CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187
https://doi.org/10.5281/zenodo.7642186

Available online at: http://www.iajps.com *Research Article*

ANTIBIOTIC STEWARDSHIP AND PHARMACIST AND NURSING ROLE

Khadija Yahya Ayiash,
Abrar Sami Foudah,
Saud Mahmood M Alzhrani,
Abdulaziz Hazzaa Aljabri,
Adnan Awad Alwetinani
Najwa Marzooq Alharbi
Nawaf Marzooq Alharbi
Abdulelah Muqbil Alsaedi

Article Received: July 2022 **Accepted:** July 2022 **Published: August** 2022

Abstract:

This review was aimed to discuss the roles of nurses as well as pharmacist in Antibiotic stewardship worldwide, literature reviews for all relevant articles in this topic published in English language up to the middle of 2022. The desire of nurses to become active partners in antibiotic stewardship was viewed as an extension of their job as patient advocates. Unmet knowledge requirements were viewed as the greatest barrier to nurses' ability to collaborate in antimicrobial stewardship activities. Pharmacists are heavily involved in AMS programs and perceive their duty as regulating proper prescribing practices and controlling antimicrobial agents, which includes pharmaceutical review, restriction policy, prospective audit and feedback, and monitoring antibiotic usage and consumption.

Corresponding author:
Khadija Yahya Ayiash,

QR code

Please cite this article in press Khadija Yahya Ayiash et al, ***Antibiotic Stewardship And Pharmacist And Nursing Role****., Indo Am. J. P. Sci, 2022; 09(8).*

INTRODUCTION:

Infections caused by multidrug-resistant bacteria result in 23,000 and 25,000 deaths annually in the United States and Europe, respectively, posing a significant danger to global public health [1]. In this setting, antimicrobial stewardship (AMS) programs were developed, and their adoption has been linked to reductions in antibiotic consumption, costs, and bacterial resistance [2]. The foundation of AMS programs is interdisciplinary actions including all health providers. In the U.S. and the U.K., where pharmacists are generally active in AMS programs, the influence of pharmacists' actions in these programs is well documented [3]. The efforts of pharmacists in AMS teams have been linked globally to a decrease in antibiotic consumption, associated costs, and death [4,5]. In these nations, the majority of pharmacists participating in AMS programs are clinical pharmacists with specific infectious disease (ID) training, and this training has been associated with a reduction in antibiotic consumption [6]. In France, ID physicians lead AMS programs; however, French pharmacists are heavily involved in AMS programs and consider themselves responsible for overseeing good prescribing practices and managing antimicrobial agents, including pharmaceutical review, restriction policy, prospective audit and feedback, and antibiotic use and consumption monitoring [7].

Antibiotic resistance is a worldwide concern that is rising. According to the Center for Disease Dynamics, Economics & Policy and the Centers for Disease Control and Prevention (CDC), the use of antibiotics is the single most significant factor in the development of resistance. The diversity and incidence of antibiotic-resistant bacteria have increased globally due in part to increased antibiotic usage in humans and animals, boosted by increased worldwide trade and human migration [8].

It is predicted that antibiotic-resistant illnesses account for up to $55 billion in annual excess health care expenses due to direct health care costs and lost productivity due to hospitalizations and sick days. Approximately 50 percent of hospitalized patients receive at least one antibiotic, of which 50 percent are unneeded or inappropriate [9]. In a retrospective examination of 505 nonfederal acute care hospitals, 78% of hospitals were found to have evidence of possibly inappropriate and duplicate antibiotic use, representing >$12 million in potentially avoided health care expenses [10]. >60% of antibiotic expenditures occur in the outpatient sector, and 58% of all antibiotic prescriptions in this scenario are for respiratory infections with a predominant viral etiology [11]. The concept of antibiotic stewardship arose in the late 1990s to reduce antibiotic abuse, mostly through teaching and convincing doctors to adhere to evidence-based prescribing recommendations [12].

