Antibiotic Stewardship in Nursing- A Comprehensive Review

Nandeesh Kumar P R

ABSTRACT

Antibiotic stewardship is at the center of the healthcare system of the future, in a world where antimicrobial resistance (AMR) is a rapidly growing threat. The primary causes of resistance have been the abuse and overuse of antibiotics in clinical, community, and agricultural settings. As a result, patient outcomes have been negatively impacted, leading to longer illness durations, higher death rates, and higher healthcare expenses. Antibiotic stewardship programs (ASPs) employ evidence-based guidelines, diagnostics, surveillance, and interdisciplinary collaboration to prevent needless antibiotic use. Antibiotic use during direct patient care, surveillance, infection prevention, and health education can be greatly influenced by nurses, who make up the majority of the healthcare workforce It also discusses how to strengthen nursing leadership and stewardship capacity in the future.

Keywords: antibiotic stewardship, antimicrobial resistance, nursing practice, infection control, surveillance, antibiotic misuse.

Classification: NLM Code: WY 100

Language: English

Great Britain Journals Press

London Journal of Medical & Health Research

Volume 25 | Issue 10 | Compilation 1.0

Antibiotic Stewardship in Nursing- A Comprehensive Review

Nandeesh Kumar P R

ABSTRACT

Antibiotic stewardship is at the center of the healthcare system of the future, in a world where antimicrobial resistance (AMR) is a rapidly growing threat. The primary causes of resistance have been the abuse and overuse of antibiotics in clinical, community, and agricultural settings. As a result, patient outcomes have been negatively impacted, leading to longer illness durations, higher death rates, and higher healthcare expenses. Antibiotic stewardship programs (ASPs) employ evidence-based guidelines, diagnostics, surveillance, and interdisciplinary collaboration to prevent needless antibiotic use. Antibiotic use during direct patient care, surveillance, infection prevention, and health education can be greatly influenced by nurses, who make up the majority of the healthcare workforce It also discusses how to strengthen nursing leadership and stewardship capacity in the future.

Keywords: antibiotic stewardship, antimicrobial resistance, nursing practice, infection control, surveillance, antibiotic misuse.

Author: Assistant Professor, Department of Medical Surgical Nursing, Cauvery College of Nursing, Mysuru.

I. INTRODUCTION

Antibiotics have transformed medicine since penicillin was discovered in 1928. Surgical procedures, organ transplants, cancer chemotherapy, and critical care rely heavily on effective antimicrobial therapy. Unfortunately, in the middle of the huge success of antibiotics, the problem of antimicrobial resistance (AMR) is becoming worse and overshadowing this success. The main reason for this situation is that the use of antibiotics has been generally inappropriate, excessive, and in the majority of cases, broad-spectrum agents have been used, thus the selective pressure has been created which in turn promotes the survival and multiplication of resistant organisms. As a result, infections that were once easily treatable now pose major clinical challenges.

One of the most urgent problems of the planet, according to the World Health Organization (WHO), is AMR that is among the top ten global public health threats of the 21st century [2]. There are millions of deaths caused by resistant microorganisms like MRSA, ESBL-producing organisms, VRE, and multidrug-resistant Pseudomonas and Acinetobacter species. These also lead to significant economic losses. Antibiotic misuse is common in many countries, particularly in low- and middle-income nations. This happens due to weak regulations, self-medication, and easy access to over-the-counter drugs. To prevent antibiotic resistance from getting worse, we need to practice antibiotic stewardship. This means using antibiotics in a way that provides the greatest benefit to patients and minimizes harm to the medications.

Nurses who provide continuous patient monitoring and form the interface between patients and healthcare systems are in a unique position to facilitate this program. Most certainly, their contribution to the program is beyond giving medication - they are now the core of surveillance, prompt spotting of symptoms, quick communication, and patient education.

II. CONCEPT AND PRINCIPLES OF ANTIBIOTIC STEWARDSHIP

Antibiotic stewardship includes the policies, strategies, and practices that promote the responsible use of antibiotics in healthcare. Dellit et al. describe stewardship as a well-planned

method to ensure that patients receive the correct antibiotic, in the right dose, by the right route, for the right duration, and for the right reason [3].

