

Implementing antimicrobial stewardship in South Africa – how well prepared are pharmacists for their role?

Y Khan,¹ L Kritiotis,¹ R Coetzee,² J McCartney,² S Boschmans³

¹ Nelson Mandela University, South Africa

² University of the Western Cape, South Africa

³ Pharmacy Education Consultant

This review is based on the presentation which won Yasmine Khan the Best Poster Award at the SAAHIP Conference 2019.

The abstract of that presentation is appended below.

Introduction

Antimicrobial resistance is a global health crisis that diminishes the therapeutic benefit of antimicrobial agents in the treatment of infections.^{1,2,3} Since antimicrobial resistance decreases the response of infecting microorganisms to antimicrobial therapy, resistant infections are associated with longer durations of hospital stay and higher mortality rates when compared with antimicrobial-sensitive infections.^{1,3,4}

The rising threat of antimicrobial resistance has emphasised the importance of ensuring appropriate antimicrobial prescribing, through antimicrobial stewardship (AMS) initiatives.^{1,5} The practice of AMS involves implementation of co-ordinated strategies which aim to improve the judicious use of antimicrobial agents. Optimisation of antimicrobial prescribing has the following potential healthcare benefits: minimisation of the progression of antimicrobial resistance, improvement in patient



Yasmine Khan

therapeutic outcomes, minimisation of adverse effects experienced by patients, and reductions in healthcare costs.^{3,6,7,8,9,10}

Antimicrobial stewardship in South Africa

The increase in the number of drug-resistant infections in South African hospitals led to the formation of the South African Antibiotic Stewardship Programme (SAASP), in order to strengthen AMS interventions in the country.^{4,11} With the support of SAASP and the World Health Organization, the South African National Department of Health developed a series of policy documents and guidelines, which provide recommendations for the containment of antimicrobial resistance and implementation of AMS (as depicted in Figure 1).^{9,12,13,14,15,16}

The policy recommendations from the South African National Department of Health identify appropriate antimicrobial use as one of the five key strategic objectives for the containment of antimicrobial resistance in South Africa.^{14,16} The institutionalisation of AMS forms one of the sub-objectives that are necessary to ensure appropriate antimicrobial use.^{14,16} The structure of institutional AMS should include both a multidisciplinary AMS committee to perform AMS leadership functions; as well as a multidisciplinary AMS team that is responsible for actively overseeing the appropriateness of antimicrobial prescribing at a patient level.^{14,16}