Antibiotic stewardship (AS) OR Antimicrobial stewardship (AMS) refers to a collection of coordinated, interprofessional, focused strategies to optimize antibiotic use by ensuring that every patient receives an antibiotic only when it is clinically indicated and then receives the appropriate antibiotic at the appropriate dose, duration, and route of administration. The objective is to maximize clinical efficacy while limiting toxicity, side effects, and the formation of antibiotic-resistant bacterial strains. There is accumulating evidence that antibiotic stewardship programs reduce needless drug exposure, limit the establishment of antibiotic resistance, and result in substantial cost savings for institutions [13,14].

DISCUSSION:

Antibiotic resistance is a global hazard to public health, and national and international efforts have highlighted the need to decrease antimicrobial resistance. In 2014, the Centers for Disease Control and Prevention (CDC) urged hospitals to implement antibiotic stewardship programs, described as coordinated efforts to optimize antibiotic use based on evidence [15]. In 2016, world leaders promised to battle the spread of resistance at the 71st United Nations General Assembly, and since 2017, the Joint Commission has mandated that hospitals undertake antibiotic stewardship programs [16,17]. However, the primary focus of stewardship program implementation has been on prescribers and pharmacists. Multisite research found that just 38% of inpatient clinical nurses were familiar with the term "antibiotic stewardship" [18]; nurses have been mostly missing from stewardship activities.

Recent editorials [19] have argued for the official involvement of nurses in antimicrobial stewardship initiatives. This is owing to nurses' extensive participation in activities directly related to antibiotic use and the idea that a lack of engagement with nurses hinders the effectiveness of antibiotic stewardship programs. Antibiotic stewardship can encompass a variety of initiatives led by nurses (eg, effective assessments, antibiotic de-escalation, and timely culturing practices). However, nurses' viewpoints on the specific stewardship activities that should be

focused are limited, as are techniques for engaging nurses in stewardship programs.
In July 2016, the Centers for Disease Control and Prevention (CDC) and the American Nurses Association (ANA) cosponsored a full-day conference in Silver Spring, Maryland, where thirty nurses from across the United States discussed strategies to promote nurse-driven antibiotic stewardship and to identify specific nurse-driven antibiotic stewardship activities. In the white paper jointly released by the CDC and the ANA [21], a report of the conference and the working group's actions are given.

These knowledge gaps are likely linked to pre-licensure and post-licensure educational disparities at the system level. Antibiotic resistance and antibiotic stewardship education are not included in the basic curriculum of bachelor nursing education [22]. State-specific criteria for post-licensure continuing education differ, and courses on antibiotic resistance and antibiotic stewardship have not been specified [23]. In the absence of such obligatory education, nurses' receipt of antibiotic or antibiotic stewardship-related education is dependant on the knowledge and interest of faculty curriculum committees within each nursing program or the individual nurse's interests. Consequentially, participants advised that nurses get continuous education to satisfy existing knowledge demands, a recommendation consistent with studies showing that knowledge is better kept when it is reviewed or practiced [24,25]. In addition to formal education, the necessity for readily accessible educational tools (e.g., practice guidelines and algorithms) that nurses can consult at the point of care was emphasized. Together, our findings imply that additional education on antibiotic stewardship is necessary pre- and post-nurse licensure, and that action-oriented, evidence-based materials should be developed and offered to nurses in their work situations. However, we are unaware of any publicly accessible training materials intended to educate hospital-based nurses in the United States about their roles and responsibilities in antibiotic stewardship. There is a need for antibiotic stewardship training materials based on evidence and centered on the nurse [26].

The majority of nurses were in support of taking a significant role in antibiotic stewardship. Despite their little experience to antibiotic stewardship, nurses immediately understood their role in optimizing antibiotic usage and viewed stewardship responsibilities as an extension of their patient advocate position. Participants did not consider their contributions to antimicrobial stewardship as more work, but rather as a chance to improve and contribute value to the work they already undertake [27].

Education is an important component of AS programs for both patients and doctors. Nurses play a significant role in health care education and are therefore valuable resources for AS. However, nurses must be supported in their duty as educators. Before nurses can effectively engage, nurse leaders and interdisciplinary partners must coordinate and provide resources for the education of nursing staff specifically to assist AS. When strong administrative support is generated throughout an organization, change is most effective. Staff nurses would be empowered to educate patients and engage with clinicians about antibiotic resistance, acceptable indications for antibiotic usage, and potential adverse effects if they received education and support. It is crucial that nursing engage with pharmacy, laboratory, and infection preventionists to study fundamental microbiology, basic medication classifications (wide versus narrow range action), and their impact on antibiotic resistance. In addition, the orientation of new nurses must be evaluated and changed to incorporate AS concepts. It will be necessary to update discharge instruction materials to include AS principles, and bedside nurses will need to be trained to communicate these concepts to patients during the discharge process. For example, if a patient is being released on an antibiotic, systematic instruction should be implemented [28].

