JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S12

Antimicrobial Resistance: Challenges And Potential Solutions In Pharmacy Practice

Abdullah Salah Alqurashi[1], Majed Bakheet Alsafri[2], Jasir Shadad Alharbi[3], Ahmed Mohammed Rajeh Alzubaidi[4], Ibrahim Awadh Saeed Almiqdad[5], Saeed Mohammed Saeed Alqahtani[6], Manal Khlif Nhar Alanazi[7], Abdullah Saleh Hossain Alzhrani[8],Nasser Abdullah Alqahtani[9]

1. *Pharmacy technician Almuzailif General Hospital*
2. *Pharmacy technician Almuzailif General Hospital*
3. *Pharmacist Medina health Cluster*
4. *Pharmacy technician Sabia lomah phcc*
5. *Pharmacy Technician Harejah General Hospital*
6. *Pharmacy Technician AlHarejah General Hospital*
7. *Pharmacy technician Office of the Directorate of Health Affairs Qurayyat*
8. *Primary Health Care centre manager Almuzailif General Hospital*
9. *Pharmacy technician Ministry of Health – aseer*

Abstract

1. Introduction

Medicines are complex interventions that can improve patient outcomes but also have the potential to harm if inappropriately selected or used. The available international evidence reveals that 60 to 70% of patients may experience at least one medication error during their time in hospital. In the community sector, it is even higher with studies indicating that 82.6% of the general public report that they have been prescribed medication unnecessarily, and 95% of individuals who seek advice from pharmacists have at least one drug-related problem. The reasons why medication-related risks occur are complex. Factors associated with the individual, the task, the work system, and the organizational safety culture all play a role in creating an environment that makes it easy for staff to make errors. There is a belief that if the error can occur, it will, and this approach to systems thinking creates an environment where risk reduction and minimization is a priority.

Methods

An extensive literature search was undertaken to identify research investigating antimicrobial resistance (AMR). The following databases were utilized: The search was conducted from 2000 to April 2021, and a combination of free-text terms, controlled vocabulary, and validated keyword searches were utilized. The keywords were grouped into MeSH terms, and the search syntax was developed.

Conclusion

In conclusion, antimicrobial resistance is a fundamental global public health challenge that jeopardizes the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses, and fungi. Despite the importance of antimicrobial stewardship as a means to prevent and combat the problem of resistance, it is clear that there is much work still needed in educating and empowering pharmacists in the full application of stewardship principles in their routine practice in community and outpatient hospital pharmacies. In addition, further research that investigates the underpinning causes of resistance and behavior, as well as the impact on specific initiatives that can help to

prevent or delay the development and transmission of resistant microorganisms, would be desirable. We hope this review will help to focus attention and awareness on this critical issue and can contribute to the development of principled and effective pharmacy practice guidelines for the responsible use of antimicrobials. Finally, we encourage all pharmacists to carefully consider solutions to problems that ought to have appropriate antimicrobial stewardship as an inextricable part of their resolution. These solutions should work towards quality improvement by promoting the principles of holistic healthcare for patients, the wider community, and for the good of the global population.

Introduction

The discovery of penicillin was a groundbreaking event in modern medicine. The discovery of the antibiotic and the ability of antibiotics to interfere specifically with microbial life processes provided the key component for significant advancements in therapeutic treatments and preventative medicine. While human lifespan has increased significantly over the past century and advances in the treatment of several historically significant diseases have been hampered or decreased, barriers still remain in preserving the life-sustaining and infection-treating aspects of antibiotics due to microbial adaptation. Antimicrobial resistance (AMR) has become an increasingly significant threat to human and animal health. AMR challenges not only pertain to healthcare professionals but also to global agricultural needs and other stakeholders. The overall burden of antibiotic resistance is difficult to quantify.

