

Why you should read this article

- To refresh your knowledge of antimicrobial resistance and antimicrobial stewardship
- To discover an antimicrobial stewardship competency framework for supporting nurse education and nursing practice
- To understand the needs of nurses in fulfilling their role in antimicrobial stewardship

Antimicrobial stewardship: a competency framework to support the role of nurses

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Abstract

Antimicrobial resistance is a global threat that has prompted a global response. One strategy used to tackle antimicrobial resistance is known as antimicrobial stewardship, its main goal being to optimise antibiotic use and avoid unnecessary antibiotic prescribing. There is an increase in the number of nurse prescribers as well as in the percentage of antibiotics dispensed in primary care prescribed by non-medical prescribers such as nurses. Nurses, both prescribers and non-prescribers, play an important role in antimicrobial stewardship, including during the COVID-19 pandemic. To be able to fulfil that role, nurses need the right knowledge, skills, resources and behaviours. This article explores the role of nurses in antimicrobial stewardship and describes a competency framework designed to underpin it.

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Keywords

antibiotic resistance, antibiotics, antimicrobial resistance, antimicrobials, clinical, medicines, nurse prescribing, prescribing, professional, professional issues, competence, competency framework

Key points

- *Antimicrobial stewardship can reduce unnecessary antibiotic use and slow the development of antimicrobial resistance*
- *Nurses, including nurse prescribers, perform numerous functions that are critical to optimal antimicrobial stewardship*
- *To avoid unnecessary antibiotic use, nurses can employ patient-centred self-management strategies*
- *COVID-19 has brought to light several areas in which nurses' competency in antimicrobial stewardship can support the response to antimicrobial resistance*

- *An antimicrobial stewardship competency framework has been developed to support nurse education and nursing practice*

Introduction

Antimicrobial resistance occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to antimicrobial medicines, which become ineffective, making infections increasingly difficult or impossible to treat (World Health Organization (WHO) 2020). Around 700,000 deaths each year are attributable to antimicrobial resistance (Review on Antimicrobial Resistance 2014), and in 2015 the WHO adopted a global action plan to tackle it (WHO 2015). The development of antimicrobial resistance is notably influenced by the frequency of antibiotic use (Holmes et al 2016).

One strategy for responding to antimicrobial resistance has become known as antimicrobial stewardship. There is evidence that global antimicrobial stewardship programmes can reduce unnecessary antibiotic use and therefore slow down the development of antimicrobial resistance (Levy Hara 2014, Manning et al 2016). Antimicrobial stewardship can be described as ‘a collection of coordinated interprofessional focused strategies to optimise antibiotic use by ensuring that every patient receives an antibiotic only when it is clinically indicated and then receives the appropriate antibiotic, at the right dose, duration and route of administration’ (Manning et al 2016).

This article explores the important role nurses play in antimicrobial stewardship – including during the COVID-19 pandemic – and describes a competency framework designed to underpin this role.

Nurses and antibiotic prescribing

Appropriately qualified nurses have been able to prescribe medicines as independent prescribers since 2001 and as supplementary prescribers since 2003. All nurses, on registration, are expected to have some knowledge of pharmacology and prescribing, notably demonstrating ‘the ability to progress to a prescribing qualification following registration’ (Nursing and Midwifery Council (NMC) 2018a). Nurses can undertake the independent/supplementary prescribing training programme after one year of professional experience as registered nurses (NMC 2018b). In the UK, the number of non-medical prescribers – who include mainly nurses but also pharmacists and to a lesser extent optometrists, physiotherapists, podiatrists/chiropractors, dieticians, paramedics and radiographers – has been rising (Courtenay et al 2017a) to meet the workforce needs of the NHS. NMC data show that there were 47,899 independent or supplementary nurse prescribers in the UK in March 2020, up from 34,265 in March 2016 (NMC 2020).