By empowering nurses, nursing educators have a unique potential to contribute to the success of AS. Educators can give AS-specific instruction and collaborate with other AS leaders to create, test, and report on nursing-AS activities. In addition, additional research is required to investigate the influence of nurse involvement in AS on patient outcomes. There is limited published information about the role of nurses in AS and no research studies published about the effect of the nursing role in AS [29]. Previous research [30] addressed specific recommendations for practice, education, research, and policy regarding the role of nurses in AS. Numerous of these suggestions have not yet been adopted. For instance, nurses at all levels and in all clinical settings provide and receive education on AS, collaborate with interdisciplinary teams, raise awareness, and employ evidence-based strategies such as antibiotic time outs and national awareness campaigns supported by the CDC or the National Health Service [31]. According to previous research, nurses are currently performing a variety of therapies for AS, but their efforts are not well understood or incorporated into practice. During the admission process (medication reconciliation, allergy

history, antibiotic initiation), throughout the hospital stay (reconciling culture results, dose de-escalation, adverse events), and upon discharge (patient education, outpatient management), it is recommended that nurses provide support for AS [32]. While it is acknowledged that bedside nurses are not antibiotic prescribers, there remains a collaborative role with AS comparable to a number of other quality and safety programs, such as reducing healthcare-associated infections or pain management. Few papers addressing nursing AS indicate that nurses play a vital role in AS, many nurses presently execute AS activities, and more education is required for nurses and the multidisciplinary team to interact effectively and completely implement AS in acute care settings [33,34].

The viewpoints of nurses and the active participation of nurses and the nursing profession are essential for the optimal implementation of antimicrobial stewardship programs in all contexts of care. Approximately 2,8 million registered nurses are the largest part of the health care workforce in the United States [35]. Employed across the continuum of health care, nurses are at the core of patient care. Bedside nurses, for instance, are primarily responsible for giving and monitoring antibiotic therapy and are therefore perfectly positioned, together with other members of the patient care team, to evaluate antibiotic use daily.

According to a recent article published in Clinical Infectious Diseases, "nurses are antibiotic first responders, central communicators, care coordinators, as well as 24-hour monitors of patient status, safety, and antibiotic medication response" [36]. In addition, there are more than 205,000 licensed nurse practitioners in the United States, the vast majority of whom have independent prescribing authority. 21 Notably, nurse practitioners are increasingly prescribing antibiotics in primary care and other settings, placing them in a favorable position to address antibiotic resistance by prescribing appropriate medications and educating patients. Collectively, nurses contribute a unique viewpoint to the task of teaching patients, family members, and the general public about the proper use of antibiotics [37].

CONCLUSION:

Worldwide hospitals, pharmacists are routinely integrated into AMS programs despite the absence of clear standards specifying their function. Although universities commonly offer multidisciplinary training courses in infectious diseases or hospital hygiene, specific training for French pharmacists in ID and antibiotic use has not yet been devised, nor is there a corresponding university diploma. In light of current findings, standardisation and development of pharmacist training appears to be a promising strategy for limiting antibiotic consumption and reducing antibiotic resistance.

The majority of nurses were in support of taking a significant role in antibiotic stewardship. Despite their little experience to antibiotic stewardship, nurses immediately understood their role in optimizing antibiotic usage and viewed stewardship responsibilities as an extension of their patient advocate position. While a lack of time and increased workload are frequently cited as barriers to the integration of evidence into practice, participants did not appear to view their contributions to antibiotic stewardship as additional work, but rather as an opportunity to improve and add value to the work they already perform.