The essential principles of antibiotic stewardship are:

Optimizing antibiotic therapy. It is about choosing the most effective antibiotic for the pathogen that is either suspected or confirmed, at the same time ensuring the patient has adequate drug exposure by the correct dosing, and also by not allowing unnecessary usage of broad-spectrum agents.

Preventing misuse and overuse. Researches reveal that half of the antibiotic uses worldwide are done inappropriately. AMR is exacerbated by overprescribing for viral infections, using prolonged courses, and prescribing without culture data.

Using microbiological and diagnostic tools. Culture and sensitivity tests, biomarkers like procalcitonin, and radiological investigations improve the accuracy of diagnostic and therapeutic decisions. Promoting evidence-based practice. Antibiotic prescribing is made more efficient through the use of clinical guidelines, hospital antibiograms, and standardized treatment protocols.

Monitoring outcomes and modifying therapy. De-escalation based on culture results, IV-to-oral switch, and antibiotic "time-out" reviews are the necessary steps that lead to the therapy of choice and thus should always be present in the chain of patient care.

Stewardship, by combining these tenets, not only saves the clinical outcomes but also ensures the continuation of antibiotic efficacy to the descendants.

III. GLOBAL BURDEN AND CONSEQUENCES OF ANTIMICROBIAL RESISTANCE

Antimicrobial resistance (AMR) threatens to lead to disastrous consequences on a global scale. The World Health Organization (WHO) estimates that, at present, AMR is the cause of around five million deaths every year. Their projections indicate that, by 2050, fatalities related to AMR will double to reach a total of 10 million deaths annually unless immediate action is taken [2]. Most of the burden goes to developing countries. Poor healthcare infrastructure, inadequate infection prevention practices, and the overuse of antibiotics without proper regulation are major factors that lead to resistance in these countries.

The implications of AMR are very serious. Treatment failure is increasing, forcing doctors to rely on last-line or toxic antibiotics. Patients with resistant infections often stay in the hospital longer. Many of these patients are admitted to intensive care units, and their death rates are rising. Additionally, resistant infections create a large burden on healthcare systems that are already struggling. The reason for this is that they result in increased medicine use, prolonged therapies, additional investigations, and repeated hospital visits.

Several reasons are given for the rise of AMR, among them are: the prescribing of medicines irrationally, self-medication, not finishing one's treatments, bad sanitation, the sale of antibiotics without regulation, and the use of antibiotics in animals. High population density, overcrowded hospitals, and the absence of antibiotic guidelines in India are factors that have a major impact on resistance patterns [5]. Nurses have a key role in realizing the objectives that are set to lessen the driving forces of AMR, most especially in healthcare settings.

IV. NURSES' ROLE IN ANTIBIOTIC STEWARDSHIP

The role of nurses in antibiotic stewardship is beyond that of a simple drug administration one. Their almost continuous contact with patients and the medical facilities makes their contribution to the antibiotic stewardship program indispensable.

4.1 Ensuring Rational Antibiotic Administration

Nurses carry out the antibiotics administration that is accurate and in time according to the schedule that was prescribed. The effectiveness of the intervention will be reduced and resistance

promoted if any time deviation, in particular for drugs with a narrow therapeutic range, is done. Nurses also check for drug allergies, patient identifiers, and compatibility with other medications. They are controlling the infusion speed and ensuring that the dilution is correct so that the patient is safe from, for example, phlebitis or drug interactions.

4.2 Surveillance and Monitoring

Moreover, nurses are the first to notice how patients respond to the antibiotic therapy. To achieve this, they monitor vital signs, check laboratory parameters and refer to the infection markers such as fever, WBC count, and inflammatory markers. The very first exposure to drug toxicity (renal, hepatic, haematological) and allergic reaction symptoms is what helps to avert these problems altogether. Nurses are often in a position to spot happening of the disease more quickly than other members of the team, thus they become very important in making antimicrobial decisions.