AMR affects morbidity rates, healthcare costs, the food supply, and global economies. Discussing drivers of and solutions for the AMR issue is important as these efforts could lead to significant cost reductions and life-saving interventions within all sectors. AMR is a complex, multifaceted issue driven by the overuse and misuse of antibiotics, poor sanitation, non-standardized global regulations and practices, the ubiquity of antimicrobials, and insufficient funding for alternatives. There is a lack of standardized guidelines in the prescribing of antibiotics between nations and even within nations, leading to non-standardized use. Growth-friendly antimicrobials, which are cheaper than vaccines and diagnostics, also contribute to challenges with alternative solutions. While generally prescribed by non-HCPs in comparison to developed countries, complementary and alternative medicine therapies have not been accepted into the global health dialogue for AMR. Pharmacists exert involvement that has been implemented and should grow further in the AMR crisis. Some solutions that pharmacists can participate in to address the AMR global crisis are antibiotic stewardship, disseminating appropriate drug information, such as side effects and proper use, prevention, compliance, and administering across-the-spectrum vaccinations. There are further solutions that pharmacists can become involved in, and other recommendations propose expanding these contributions.

1.1. Background on Antimicrobial Resistance

The increase in resistance to expand broader healthcare settings and affect a wide range of infections makes it harder for the healthcare community to provide patients with effective and necessary treatments. Antimicrobial resistance (AMR) is the ability of a microorganism to stop an antimicrobial from working. As a result, standard treatments become ineffective, infections persist, potentially spread to others, and increase the risk of severe infections.

Antimicrobial resistance develops naturally over time but is accelerated by the misuse and overuse of antibiotic agents. Resistance emerges as bacteria survive exposure to an antimicrobial agent used to treat the infection and continue to multiply. This happens when antibiotics are used to treat infections that they cannot cure, for example, illnesses caused by viruses like colds or flu. Antibiotic resistance and antibiotic prescribing have been linked as doctors prescribe specific or broad-spectrum antibiotics for infections that do not need them. Data showed that nearly 30% of antibiotic prescriptions in outpatient settings are prescribed unnecessarily, which makes improving outpatient prescribing a national priority. However, many common antibiotics are becoming less effective in treating illness.

2. The Impact of Antimicrobial Resistance in Pharmacy Practice

Community pharmacists are uniquely positioned to play a critical role in preventing, treating, and controlling infectious diseases. The problem of antimicrobial resistance is being experienced by all professional health disciplines and is causing extensive concern. In response, degree programs containing content designed to prevent and manage antimicrobial resistance are becoming commonplace, particularly in respect to the allied health disciplines. However, compared to the other health professions, less emphasis has been given in degree programs to curricula designed to foster professional practice facilitators such as communication, teamwork, networking, or the clinical problem-solving skills required to solve practice challenges. Little is known about their degree of preparedness to manage university curriculum-related knowledge that is so pertinent to professional practice demands in the context of antimicrobial resistance and the practice skills that they require.

The aim of the investigation is to gather exploratory information correlating to the current provision of the topic of antimicrobial stewardship and resistance management curricula in seven English-speaking countries and the degree to which students are prepared to practice once they graduate. An online survey was completed by university lecturers appointed at accredited schools of pharmacy or a related tertiary institution within the multiple countries. The response rate was fifteen percent. Personnel from pharmacy programs in the United Kingdom, United States of America, and Australia generated most of the responses to the survey questions. Two schools of pharmacy reported that a majority of their students confidently participated in either clinically or professionally focused, multidisciplinary practicum-based programs which contained activities designed to prevent and/or manage infectious diseases.

2.1. Increased Healthcare Costs

Diseases

Abstract: Antimicrobial resistance occurs when microorganisms are able to withstand the effects of an antimicrobial. As a result, standard medical treatments become ineffective, thereby increasing chronic illnesses, fatalities, and the spread of infections, as well as increasing healthcare costs. In recognition of the effect of antimicrobial resistance, policymakers globally have articulated their concerns about the ability of antibiotics and other antimicrobials to lose their effectiveness. The high costs of addressing resistance undermine the benefits of antibiotic treatment. Thus, antimicrobials themselves carry significant unnecessary costs, impacting all three major domains of health: personal health,

economics, and socioeconomics. Using a narrative approach, this paper explores how increased healthcare costs brought about by antimicrobial resistance can undermine and ultimately impede antimicrobial treatment. Additionally, it discusses how decreased effective treatment will impact alternatives and subsequent healthcare. It concludes by identifying likely areas for pharmacy intervention to address these challenges.