REFERENCES:

1. America S for HE of, America IDS of, Society PID. Policy Statement on Antimicrobial Stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS), Infect Control Hosp Epidemiol, 33 (2012), pp. 322-327.
2. S. Karanika, S. Paudel, C. Grigoras, A. Kalbasi, E. Mylonakis. Systematic review and meta-analysis of clinical and economic outcomes from the implementation of hospital-based antimicrobial stewardship programs. Antimicrob Agents Chemother, 60 (2016), pp. 4840-4852.
3. B. Wagner, G.A. Filice, D. Drekonja, N. Greer, R. MacDonald, I. Rutks, *et al.* Antimicrobial stewardship programs in inpatient hospital settings: a systematic review Infect Control Hosp Epidemiol, 35 (2014), pp. 1209-1228.
4. B. Amadeo, C. Dumartin, P. Parneix, A. Fourrier -Réglat, A.-M. Rogues. Relationship between antibiotic consumption and antibiotic policy: an adjusted analysis in the French healthcare system, J Antimicrob Chemother, 66 (2011), pp. 434-442.
5. K.L. Buising, K.A. Thursky, M.B. Robertson, J. F. Black, A.C. Street, M.J. Richards, *et al.* Electronic antibiotic stewardship—reduced consumption of broad-spectrum antibiotics using a computerized antimicrobial approval system in a hospital settingJ Antimicrob Chemother, 62 (2008), pp. 608-616.

6. T.F. Barlam, S.E. Cosgrove, L.M. Abbo, C. Mac Dougall, A.N. Schuetz, E.J. Septimus, *et al.*Implementing an antibiotic stewardship program: guidelines by the infectious diseases society of America and the Society for Healthcare Epidemiology of America Clin Infect Dis, 62 (2016), pp. e51-e77.
7. Anon. Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. Guidance and guidelines. NICE. Available at: https://www.nice.org.uk/guidance/ng15?unlid=3488529072015112920111817937824201617153221.
8. A.F. Chou, C.J. Graber, M. Jones, Y. Zhang, M. B. Goetz, K. Madaras-Kelly, *et al.* Characteristics of antimicrobial stewardship programs at veterans affairs hospitals: results of a nationwide survey. Infect Control Hosp Epidemiol, 37 (2016), pp. 647-654
9. A.J. Brink, A.P. Messina, C. Feldman, G.A. Rich ards, P.J. Becker, D.A. Goff, *et al.* Antimicrobial stewardship across 47 South African hospitals: an implementation study. Lancet Infect Dis, 16 (2016), pp. 1017-1025
10. CDC, Antibiotic resistance threats in the United States, 2013, (2012). Available at: https://www.cdc.gov/drugresistance/threat-report-2013/index.html
11. WHO, Global action plan on antimicrobial resistance. World Health Organization, Geneva (2015). Available at: http://www.who.int/antimicrobial-resistance/publications/global-action-plan/en/
12. Tamma PD, Holmes A, Ashley AD. Antimicrobial stewardship: another focus for patient safety? Curr Opin Infect Dis 2014;27:348-55.
13. Dellit TH, Owens RC, McGowan JE, Gerding DN, Weinstein RA, Burke JP, et al. Infectious Disease Society of America and the Society for Healthcare Epidemiology of America guideline for developing an institutional program to enhance antimicrobial stewardship. Clin Infect Dis 2007;44:159-77.
14. Drekonja DM, Filice GA, Greer N, Olson A, MacDonald R, Rutks I, et al. Antimicrobial stewardship in outpatient settings: a systematic review. Infect Control Hosp Epidemiol 2015;36:142-52.
15. Fridkin S, Baggs J, Fagan R, Magill S, Pollack LA, Malpiedi P, et al. Vital signs: improving antibiotic use among hospitalized patients.*MMWR Morb Mortal Wkly Rep* 2014;63:194–200.
16. Society for Healthcare Epidemiology of America, Infectious Diseases Society of America, Pediatric Infectious Diseases Society. Policy statement on antimicrobial stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS). *Infect Control Hosp Epidemiol* 2012;33:322–7.
17. The Joint Commission. *Approved: New Antimicrobial Stewardship Standard*; 2016.
18. Greendyke WCE, Salsgiver E, Calfee D, Saiman L, Furuya Y. Clinical Nurses are Active Partners in Antimicrobial Stewardship Efforts: Results from a Multisite Survey *IDWeek*; 2016; San Diego.
19. Olans RN, Olans RD, DeMaria A Jr. The critical role of the staff nurse in antimicrobial stewardship–unrecognized, but already there. *Clin Infect Dis* 2016;62:84–9.
20. Manning ML, Giannuzzi D. Keeping patients safe: antibiotic resistance and the role of nurse executives in antibiotic stewardship. *J Nurs Adm* 2015;45:67–9.
21. ANA & CDC. Redefining the Antibiotic Stewardship Team: Recommendations from the American Nurses Association/Centers for Disease Control and Prevention Workgroup on the Role of Registered Nurses in Hospital Antibiotic Stewardship Practices. Silver Springs, MD: American Nurses Association; 2017.
22. American Association of Colleges of Nursing. The Essentials of Baccalaureate Educaction for Profesional Nursing Practice Washington, DC: American Association of Colleges of Nursing; 2008.
23. American Nurses Association. *States Which Require Continuing Education for RN Licensure*: American Nurses Association; 2013.
24. Custers EJ. Long-term retention of basic science knowledge: a review study. *Adv Health Sci Educ Theory Pract* 2010;15:109–28.
25. 17. Custers EJ, Ten Cate OT. Very long-term retention of basic science knowledge in doctors after graduation. *Med Educ* 2011;45:422–30.
26. Krein SL, Kowalski CP, Harrod M, Forman J, Saint S. Barriers to reducing urinary catheter use: a qualitative assessment of a statewide initiative. *JAMA Intern Med* 2013;173:881–6.
27. McKee G, Kerins M, Hamilton G, Hansen T, Hendriks J, Kletsiou E, et al. Barriers to ESC guideline implementation: results of a survey from the European Council on Cardiovascular Nursing and Allied Professions (CCNAP). *Eur J Cardiovasc Nurs* 2017;16:678–86.