4.3 Infection Prevention and Control

Nurses, free from doubt, are at the frontlines in the fight against hospital-acquired infections (HAIs), which, among others, are the main factors contributing to the use of antibiotics. Infection prevention methods that include hand hygiene, aseptic wound care, catheter care, environmental cleaning, isolation protocols contribute to lowering infection rates in a direct way. The fewer the number of HAIs, the lesser the number of antibiotic prescriptions, and the risk of resistance is dropped accordingly. Pittet's pioneering work provides evidence that hand hygiene compliance can lead to a HAI incidence rate drop of around 40% [7].

4.4 Diagnostic Stewardship Support

Diagnostic stewardship is a method of using lab results to guide decision-making in the use of antibiotics. Nurses are very instrumental in specimen gathering—blood cultures, urine samples, sputum, wound swabs—before antibiotic therapy is started. Correct collection methods not only avoid contamination but also enhance diagnosis and minimize unnecessary changes of antibiotics. Moreover, nurses take care of ensuring that the samples are sent without delays, which is a prerequisite for accurate culture growth.

4.5 Patient and Family Education

Education is one of the most effective means by which antibiotic misuse can be lowered. Patients very often misunderstand antibiotics, and one of their fallacies is that they are effective for viral infections. Nurses narrow this knowledge gap by educating patients on drug adherence, the wrong doing of self-medication, and the necessity of using the drug until the end of the course. Public awareness campaigns run by nurses have had great success in lowering the rates of improper antibiotic use [8].

4.6 Interprofessional Collaboration

Nurses are among the key contributors of antimicrobial stewardship teams. Their feedback is instrumental in decisions of therapy duration, symptoms of recovery, side effects, and the readiness of the patient for discharge or IV-to-oral conversion. Multidisciplinary rounds cannot do without the help of nurses who provide them with accurate clinical assessments.

The Functioning and Different Parts of Antibiotic Stewardship Programs.

Antibiotic stewardship programs are intensified by nursing contributions through various coordinated parts.

4.7 Guideline-Based Prescribing

Practice guidelines based on hospital antibiograms direct clinicians in choosing the best antibiotics for standard conditions. Nurses make certain that prescriptions follow these guidelines and report any violations.

4.8 Culture-Directed Therapy

At the core of any diagnostic is absolute precision. Nurses facilitate proper specimen collection, assist in accurate labeling, and ensure the

transport process is not interrupted. After the cultures are performed, they become the first to check the therapeutic changes and also inform the result quickly.

4.9 De-escalation and therapy Modification

The narrowing of the broad-spectrum drugs is possible if the cultures sensitivity patterns indicate such. Nurses give the daily clinical data which helps in making the decision whether the de-escalation is feasible or not.

4.10 Antibiotic Time-Out

An antibiotic time-out refers to a voluntary review 48–72 hours after the beginning of the therapy. The evidence nurses have regarding patient progress is their participation in reassessment discussions.

4.11 Dose Optimization

Nurses keep an eye on the levels of antibiotics in the body such as for vancomycin and aminoglycosides. The changes in dosage are guided by the kidney/liver condition, which nurses monitor through patient evaluations and lab reports.

4.12 IV-to-Oral Switch

The change from IV to oral antibiotics not only lowers the risks of complications but also raises the patient's freedom of movement and is a great cost-saving for the health care system. Nurses play a major role in the identification of patients who can safely undergo the switch therapy by evaluating oral tolerance, vital stability, and infection improvement [10].

V. CLINICAL IMPACT OF NURSING-DRIVEN STEWARDSHIP

Nurse involvement is one of the main factors that improves the success of overall efforts to conserve resources. Better surveillance allows for quick detection of sepsis, reactions, and complications like Clostridioides difficile infection. This means that interventions can be carried out promptly. Additionally, nurses reduce medication errors, ensure correct dosing intervals, and prevent situations of overdosing or underdosing.