Between 2011 and 2015 the percentage of antibiotics dispensed in primary care that were prescribed by non-medical prescribers increased to nearly 8% (Courtenay et al 2017a). Nurse prescribers frequently manage patients with respiratory tract infections (RTIs), which are the most frequent acute health condition for which patients consult in primary care (National Institute for Health and Care Excellence (NICE) 2008). Most RTIs are viral and self-limiting – lasting between four days and three weeks – and only require analgesics and antipyretics (NICE 2008). However, it has been shown that over half of all patients who present with an RTI receive a prescription for an antibiotic (Gulliford et al 2014). Furthermore, a systematic review and meta-analysis found strong evidence that people who are prescribed an antibiotic for an RTI or a urinary tract infection in primary care develop bacterial resistance to that antibiotic, which not only increases the population-wide carriage of organisms resistant to first-line antibiotics, but also creates the conditions for increased use of second-line antibiotics in the community (Costelloe et al 2010).

In the 1990s, a randomised trial conducted to assess the medicalising effects of prescribing antibiotics for sore throat found that antibiotic prescribing increased re-attendance, thereby failing to encourage patients to adopt self-management strategies for a condition which is usually self-limiting (Little et al 1997). To avoid unnecessarily prescribing antibiotics to patients with RTIs, healthcare professionals can use patient-centred self-management strategies, whereby they listen to patients’ concerns, provide reassurance and advice, explain treatment decisions and discuss a management plan (Chater and Courtenay, 2019). Such communication skills that lead to self-management strategies have been shown to satisfy patients with their consultation, even when they were expecting an antibiotic prescription but did not receive one (Courtenay et al 2017b).

Nurses and antimicrobial stewardship

Nurses, both prescribers and non-prescribers, perform numerous functions that are critical to optimal antimicrobial stewardship. They are directly involved in patient- and medicine-related antimicrobial stewardship activities such as specimen collection and monitoring of culture results (WHO 2018). Nurse prescribers are also involved in antimicrobial prescribing. Furthermore, nurses are at the centre of, and facilitate, interprofessional collaborative practice, which is a requirement of optimal antimicrobial stewardship

(Courtenay et al 2018). Nurses are well placed to discuss, with colleagues and with patients and family carers, treatment decisions and management plans that promote the rational and appropriate use of antibiotics. Nurses, in particular practice nurses, are also well placed to increase the public's awareness of the risks of antimicrobial resistance that arise from unnecessary antibiotic prescribing.

Various UK policies have outlined the role and responsibilities of nurses in antimicrobial stewardship. In its antimicrobial resistance action plan, NHS Scotland recommended that all nurses – and all prescribers – ensure they have adequate knowledge of infection management and appropriate antimicrobial use (NHS Scotland 2014). NHS Scotland also set antimicrobial stewardship objectives for nurses and for prescribers, which are listed in Boxes 1 and 2 respectively.

Box 1. NHS Scotland: antimicrobial stewardship objectives for nurses

- » Support the multidisciplinary team to ensure that all use of antimicrobials is rational and appropriate, and follows local policy
- » Understand and support the appropriate taking of microbiological samples in patients with infection
- » Ensure the timely administration of antimicrobials by supporting the sepsis programme and bundle, and by following up on missed doses
- » Monitor the duration and route of antimicrobial treatment, including instigating prompt de-escalation from intravenous to oral therapy as part of care bundles for venous access devices
- » Monitor patients for allergies to drugs and side effects from them
- » Support the appropriate therapeutic drug monitoring of antimicrobials as per local policy
- » Engage with opportunities for education and training on antimicrobials and the management of infection
- » Support patients' and carers' understanding of antibiotic use

(Adapted from NHS Scotland 2014)

