

Role of the Pharmacist in Antimicrobial Stewardship: A Commitment to Leadership

In recent years, bacterial resistance to antimicrobials has become a serious public health threat at the global level, driven by the misuse of antimicrobials in clinical practice in humans and in animals. On one hand the prevalence of resistant bacteria has risen; on the other hand, the occurrence of multidrug-resistant organisms (bacteria resistant to multiple classes of antibiotics), has been linked to increased morbidity and mortality, and to increased cost of care. In 2014, a report by the Wellcome Trust in the UK projected that in 2050, 10 million human deaths would occur globally from infection with resistant bacteria, if no action is taken to curb down this threat. The growing awareness of the issue has prompted institutions and researchers to find ways to combat bacterial resistance. Efficient application of Antimicrobial Stewardship, coupled to proper Infection Control and Prevention practices, has been shown to decrease the incidence of colonization with resistant bacteria¹.

What is “Antimicrobial Stewardship”?

An Antimicrobial Stewardship (AMS) program is a program aimed at halting the increase in resistant bacteria, while ensuring the best clinical outcome to the patient at the same time. AMS requires a collaborative approach². In hospital settings, the AMS program is managed by a group of multidisciplinary experts. In a community where a sizeable proportion of antibiotics is dispensed, the institution of AMS programs is important. A community AMS program depends primarily on (1) efficient communication between the community pharmacist and the clinical practitioners, and (2) the implementation of national regulations for the dispensing of antimicrobials in the community.

What are the strategies followed by any AMS program?

The aim of AMS programs is to improve the prescription of antimicrobials: they optimize the patient’s clinical outcome, while minimizing the side effects of the antibiotic therapy, at the level of the short-term toxicity, and of the long-term collateral damage (such as selection of resistant pathogens and emergence of resistance). In 2016, the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America provided guidance for implementing AMS programs³. In 2017, the CDC defined the core elements for successful AMS programs in the setting of (1) acute care hospitals, (2) long term care institutions, and (3) outpatient settings⁴⁻⁶. Prominent among those elements is a continuous tracking of resistance patterns, with subsequent reporting to the prescribers. In any given setting, the AMS program would provide the prescribers with education and expert advice about the best practices in the antibiotic management. The strategy of AMS in a hospital setting is hence (1) to regularly audit the use of antimicrobials, (2) to devise policies of antimicrobial use pertinent to the situation observed in that hospital, and (3) to always aim at minimizing the misuse of those antibiotics. Examples of strategies used by AMS programs in the literature are many: “Carbapenem-sparing policy” to decrease the incidence of carbapenem-resistant organisms; “Antibiotic Cycling” to decrease pressure on specific antibiotic classes; “Restriction of Glycopeptides” to decrease the incidence of *Clostridium difficile* infection; “Surgical prophylaxis protocols” to provide best

practices in the matter. “De-escalation” is a strategy led by the hospital pharmacist applying the treatment guidelines approved by the AMS program, to decrease abuse of antibiotics⁷.

Is the pharmacist role in AMS important?

It is evident that the pharmacist’s role is crucial to AMS, since, as per the CDC, “Drug Expertise” is an essential core element to any AMS program. Their role is a dynamic interaction with the clinical situation. Knowledge provided by the pharmacist relates to drug indications, drug toxicities, drug-drug interactions, optimum antimicrobial molecules usage, optimal route of administration and duration.

What is the role of the hospital pharmacist in AMS?

In the hospital, the pharmacist contributes to the elaboration of guidelines in treatment protocols. They monitor the antibiotic use and provide educational feedback to the prescribers about the best practices. There is evidence in the literature⁸ that antibiotic consumption in a hospital is lower when the hospital pharmacist reviews all antibiotic prescriptions, hospital-wide. The impact of antimicrobial stewardship led by hospital pharmacists has been described in the literature in many countries. In a retrospective observational study in China, the implementation of AMS led to decreasing resistance to Fluoroquinolones. The contribution of the clinical pharmacists to the AMS program has led to improved rational use of the antibiotics⁹. In Japan, the outcome of patients with methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia was studied prospectively. Their results suggest that the mortality from MRSA bacteremia is decreased if an appropriate bundle of care is applied within an AMS program with a clinical pharmacist intervention¹⁰.

What is the role of the community pharmacist in AMS?

Many antibiotic regimens are dispensed in the outpatient settings. When ill-informed, these contribute to the spread of bacterial resistance. Despite the need for them, AMS programs in the community setting are not yet widely available. The implementation of AMS in the community health system is extremely challenging for multiple reasons. In 2019, a study in Australia looked at the perceptions and practices of community pharmacists with regard to AMS. The authors identified some of the barriers to the implementation of community AMS in this study, like availability of treatment guidelines, availability of training, and like the actual interaction with the prescribers¹¹. In the outpatient setting, communication between the community pharmacist and the primary prescriber would be at the heart of AMS application. Together, community pharmacist and prescriber, would define the best practices based on locally approved treatment guidelines, in accordance with the national antibiotics use policies, as tailored to individual patients. The community pharmacist would provide education to both prescriber and patients.

The role of the pharmacist is therefore vital in the promotion of Antimicrobial Stewardship in any healthcare setting.

References:

1. Baur D, Gladstone BP, Burkert F, et al. Effect of antibiotic stewardship on the incidence of infection and colonisation with antibiotic-resistant bacteria and *Clostridium difficile* infection: a systematic review and meta-analysis. *Lancet Infect Dis.* 2017; 17(9):990-1001.
2. Cunha CB. Antimicrobial stewardship programs: Principles and practice. *Med Clin N Am.* 2018; 102:797-803.
3. Barlam TF, Cosgrove SE, et al. Implementing an antibiotic stewardship program: Guidelines by the Infectious Disease Society of America and the Society for Healthcare Epidemiology of America. *CID* 2016;62(10):e51-e77.
4. Center for Disease Control and prevention. Core elements of hospital antibiotic stewardship programs. Available at <http://www.cdc.gov/antibiotic-use/core-elements/hospital.html>. Accessed July 20, 2021.
5. Center for Disease Control and Prevention. Core elements of antibiotic stewardship programs for nursing homes. Available at <http://www.cdc.gov/antibiotic-use/core-elements/nursing-homes.html>. Accessed on July 20,2021.
6. Center for Disease Control and prevention. Core elements of out-patient antibiotic stewardship. Available at <http://www.cdc.gov/core-elements/outpatient.html>. Accessed on July 20,2021.
7. Septimus EJ. Antimicrobial resistance-An antimicrobial/diagnostic stewardship and infection prevention approach. *Med Clin N Am.* 2018; 102:819-829.
8. Ourghanlian C, Lapidus N, Antignac M, Fernandez C, Dumartin C, Hindlet P. Pharmacist's role in antimicrobial stewardship and relationship with antibiotic consumption in hospitals: an observational multicenter study. *Journal of global antimicrobial resistance* 2020;20:131-134.
9. Wang H, et al. Impact of antimicrobial stewardship managed by clinical pharmacists on antibiotic use and drug resistance in a Chinese hospital, 2010-2016: a retrospective observational study. *BMJ Open* 2019;9:e026072. Doi:10.1136.
10. Ohashi K, et al. Evaluation of treatment outcome of patients with MRSA bacteremia following antimicrobial stewardship programs with pharmacist intervention. *Int J Clin Pract.* 2018;72:e13065.
11. Saha S, Barton C, Promite S and Mazza D. Knowledge, perceptions and practices of community pharmacists towards antimicrobial stewardship: a systematic scoping review. *Antibiotics.* 2019;8:263.