Nurses who are empowered to carry out stewardship initiatives also experience less illness and thus, their hospital stays become shorter. Patient satisfaction rises, mortality rates fall, and the healthcare dollar is stretched more efficiently. Fishman emphasized that stewardship efforts lead to cost savings by cutting down on unnecessary prescriptions, hospital readmissions, and prolonged therapies [11].

Barriers to Nursing Participation in Stewardship.

Nurses, being the main contributors, encounter several systemic obstacles:

Firstly, heavy workloads and nursing shortages make it hard to find time for proper documentation and monitoring. Secondly, the lack of formal training in stewardship can lead to a hesitation to question prescriptions. Thirdly, a nurse with limited authority in a strictly hierarchical healthcare setting may find that their contribution to decision-making is minimal. Moreover, limited access to laboratory data, poor communication channels, and lack of institutional support completely enwrap the nurses' involvement in a quagmire. Therefore, it can be concluded that without going through these obstacles nurses cannot fully unleash their potentials.

5.1 Strategies to Strengthen Nursing Involvement

There is no doubt that the healthcare sector needs to put in efforts to get nurses actively involved in their work. Various educational activities such as seminars, simulated scenarios for training purposes and the inclusion of stewardship topics in the nursing curriculum are all means that help in nurse training. Besides empowering nurses with policy changes and well-established-seamless communication networks, the hospital work environment becomes collaborative. Also, modern-day innovations such as electronic health records, decision support tools, and automated alerts ease the process for nurses to rapidly spot inconsistencies within prescribing.

One of the ways to support the infection prevention programs is to be rigorous with the audit process and feedback, thus compliance improves and hospital-acquired infections lessen. Leadership support, having enough staff, and being recognized for one's contribution to the nursing field all work together to bring about active stewardship participation.

5.2 Future Directions

The use of antibiotics will be closely monitored by advanced diagnostics, Artificial Intelligence, and Precision Medicine. The rapid diagnostic test can locate the pathogen in a very short time, and thus, the target therapy can be started immediately. Besides, machine-learning tools can foresee resistance patterns and suggest empirical options. In order to stay relevant and competitive, nurses have to undergo professional development to keep up with these innovations. In addition, by the gradual expansion of nursing roles in the community, the fight against AMR will not only concern hospitals but also the general public.

VI. CONCLUSION

Antibiotic stewardship remains a key part of healthcare in the present times, the primary goal being the fight against antimicrobial resistance. As such, nurses that are closest to patients, are clinically proficient, and have the capabilities for monitoring, thus, they must be considered as the most valuable partners in stewardship programs. By expanding the nursing engagement with education, support from the institution, and cooperation among different professions, not only the correct use of antibiotics will be greatly facilitated but also the patient's safety will be elevated and the fight against microbes will be prolonged through the conservation of antibiotics for the next generations.

REFERENCES

1. Davies J, Davies D. Origins and evolution of antibiotic resistance. Microbiol Mol Biol Rev. 2010; 74(3): 417–33.
2. World Health Organization. Global Action Plan on Antimicrobial Resistance. Geneva: WHO; 2015.
3. Dellit TH, Owens RC, et al. Infectious Diseases Society of America guidelines for developing an institutional program to enhance antimicrobial stewardship. Clin Infect Dis. 2007; 44:159–77.
4. Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse. Ther Adv Drug Saf. 2014;5(6):229–41.
5. Government of India. National Action Plan on Antimicrobial Resistance. New Delhi: Ministry of Health; 2017.
6. Olans RN, Olans RD, DeMaria A. The critical role of the nurse in antimicrobial stewardship. OJIN. 2016;21(1).
7. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. J Hosp Infect. 2009;73:305–15.
8. McCullough AR, et al. Patient experience of antibiotic use. J Antimicrob Chemother. 2016;71:2395–402.
9. Barlam TF, Cosgrove SE, et al. Implementing antibiotic stewardship. Clin Infect Dis. 2016;62:e51–77.
10. Shrestha S, et al. Intravenous-to-oral antibiotic switch therapy. Hosp Pract. 2013;41(1):28–38.
11. Fishman N. Economic impact of antimicrobial stewardship. Clin Infect Dis.2006;42:S159-66.