Box 2. NHS Scotland: antimicrobial stewardship objectives for prescribers

- » Ensure that all use of antimicrobials is rational and appropriate
- » Document, in the medical notes, the indication for prescribing an antimicrobial, the supporting rationale for the decision to prescribe and the intended duration of antimicrobial therapy
- » Follow local antimicrobial policy to ensure appropriate choice, route, dose and duration of antimicrobial therapy
- » Use the narrowest-spectrum agent possible
- » Comply with local policy to restrict the use of antimicrobials with a high risk of *Clostridium difficile* infection and of 'alert' antimicrobials
- » Seek specialist advice from microbiology, infectious diseases or pharmacy (as appropriate) if required and document the advice received in the medical notes
- » Ensure empirical antimicrobial prescriptions are reviewed within 48-72 hours and therapy is de-escalated where appropriate
- » Ensure the appropriate therapeutic drug monitoring of antimicrobials as per local policy
- » Identify and report adverse events or harm from antibiotics through the local risk management system and participate in significant adverse events analysis where appropriate
- » Participate in, and show evidence of engagement with, opportunities for education and training on antimicrobials and the management of infection
- » Engage with data collection and feedback activities for national and local prescribing indicators
- » Contribute to individual and organisational actions necessary to improve antimicrobial use, as highlighted by national and local surveillance and prescribing indicator data

(Adapted from NHS Scotland 2014)

Antimicrobial stewardship and COVID-19

The COVID-19 pandemic has brought to light several areas in which nurses' competency in antimicrobial stewardship can support the response to antimicrobial resistance (Courtenay et al 2020).

Antimicrobial stewardship requires that nurses are able to differentiate between symptoms of viral infection and symptoms of bacterial infection and question the use of antibiotics if symptoms are more consistent with viral infection or when microbiology test results are not indicative of a bacterial cause (Courtenay et al 2020). These actions will help to ensure that antimicrobial resistance does not increase as an unintended consequence of the unnecessary use of antibiotics during the COVID-19 pandemic.

Nurses are well placed to engage with the public and support people to understand how infection is transmitted (Courtenay and Castro-Sánchez 2020) and how important it is to ensure that antibiotics are used carefully. This role of informing the public has taken on even more importance in the context of the COVID-19 pandemic, since the amount of information on COVID-19, and the fact that there is new information emerging all the time, has made it challenging for the public to understand when, and whether, antibiotics are needed to treat the disease.

Antimicrobial stewardship requires nurses to engage in multidisciplinary collaboration (Courtenay and Castro-Sánchez 2020). However, the rapid emergence of COVID-19 has resulted in a reconfiguration of healthcare services and a dilution of team cohesion, and this may negatively affect team discussions and decisions around antimicrobial prescribing. It is important, during the pandemic,

that nurses remain active participants in antimicrobial stewardship policy decisions and continue to discuss antimicrobial treatment decisions and management plans with their colleagues and with patients and family carers.

Antimicrobial stewardship competency framework

The NMC's standards of proficiency for registered nurses state that nurses, at the point of registration, need to demonstrate the ability to 'protect health through understanding and applying the principles of infection prevention and control, including communicable disease surveillance and antimicrobial stewardship and resistance' (NMC 2018a). However, undergraduate nursing students receive 'disparate' education on antimicrobial stewardship, with only two thirds of programmes incorporating any teaching on the topic (Castro-Sánchez et al 2016). A survey of Scottish nurses and midwives found that only 22% had heard of the term 'antimicrobial stewardship' (McGregor et al 2015), while a survey of nursing students found that only 15% of them were aware of the term before attending a lecture on the topic (McEwen and Burnett 2018).

To address the gap in antimicrobial stewardship teaching in undergraduate nurse education, and to support healthcare professionals who are new to roles for which an understanding of antimicrobial stewardship is important, an antimicrobial stewardship competency framework has been developed (Courtenay et al 2019a). This framework, which has been endorsed by NICE (NICE 2020), can be used to support nurse education and nursing practice, ensuring that nurses, nursing associates and nursing students have the knowledge and skills they need to act against antimicrobial resistance.

The competency framework, which is shown in Table 1, comprises six domains:

- » Infection prevention and control.
- » Antimicrobials and antimicrobial resistance.
- » Diagnosis of infection and use of antimicrobials.
- » Antimicrobial prescribing practice.
- » Person-centred care.
- » Interprofessional collaborative practice.

