurses constitute the professional group with the largest workforce in the hospital that spends 24 hours with the patient, closely monitors the patients, coordinates care, and constantly communicates with other disciplines. Many interventions are made within the scope of antimicrobial stewardship, with or without nurses' awareness, and these interventions are recorded [10].
- Antibiotics-based coatings need to be developed carefully, as antibiotic resistance has been reported in implant-associated pathogens. To avoid drug resistance, antibiotics-releasing coatings have been developed to release therapeutic doses of drugs in a specific timeframe. The therapeutics against Implant Associated Infections have been shifted towards implant coatings, releasing antibiotics considered a practical approach for preventing and treating implant-associated disorders.

Conclusion

Antimicrobial resistance (AMR) represents a critical threat as microorganisms evolve to evade conventional treatments, leading to "superbugs" that resist most antimicrobials. This escalation significantly impacts patient outcomes and imposes economic burdens. Key resistant pathogens include *Staphylococcus aureus*, *E. coli*, and *Klebsiella species*. Effective management of AMR requires multi-faceted strategies involving rigorous hand hygiene, timely infection monitoring, and adherence to preventive protocols. Nurses play a pivotal role in AMR control through vigilant

monitoring, proper medication management, and adherence to infection control practices. Their proactive involvement in antimicrobial stewardship and patient education is essential to curbing AMR and improving healthcare outcomes.

Declaration of Interests: The author has no conflict of interest to declare.

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