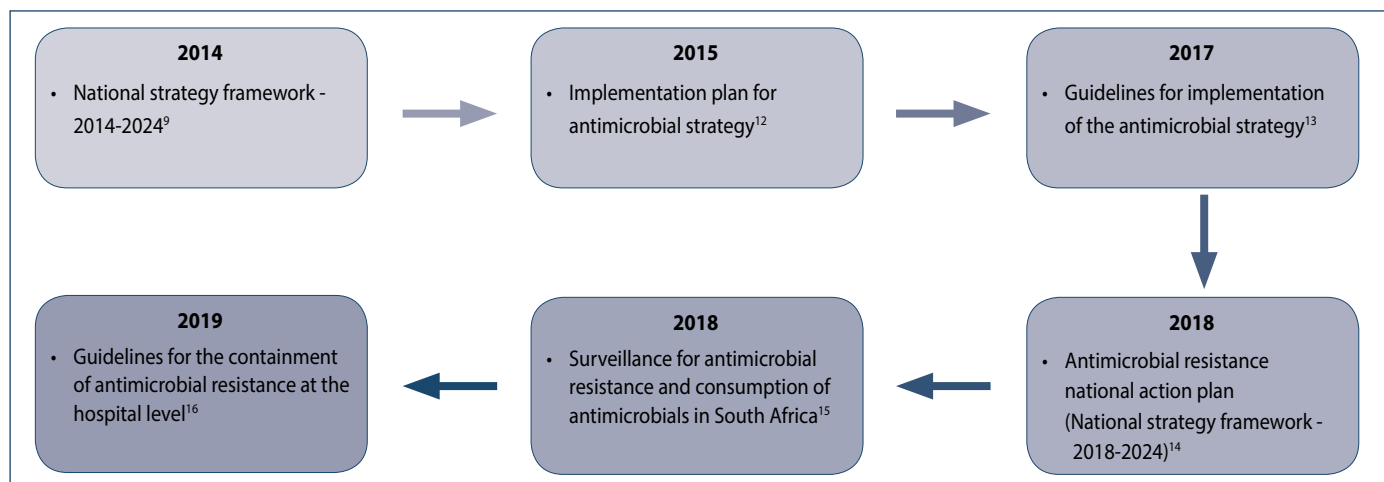


Figure 1: Development of South African National Policy Documents for the Containment of Antimicrobial Resistance in South Africa

Role of the pharmacist in antimicrobial stewardship

Internationally, pharmacists working within the hospital environment (both generalist and clinical pharmacists) contribute to the implementation of AMS.⁸ Clinical pharmacists in the United States, with specialised training in infectious diseases, serve as leaders on AMS teams, providing expertise on the optimal use of antimicrobial agents.¹⁷ Similarly in the United Kingdom, clinical pharmacists with infectious disease training, serve as AMS specialists in the hospital setting.¹⁸ The functions of pharmacist leaders on AMS teams include: the provision of clinical recommendations and feedback to prescribers; development of antimicrobial prescribing guidelines and contribution to formulary decisions.¹⁸

In addition to the leadership roles that clinical pharmacists play in AMS internationally, generalist pharmacists, working within the hospital setting, have recognised roles and responsibilities in AMS.^{8,17} The United States Centers for Disease Control and Prevention describe numerous pharmacist-initiated interventions at the patient level, such as implementing IV-to-oral switches, performing dose adjustments, conducting and interpreting therapeutic drug monitoring, alerting prescribers about spectrum duplications, performing stop-orders when antimicrobial duration is prolonged, and detecting antimicrobial drug interactions.¹⁷

In South Africa, the National Strategy Framework emphasises the importance of multidisciplinary collaboration for effective implementation of AMS.¹⁴ At the national level, the role of the pharmacist in AMS has been recognised and developed, together with the conceptualisation and implementation of AMS as a practice.

The pharmacist was identified as part of the ideal core of AMS teams within healthcare institutions, along with the prescribing physician.^{1,14} Pharmacists have the potential to contribute to institutional AMS structures, both as members of AMS committees and as active core members of AMS teams.^{16,19}

The chief pharmacist on hospital AMS committees would be involved in committee discussions regarding: surveillance of antimicrobial consumption, antimicrobial resistance patterns, compliance with AMS programme interventions, multidisciplinary and interdepartmental communication, and in-service AMS training requirements.¹⁶ Additionally, pharmacists with clinical training and experience, can serve as leaders or members of AMS teams.¹⁶ Stewardship pharmacists, who serve as active members on AMS teams, are crucial role players in the development, implementation and monitoring of AMS programmes.¹⁹

Implementation of AMS strategies cannot be limited to the members of the AMS team, but must also include pharmacists who are based in the dispensary. At the dispensary level, pharmacists can monitor the appropriateness of antimicrobial prescribing when interpreting prescriptions.¹⁹ Furthermore, dispensary-based pharmacists are well positioned to implement prospective-audit and feedback interventions at the point of dispensing, where inappropriate antimicrobial prescribing is detected.¹⁹

Thus, the roles and responsibilities of all members of the AMS team have been set out in the National Strategy Framework.¹⁶ A position statement was also released by the South African Society of Clinical Pharmacy (SASOCP) on the role of the pharmacist in AMS.¹⁹ Yet, from the perspective of the actively practising AMS team members, there is still a lack of published research that explores the role of the South African pharmacist in AMS.