Each domain is linked with an overall competency statement and 5-18 competency descriptors, which detail how nurses, nursing associates and nursing students can demonstrate competency in each domain (Courtenay et al 2019a). For example, to demonstrate competency in infection prevention and control, learners must be able to explain what an antimicrobial-resistant organism is (competency descriptor 3) and demonstrate an understanding of the importance of surveillance (competency descriptor 8).

Supporting behaviour change in nurses

Growing evidence supports the use of theoretical models to identify barriers and facilitators to changing the behaviours of healthcare professionals in relation to antibiotic prescribing (Arnold and Straus 2005, McCullough and Glasziou 2016). One such model is the Behaviour Change Wheel (Michie et al 2011), which describes three determinants of behaviour:

- » Capability – both physical capability (such as skills) and psychological capability (such as knowledge).
- » Opportunity – both social opportunity (norms of practice) and physical opportunity (time and/or space).
- » Motivation – both reflective motivation (influenced by beliefs such as confidence and intention) and automatic motivation (influenced by emotion or habit).

This is known as the COM-B model of behaviour change (Michie et al 2011, 2014), which can be applied to support nurses to adopt behaviours that promote antimicrobial stewardship. Research (Courtenay et al 2019b, Chater et al 2020) has shown that optimal antimicrobial stewardship requires capability (knowledge and skills), opportunity (practical and environmental resources) and motivation (positive beliefs), all interacting as part of a system. Employers, managers and educators need to ensure that, to optimise practice, nurses are equipped with the right knowledge and skills, social, practical and environmental resources, and positive beliefs. Box 3 contains recommendations for improving nursing practice in relation to antimicrobial stewardship based on the COM-B model of behaviour change.

Box 3. Recommendations for improving nursing practice in relation to antimicrobial stewardship based on the COM-B model of behaviour change

Capability: knowledge and skills

Ensuring that nurses know what constitutes optimal antimicrobial stewardship and why it is important, they know when to take action, and they have the skills required to take action. These skills include strong interpersonal communication skills which are needed, for example, to negotiate with patients who request an antibiotic when there is no clinical evidence that they need one.

Opportunity: social, practical and environmental resources

Ensuring that nurses work in an environment that is conducive to antimicrobial stewardship and they are provided with the necessary physical and social resources. These resources include a supportive culture, sufficient time allocated to consultations, and access to appropriate screening or testing facilities.

Motivation: positive beliefs

Ensuring that nurses want to engage in antimicrobial stewardship. Motivation includes a belief in positive outcomes that is stronger than barriers such as habit, hectic schedules and emotional decision-making resulting from pressure from patients. It also includes the confidence to make and stick to a decision not to prescribe an antibiotic when there is no clinical evidence that the patient needs one.

(Adapted from Chater and Courtenay 2019, Courtenay et al 2019b, Chater et al 2020)

Conclusion

Nurses have an important role to play in the global response to antimicrobial resistance, and the COVID-19 pandemic has brought to light several areas in which nurses' competency in antimicrobial stewardship can support that response. Nurses are directly involved in patient- and medicine-related antimicrobial stewardship activities including, for nurse prescribers, antibiotic prescribing. A competency framework has been developed to support nurses, nursing associates and nursing students in fulfilling their role in antimicrobial stewardship. To assist nurses in adopting behaviours that promote antimicrobial stewardship, employers, managers and educators need to ensure that nurses are equipped with the right knowledge and skills as well as social, practical and environmental resources, and have positive beliefs.

FURTHER RESOURCES

NICE guidance on antimicrobial stewardship

www.nice.org.uk/guidance/health-protection/communicable-diseases/antimicrobial-stewardship

Antimicrobial prescribing guidance for managing common infections

www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/antimicrobial-prescribing-guidelines

PrescQipp antimicrobial stewardship hub

www.prescqipp.info/our-resources/webkits/antimicrobial-stewardship/

UK's 20-year vision for antimicrobial resistance

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/773065/uk-20-year-vision-for-antimicrobial-resistance.pdf

UK's national antimicrobial resistance action plan 2019-24

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/784894/UK_AMR_5_year_national_action_plan.pdf