28. Al-Orifi F, McGillivray D, Tange S, Kramer MS. Urine culture from bag specimens in young children: are the risks too high? *J Pediatr* 2000;137:221–6.
29. Mertz D, Koller M, Haller P, Lampert ML, Plagge H, Hug B, et al. Outcomes of early switching from intravenous to oral antibiotics on medical wards. *J Antimicrob Chemother* 2009;64:188–99.
30. Waagsbo B, Sundoy A, Paulsen EQ. Reduction of unnecessary i.v. antibiotic days using general criteria for antibiotic switch. *Scand J Infect Dis* 2008;40:468–73.
31. Moskow JM, Cook N, Champion-Lippmann C, Amofah SA, Garcia AS. Identifying opportunities in EHR to improve the quality of antibiotic allergy data. *J Am Med Inform Assoc* 2016;23:e108–12.
32. Carter EJ, Pallin DJ, Mandel L, Sinnette C, Schuur JD. A qualitative study of factors facilitating clinical nurse engagement in emergency department catheter-associated urinary tract infection prevention. *J Nurs Adm* 2016;46:495–500.
33. Broom A, Broom J, Kirby E, Scambler G. Nurses as antibiotic brokers: institutionalized praxis in the hospital. *Qual Health Res* 2017;27:1924–35.
34. The White House Briefing Room. Fact sheet: over 150 animal and health stakeholders join white house efforts to combat antibiotic resistance. 2015. Available from: https://www.whitehouse.gov/the-press-office/2015/06/02/ fact-sheet-over-150-animal-and-health-stakeholders-join-white-house-effo. Accessed January 5, 2016.
35. House Appropriations Committee. H.R. 2029, the Consolidated Appropriations Act, 2016, Joint Explanatory Statement, Division H, Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2016. 2016. Available from: http://1.usa.gov/1I93mds. Accessed January 5, 2016.
36. Grijalva CG, Nuorti JP, Griffin MR. Antibiotic prescription rates for acute respiratory tract infections in US ambulatory settings. J Am Med Assoc 2009;302:758-66.
37. Suda KJ, Hicks LA, Roberts RM, Hunkler RJ, Danziger LH. A national evaluation of antibiotic expenditures by healthcare setting in the United States 2009. J Antimicrob Chemother 2013;68:715-8.