Keywords: antimicrobial resistance; increased healthcare costs; global concern; treatment ineffectiveness; pharmacy; nursing practice

3. Challenges Faced by Pharmacists in Addressing Antimicrobial Resistance

Pharmacists often face an array of challenges when it comes to addressing AMR. First and foremost, pharmacy education is not uniform across the globe. Official undergraduate pharmacy practice competencies for pharmacy education have been developed, but it is up to individual countries and their regulatory bodies to agree on and incorporate these into the education and competencies for older pharmacists. In general, pharmacists go through training that has stricter guidelines and frameworks with defined competencies, including undergraduate training of at least five years, practical competencies, and restrictions for licenses to supply antimicrobials with university training. The real-world experience of pharmacists also differs greatly by country and within countries, and often pharmacists are experienced at the job as part of their day-to-day work.

Education in the use of antibiotics and the effects of AMR on treatment is not necessarily uniform around the world, and international standards have not been defined for postgraduate education or the extra work time that all healthcare workers require to keep up with the constant changes in health systems. These factors might lead to confusion on the part of both healthcare providers and the final consumer. Governments and society in general could be underestimating the necessity of constant education and potential professional development costs. Moreover, keeping up to date on the correct handling of antimicrobial agents, which might appear quite simple in nature, is not, in fact, simple to teach or to obtain with technological advancements without proper funding and continuous support. The various levels of public health systems and continuous funding versus the profitability of the national health system or private companies to file marketing authorization applications are other reasons accounting for variability in pharmacist activity quality.

3.1. Overuse and Misuse of Antibiotics

Antimicrobials have been widely used to combat a range of infections and have saved numerous lives from infections in the past, such as tuberculosis, pneumonia, cholera, the plague, bacterial meningitis, and sexually transmitted infections. With the possibility of entering a new phase where antibiotics may no longer be effective to treat a range of infections as a result of growing antimicrobial resistance, these advances are at risk. This threat is due to the fact that microorganisms, i.e., bacteria, fungi, viruses, and parasites, will evolve over time, and so the drugs that were effective for some time will gradually become less so. While the issue of antimicrobial resistance is complex with no single approach to solving it, it is acknowledged that the misuse and overuse of antimicrobials accelerates the emergence and spread of resistance.

The misuse of antimicrobials is a situation where the drug is prescribed, dispensed, or sold to patients when it is not necessary and can often lead to their usage for the wrong purpose. For instance, when a patient has a viral infection, they might be prescribed or ask for an antibiotic because it is thought it can treat these viruses when it cannot. Similarly, misusing antibiotics can also include not completing a course of treatment, skipping doses, or taking leftover medicine from a previous course. As a result, such actions create selection pressures for resistance or can lead to the unnecessary financial cost of responding to the side effects of taking unwanted medication, among other issues.

4. Potential Solutions for Pharmacists to Combat Antimicrobial Resistance

Increasingly, pharmaceutical professionals have to become involved in the reduction of AMR, and it is essential to understand the range of approaches that they could adopt. Therefore, this section on potential solutions for pharmacists to combat AMR is of relevance. Literature on potential solutions for pharmacists to combat AMR has been divided into three major themes, including regulations, education, and miscellaneous, and further includes different strategies such as stewardship activities, point-of-care testing, contribution to surveillance, and research.