Antimicrobial stewardship and pharmacy education in South Africa

So, how well does undergraduate pharmacy education prepare pharmacists for AMS? A qualitative study investigated the perceptions of pharmacists in Qatar regarding the preparedness of pharmacists for AMS following Pharm.D training.²⁰ The findings of the study indicated that the extent of AMS tuition and opportunity for application of AMS concepts during pharmacy training, was perceived to be inadequate in preparing pharmacists for AMS in practice.²⁰

No South African studies, which investigate the perceived preparedness of pharmacists following undergraduate training, have been published. However, a South African study investigated the AMS knowledge and attitudes of final-year pharmacy students, and reported that the majority of participating students recognised the importance of AMS programmes for the containment of antimicrobial resistance.²¹ Despite the recognised importance of AMS training, the extent of tuition on AMS within undergraduate programmes was found to be low and varied significantly between schools of pharmacy in South Africa.²¹ Furthermore, half of the participating students rated their AMS knowledge as "average", and 11.9% as "poor".²¹ A survey conducted in the United States of America revealed similar findings, with 89% of participating graduating pharmacy students desiring more undergraduate AMS training.²²

Education of pharmacists and other healthcare professionals in AMS is a recommended strategy for effective containment of antimicrobial resistance nationally and internationally.^{5,13,14,16,20} Considering the global burden of antimicrobial resistance, it is imperative that undergraduate pharmacy education provides the required knowledge and skills for future pharmacists to become active antimicrobial stewards.¹⁹

Internationally, the importance of integrating AMS training within the undergraduate pharmacy degree programme has been emphasised.^{5,20,23} Studies in the United States of America have investigated the development, implementation and evaluation of undergraduate pharmacy elective courses on AMS.^{7,24} Furthermore, the American College of Clinical Pharmacy recommended inclusion of AMS as a competency within the recommended pharmacotherapy didactic curriculum toolkit (2016).²⁵ However, there has been no consensus guideline providing specific content and/or tools for integration of AMS within undergraduate pharmacy curricula in the United States.²⁶

Similarly, AMS training is not mandated for inclusion in the undergraduate pharmacy curricula in South Africa. Thus, the capacity for pharmacists to serve as active members on AMS teams is based primarily on clinical experience gained within the working environment, or post-graduate training.¹⁸ The level of AMS

knowledge and skills of newly qualified pharmacists is, therefore, largely determined by the extent of AMS training incorporated by the respective schools of pharmacy, and is not standardised.

The South African National Department of Health has recognised the potential for undergraduate education to facilitate implementation of AMS and has advocated for the development of core curricula for undergraduate AMS training.^{12,14} An investigation has been undertaken to develop an undergraduate curriculum for the training of pharmacy students in South Africa.^{27,28} However, to date, no guideline has been published regarding the required core AMS content that should be presented in undergraduate pharmacy and other health science degrees in South Africa.

Recommendations

Nationally and internationally, pharmacists are recognised as key role-players in the implementation and monitoring of AMS.^{1,8,9,14,16,19} In order to ensure that all qualifying pharmacists possess the required knowledge and skill set to implement AMS, undergraduate training of pharmacists should include core curriculum content on AMS.^{13,14}

Although the National Strategy Framework has recognised the pharmacist as a key AMS role-player and identified recommended roles and responsibilities for pharmacists in AMS; there is a lack of published literature focusing specifically on the perceptions of the multidisciplinary AMS team members regarding the role of the pharmacist in AMS. Since effective implementation of AMS requires collaboration between the multidisciplinary team members, it would be meaningful to investigate the perceptions of practising AMS team members in South Africa, regarding the extent to which pharmacists are currently contributing to AMS, and whether pharmacists in practice possess the required knowledge and skills for implementation of AMS subsequent to undergraduate pharmacy training.