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Table 1. Antimicrobial stewardship (AMS) competency framework for nursing practice

Domains and competency statements	Competency descriptors
<p>Domain 1: Infection prevention and control</p> <p>All qualified healthcare professionals must understand the core knowledge underpinning infection prevention and control, and use this knowledge appropriately to prevent the spread of infection</p>	<p>To support AMS and demonstrate infection prevention and control, learners must be able to:</p> <ol style="list-style-type: none"> 1. Describe what a microorganism is 2. Describe the different type of organisms that may cause infections 3. Explain what an antimicrobial-resistant organism is 4. Explain the 'chain of infection' 5. Define the components required for infection transmission, including the presence of an organism, route of transmission of the organism from one person to another, and a host who is susceptible to infection 6. Describe the routes of transmission of infectious organisms, such as contact, droplet and airborne routes 7. Present and recognise the characteristics of a susceptible host 8. Demonstrate an understanding of the importance of surveillance 9. Describe how vaccines can prevent infections in susceptible persons 10. Demonstrate the application of standard precautions in healthcare environments 11. Apply appropriate policies, procedures and guidelines when collecting and handling specimens 12. Apply policies, procedures and guidelines relevant to infection control when presented with infection prevention and control cases and situations 13. Implement work practices that reduce the risk of infection, such as receiving appropriate immunisation or not coming to work when unwell to protect patients and healthcare staff 14. Appreciate that healthcare staff have the accountability and obligation to follow infection prevention and control protocols as part of their contract of employment 15. Act as a role model to healthcare staff and members of the public by adhering to infection prevention and control principles 16. Demonstrate knowledge and awareness of national and international strategies on infection prevention and control and antimicrobial resistance such as the Global Action Plan on Antimicrobial Resistance (World Health Organization 2015) and national recommendations, guidelines and legal requirements 17. Understand the role of the environment in optimal infection prevention and control practices, including hand hygiene and environmental cleaning 18. Enable infection prevention and control self-care for patients and their families
<p>Domain 2: Antimicrobials and antimicrobial resistance</p> <p>All qualified healthcare professionals are required to understand the core knowledge underpinning the concept of antimicrobial resistance and use this knowledge to assist in the prevention of antimicrobial resistance</p>	<p>To support AMS, learners must be able to:</p> <ol style="list-style-type: none"> 1. Recognise the signs and symptoms of infection 2. Discuss how inappropriate antimicrobial use, including non-adherence to treatment regimens, may lead to antimicrobial resistance 3. Identify approaches to support optimal prescribing of antimicrobials 4. Recognise the importance of adequate specimen collection during relevant stages of antimicrobial use, including before and during antibiotic treatment 5. Describe how to recognise the appropriate response to antimicrobial treatment and the main signs that demonstrate antimicrobial failures
<p>Domain 3: Diagnosis of infection and the use of antimicrobials</p> <p>All qualified healthcare professionals are required to demonstrate knowledge of how infections are diagnosed and the appropriate use of antimicrobials, and use this knowledge appropriately to support the accurate diagnosis of infection and the appropriate use of antimicrobials</p>	<p>To support AMS, learners must be able to:</p> <ol style="list-style-type: none"> 1. Explain how microbiology samples may aid diagnosis of infection 2. Describe how and demonstrate (following local procedures) the appropriate taking of samples 3. Interpret microbiology results and reports from the laboratory at a basic level 4. Explain why self-limiting bacterial or viral infections are unlikely to benefit from antimicrobials 5. Describe and demonstrate the self-management strategies – for example analgesic medicines, rest and fluids – required to treat self-limiting infections 6. Understand the importance of following local antimicrobial policies – for example, that their development is based on local resistance patterns – and follow these policies in practice 7. Explain the importance of documenting the indications for an antimicrobial – including the route by which it is administered, its duration, dose, dose interval, and review date – in clinical notes, and demonstrate this in practice 8. Demonstrate an understanding of the factors that must be considered when choosing an antimicrobial, including site of infection and type of bacteria likely to cause an infection at a particular site 9. Describe broad-spectrum and narrow-spectrum antimicrobials and the contribution of broad-spectrum antimicrobials to antimicrobial resistance 10. Present and be able to recognise the common side effects associated with commonly administered antimicrobials 11. Demonstrate an understanding of why documenting a patient allergy to an antimicrobial is important