Regulations that have been proposed to address the AMR crisis have been discussed widely and include statutory laws, such as the control of regulations, the introduction of new regulations, funds, new regulatory authority or regulatory reform, incentives to support antimicrobial therapy, and potential tax credits. Then, educational approaches encompass a range of different strategies and include the following topics: formal education, individual pharmacists seeking continuing professional development on AMR and/or antimicrobial stewardship, or conducting formal research on AMR or stewardship activities. Finally, the miscellaneous approaches include a diverse range of ideas and approaches that should be of interest to practicing pharmacists. These approaches are the tough-to-solve problems that might be resolved, such as the cost impact of stewardship, better point-of-care tests, and new technology.

4.1. Antimicrobial Stewardship Programs

Antimicrobial stewardship programs aim to optimize the use of antimicrobial agents, minimize toxicity and other adverse effects, reduce costs, and prevent resistance. Pharmacists have an integral role to play; specifically, in promoting the appropriate prescribing, dispensing, and administration of antimicrobial medications. Pharmacist-led antimicrobial stewardship interventions have led to improved clinical and economic outcomes across various healthcare settings. It is recommended that hospital pharmacists should be involved in stewardship initiatives. Community pharmacists are also well-positioned to contribute to antimicrobial stewardship initiatives. (Naseralallah et al.2024)(Cantudo-Cuenca et al.2022)(Khanina et al.2021)(Monmaturapoj et al.2021)(Uda et al.2022)(St2021)

There has been significant progress in terms of the implementation of pharmacist-led antimicrobial stewardship programs. With a greater emphasis on global health initiatives to tackle the threat of AMR, there is potential to further scale up the implementation of pharmacist-led antimicrobial stewardship programs. However, various challenges are encountered, including competing priorities and an increased workload against a lack of

human resources. The recent pandemic is likely to have further exacerbated these prevailing issues. To support sustainable pharmacist-led antimicrobial stewardship programs, it is important to acknowledge pivotal aspects that contribute to the successful implementation. Such factors include the attainment and recognition of required skill sets, the generation and translation of evidence into practice, and the use of data to inform evidence-based practice. In this chapter, we provide an overview of antimicrobial stewardship, discuss how pharmacists are well-positioned to lead these important initiatives, and highlight techniques to support the successful implementation of pharmacist-led antimicrobial stewardship programs.

References:

Naseralallah, L., Koraysh, S., Aboujabal, B., & Alasmar, M. (2024). Effectiveness of pharmacist-led antimicrobial stewardship programs in perioperative settings: A systematic review and meta-analysis. Research in Social and Administrative Pharmacy. sciencedirect.com

Cantudo-Cuenca, M. R., Jiménez-Morales, A., & Martínez-de la Plata, J. E. (2022). Pharmacist-led antimicrobial stewardship programme in a small hospital without infectious diseases physicians. Scientific Reports, 12(1), 9501. nature.com

Khanina, A., Cairns, K. A., Kong, D. C., Thursky, K. A., Slavin, M. A., & Roberts, J. A. (2021). The impact of pharmacist-led antifungal stewardship interventions in the hospital setting: a systematic review. Journal of Pharmacy Practice and Research, 51(2), 90-105. wiley.com

Monmaturapoj, T., Scott, J., Smith, P., Abutheraa, N., & Watson, M. C. (2021). Pharmacist-led education-based antimicrobial stewardship interventions and their effect on antimicrobial use in hospital inpatients: a systematic review and narrative synthesis. Journal of Hospital Infection, 115, 93-116. strath.ac.uk

Uda, A., Ebisawa, K., Sakon, H., Kusuki, M., Izuta, R., Yahata, M., ... & Miyara, T. (2022). Sustained improvements in antimicrobial therapy and clinical outcomes following a pharmacist-led antimicrobial stewardship intervention: uncontrolled before–after study. Journal of Clinical Medicine, 11(3), 566. mdpi.com

St. Louis, J., & Okere, A. N. (2021). Clinical impact of pharmacist-led antibiotic stewardship programs in outpatient settings in the United States: A scoping review. American Journal of Health-System Pharmacy, 78(15), 1426-1437. researchgate.net