References

- Mendelson M. Role of antibiotic stewardship in extending the age of modern medicine. *S Afr Med J*. 2015;105(5):414-419
- Roca I, Akova M, Baquero F, et al. The global threat of antimicrobial resistance: science for intervention. *New Microbes New Infect*. 2015;16(6):22-29
- Spelberg B, Blaser M, Guidos R, et al. Combatting antimicrobial resistance: policy recommendations to save lives. *Clin Infect Dis*. 2011;52(5):397-428
- Goff D, Kullar R, Goldstein E, et al. A global call from five countries to collaborate in antibiotic stewardship: united we succeed, divided we might fail. *Lancet Infect Dis*. 2016;17(2):1-8
- World Health Organization. Global strategy for containment of antimicrobial resistance. http://www.who.int/drugresistance/WHO_Global_Strategy.htm/en/ (Accessed 28/06/2019)
- Duguid M, Cruickshank M. Antimicrobial stewardship in Australian hospitals. Australian Commission on Safety and Quality in Health Care. <https://www.safetyandquality.gov.au/sites/default/files/migrated/AMSAH-Book-WEB-COMLETE.pdf> (Accessed 28/06/2019)
- Gauthier T, Sherman E, Unger N. Instructional design and assessment: an elective course on antimicrobial stewardship. *Am J Pharm Ed*. 2015;79(10), 1-7
- McDougall C, Polk R. Antimicrobial stewardship programmes in healthcare systems. *Clin Microbiol Rev*. 2005;18(4):638-656
- South African National Department of Health. Antimicrobial resistance national strategy framework 2014-2024. Pretoria: Government Printer. <https://www.health-e.org.za/wp-content/uploads/2015/09/Antimicrobial-Resistance-National-Strategy-Framework-2014-2024.pdf> (Accessed 28/06/2019)
- Fui Sing D, Liang Boo Y, Mukhlis R, Woon Chin P, Kee Hoo F. Antimicrobial stewardship in a Malaysian district hospital: first year experience. *Pak J Med Sci*. 2015;32(4):1-6
- Mendelson M, Matsoso P. The South African antimicrobial resistance strategy framework. *AMR control*. 2015. http://resistancecontrol.info/wp-content/uploads/2017/07/08_Mendelson-Matsoso.pdf (Accessed 28/06/2019)
- South African National Department of Health. 2015. Implementation plan for the antimicrobial resistance strategy framework in South Africa: 2014-2019. Pretoria: Department of Health. <file:///C:/Users/User/Downloads/ndoh%20amr%20implementation%20plan%202014-2019.pdf> (Accessed 28/06/2019)
- South African National Department of Health. 2017. Guidelines on implementation of the antimicrobial strategy in South Africa: One health approach & governance. Pretoria: Ministerial Advisory Committee on Antimicrobial Resistance. <http://nahf.co.za/guidelines-on-the-implementation-of-the-antimicrobial-strategy-in-south-africa-2017-07-14/>. (Accessed 28/06/2019)
- South African National Department of Health. 2018. South African antimicrobial resistance national strategy framework; a one-health approach 2018-2024. Pretoria: Government Printer. <http://www.health.gov.za/index.php/component/phocadownload/category/199-antimicrobial-resistance>. (Accessed 28/06/2019)
- South African National Department of Health. 2018. Surveillance for antimicrobial resistance and consumption of antibiotics in South Africa. Pretoria: Government Printer. [file:///C:/Users/User/Downloads/surveillance%20for%20antimicrobial%20resistance%20and%20consumption%20of%20antibiotics%20in%20south%20africa%20\(1\).pdf](file:///C:/Users/User/Downloads/surveillance%20for%20antimicrobial%20resistance%20and%20consumption%20of%20antibiotics%20in%20south%20africa%20(1).pdf) (Accessed 28/06/2019)
- South African National Department of Health. 2019. Guidelines for the prevention and containment of antimicrobial resistance in South African Hospitals. Pretoria: Government Printer. file:///C:/Users/User/Downloads/south%20africa%20-%20guideline%20on%20at%20hospital%20level_april2019_compressed.pdf (Accessed 28/06/2019)
- Pollack LA, Srinivasan A. Core elements of the hospital antibiotic stewardship programs from the Centres for Disease Control and Prevention. *Clin Infect Dis*. 2014; 59(3):97-100
- Snedden J, Gilchrist M, Wickens H. Development of an expert professional curriculum for antimicrobial pharmacists in the UK. *J Antimicrob Chemother*. 2015; 70(5):1277-1280
- Schellack N, Bronkhorst E, Coetzee R, et al. SASOCP position statement on the pharmacist's role in antibiotic stewardship. *S Afr J Infect Dis*. 2018;33(1):28-35
- Nasr ZG, Higazy A, Wilbur K. Exploring the gaps between education and pharmacy practice on antimicrobial stewardship: a qualitative study among pharmacists in Qatar. *Adv Med Educ Prac*. 2019; 2019(10):287-295
- Burger M, Fourie J, Loots D, et al. Knowledge and perceptions of antimicrobial stewardship concepts among final year pharmacy students in pharmacy schools across South Africa. *S Afr J Infect Dis*. 2016; 31(3):84-90
- Justo J, Gauthier T, Scheetz M, et al. Knowledge and attitudes of Doctor of Pharmacy students regarding the appropriate use of antimicrobials. *Clin Infect Dis*. 2014; 59(3):162-169
- Pulcini G, Guysen I. How to educate prescribers in antimicrobial stewardship practices. *Virulence*. 2013; 4(2):192-202
- Falcione B, Meyer S. Instructional design and assessment development of an antimicrobial stewardship-based infectious disease elective that incorporates human patient simulation technology. *Am J Pharm Ed*. 2014; 78(8):1-8
- Schwinghammer TL, Crannage AJ, Boyce EG, et al. The 206 ACCP pharmacotherapy didactic curriculum toolkit. *Pharmacotherapy*. 2016; 36(11):189-194
- Gallagher JC, Justo J, Chahine EB, Bookstaver PB, Scheetz M, Suda KJ, Fehrenbacher L, Klinker KP, McDougall C. Preventing the post-antibiotic era by training future pharmacists as antimicrobial stewards. *Am J Pharm Ed*. 2018; 82(6):627-634
- Khan Y, Boschmans S-A, McCartney J, Coetzee R. Undergraduate antimicrobial stewardship training for pharmacy students: Creating a foundation for containment of antimicrobial resistance in South Africa. *S Afr Med J*. 2017; 107(9):722
- Khan Y, Boschmans S-A, McCartney J, Coetzee R, Kritiitis-Germanis L. A proposed baseline South African antimicrobial stewardship curriculum for the Bachelor of Pharmacy programme. 2018; unpublished master's dissertation. Nelson Mandela University, Port Elizabeth