	<ol style="list-style-type: none"> 12. Explain why it is important to consider certain physiological conditions (such as renal function) in patients who receive an antimicrobial 13. Describe what is meant by delayed prescribing 14. Explain why it is essential that an accurate diagnosis of an allergy to an antimicrobial is based on history and laboratory tests 15. Demonstrate an understanding of the role of the nurse regarding quality and safety of antibiotic prescriptions 16. Demonstrate an awareness of laboratory culture and sensitivity results that demand prompt intervention 17. Recognise antimicrobials that should be preserved for treatment of specific infections, for example carbapenemase-producing Enterobacteriaceae or colistin-resistant pathogens
<p>Domain 4: Antimicrobial prescribing practice</p> <p>All qualified healthcare professionals must be aware of how antimicrobials are used in practice in terms of their dose, timing, duration and appropriate route of administration, and apply this knowledge as part of their routine practice</p>	<p>To support AMS, learners must be able to:</p> <ol style="list-style-type: none"> 1. Explain how to recognise and manage sepsis 2. Describe why it is important to use local guidelines to initiate prompt effective antimicrobial treatment in patients with life-threatening infections 3. Describe why it is important to switch from intravenous antimicrobials to oral therapy 4. Describe how to switch from intravenous antimicrobials to oral therapy 5. Understand the appropriateness of antimicrobial administration models such as outpatient parenteral antimicrobial therapy 6. Demonstrate an understanding of the rationale and use of perioperative prophylactic antimicrobials to prevent surgical site infection 7. Discuss factors that can influence antimicrobial prescribing and the implications for antimicrobial stewardship programmes 8. Describe the national guidance on completion of a course of antimicrobials 9. Explain how to identify the medicines with which antimicrobials can interact and why this is important 10. Describe the difference between empiric, targeted and prophylactic antimicrobial therapy
<p>Domain 5: Person-centred care</p> <p>All qualified healthcare professionals must seek out, integrate and value the input and engagement of the patient/carer as a partner in designing and implementing care</p>	<p>To support AMS that is person centred, learners must be able to:</p> <ol style="list-style-type: none"> 1. Support participation of patients and carers, as integral partners when planning and delivering their care 2. Share information with patients and carers in a respectful manner and in such a way that is understandable, encourages discussion, and enhances participation in decision-making 3. Ensure that appropriate education and support is provided by learners to patients and carers, and others involved with their care or service 4. Listen respectfully to the expressed needs of all parties in shaping and delivering care or services 5. Discuss patient and carer expectations or demands of antimicrobials and the need to use antimicrobials appropriately 6. Recognise patient social-economic restrictions (or other conditions of vulnerability) that may limit the appropriate course of antimicrobials, and support patients and their families for social protection achievement 7. Recognise patients and families who require support to complete a course of antimicrobial therapy
<p>Domain 6: Interprofessional collaborative practice</p> <p>All qualified healthcare professionals are required to understand how different professions collaborate in relation to how they contribute to AMS</p>	<p>To support AMS, learners must be able to:</p> <ol style="list-style-type: none"> 1. Demonstrate an understanding of the roles, responsibilities and competencies of other healthcare professionals involved in antimicrobial treatment policy decisions 2. Explain why it is important that healthcare professionals, involved in the delivery of antimicrobial therapy (including prescription, delivery and supply), have a common understanding of antimicrobial treatment policy decisions, the quantity of antimicrobial use, and effective patient/client outcomes 3. Establish collaborative communication principles and actively listen to other professionals, patients and carers involved in the delivery of antimicrobial therapy 4. Communicate effectively to ensure common understanding of care decisions 5. Develop trusting relationships with patients and carers, as well as other health and social care professionals 6. Effectively use information and communication technology to improve interprofessional person-centred care
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