Poster abstract: Does the Bachelor of Pharmacy degree equip pharmacy graduates for antimicrobial stewardship? Perceptions of antimicrobial stewardship team members

Introduction:

Pharmacists are recognised as part of the nucleus of antimicrobial stewardship (AMS) teams, yet the degree of AMS training in undergraduate pharmacy programmes varies between pharmacy schools in South Africa. Improving undergraduate pharmacy AMS training requires an understanding of the perceived role of pharmacists in AMS.

Objectives:

This investigation explored perceptions of healthcare professionals regarding the perceived role of pharmacists in AMS; whether pharmacists are perceived to have adequate knowledge and skills to contribute to AMS; and how AMS training could be improved at the undergraduate pharmacy level. Additionally, similarities and differences in perceptions between various health disciplines were explored.

Methods:

Qualitative semi-structured interviews were conducted with twelve AMS experts, belonging to various health disciplines (pharmacists,

infectious disease specialists, infection prevention and control specialists and clinical microbiologists). Purposive sampling was utilised to select participants for interviewing. Audio recordings of the interviews were transcribed and analysed, using Atlas.ti®, for coding and thematic analysis.

Results:

All health disciplines identified pharmacists as critical role players in AMS. Perceptions vary regarding the specific role of the pharmacist in AMS. All participants expressed that the current knowledge and skill set possessed by newly qualified pharmacists required improvement. Enhancing AMS training at the undergraduate level was emphasised as essential to ensure that pharmacists are equipped with the required AMS knowledge and skill set.

Recommendations and conclusion:

Understanding the perceptions and recommendations of various health disciplines, regarding the role of the pharmacist in AMS; and the knowledge and skills required by pharmacists to effectively implement AMS in practice, should inform the tuition of AMS to undergraduate pharmacy students in South Africa.