

REVIEW

Nurses' perceptions of their role in antimicrobial stewardship within the hospital environment. An integrative literature review

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Abstract

Background: Antimicrobial stewardship (AMS) has traditionally been the domain of doctors and pharmacists but there is a growing recognition that successful stewardship incorporates a multidisciplinary approach that includes nursing staff. This literature review explores nurses' perceptions of their role in antimicrobial stewardship within the hospital environment and provides new insights to inform future practice.

Methodology: An integrative literature review was undertaken. Five academic databases were searched, which identified six relevant studies. Whittemore and Knaf's method for conducting an integrative review was followed. ENTREQ guidelines have been adhered to.

Findings: Two themes were identified: nurses' working in partnership with other professionals and engagement in education.

Discussion: Antimicrobial stewardship illustrates the role of the nurse within the wider multidisciplinary team regarding wider patient safety issues and the need for education to enhance this role.

Relevance to clinical practice: Nurses have a clear role to play in antimicrobial stewardship but need to be fully cognisant of the issues involved. Further clarity on how nurses should enact this role in their complex working environments is required. It is essential that both student and qualified nurses are able to speak up in order to maximise patient safety, fulfil their professional duty and promote the overall effectiveness of AMS if they witness poor antibiotic management practices.

KEYWORDS

antimicrobial resistance, antimicrobial stewardship, nurse, nurse education, nurse role, perception, raising concerns, speaking up

1 | INTRODUCTION

The World Health Organisation (WHO) defines antimicrobial resistance (AMR) as 'the resistance of bacterial, viral, parasitic and fungal microorganisms to antimicrobial medicines that were previously effective for treatment of infections' (WHO, 2017). AMR is a naturally

occurring phenomenon, but it is widely recognised that the overuse and misuse of antimicrobials has accelerated this process (Jones-Berry, 2018; Olans et al., 2016). It is estimated that 30%–50% of antibiotics are prescribed inappropriately (Abbo et al., 2012) and that annually 700,000 people die globally from infections caused by multiresistant organisms (organisms that have developed resistance

ENTREQ guidelines have been adhered to.

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to the drugs that have been previously used to fight them (NICE, 2017)). This figure is forecast to rise to 10 million globally by 2050 (WHO, 2019). The problem of AMR is compounded by the absence of further antibiotics development since the 1980s (Olans et al., 2016). AMR is now recognised by WHO, the National Institute for Health and Care Excellence (NICE) and Public Health England (PHE) as a global public health emergency which, if not contained, could result in much less favourable patient outcomes from medical interventions such as routine surgery and chemotherapy (Jones-Berry, 2018).

The term 'antimicrobial stewardship' (AMS) first appeared in the scientific literature in 1996 (McGowan & Gerding, 1996) and refers to a formalised and coordinated approach to using antimicrobials responsibly to maintain their future effectiveness (NICE, 2015). In 2015, WHO launched its *Global Action Plan on Antimicrobial Resistance* calling on countries to formally engage with efforts to tackle AMR (WHO, 2015). This included strategic goals to reduce the incidence of infection, optimising the use of antimicrobials and increasing knowledge of AMR. On a national level, the UK government published a 5-year plan in 2019 containing measures to: prevent infection and thereby reduce the requirement for antimicrobials; use antimicrobials effectively where they are deemed necessary; and address issues around the lack of new antimicrobials in development (HM Government, 2019).

Successful AMS programmes require a multifaceted approach that includes improvements in clinical practice, educating healthcare professionals (HCPs) and the public, surveillance of antimicrobial use and the implementation of government health policy (Castro-Sánchez et al., 2019). When effective, AMS can minimise the growth of AMR thereby resulting in fewer infections, reduced patient mortality and, in the wider context, lower costs to healthcare systems worldwide (Agata et al., 2018).

Research has shown that antimicrobial stewardship has traditionally been the domain of doctors and pharmacists (Ladenheim, 2018). Despite the argument that stewardship requires a multidisciplinary approach (Sutthiruk et al., 2018), the role of nurses is infrequently specified in guidelines from official bodies such as NICE (Ladenheim, 2018; Monsees et al., 2019). However, Olans et al. (2016) and Ladenheim (2018) argue that nurses play a unique role in patient care by being present at all stages of the patient journey and are, therefore, ideally placed to contribute to AMS. Additionally, nurses make up a large part of the total healthcare profession and if their contribution to AMS was increased, the potential benefits to patient outcomes could be huge (Castro-Sánchez et al., 2019). It is, therefore, vital to know how nurses perceive their own role in AMS, so that AMS programmes can be adapted to maximise nurses' contributions.

2 | AIMS

To explore the role of the nurse in antimicrobial stewardship in order to inform education, practice and further research.

What does this paper contribute to the wider global community?

- There is clear evidence that many nurses are engaged and active in antimicrobial stewardship.
- Nurses' contribution is limited by a hesitancy to speak up and a lack of education.
- Focussing on nurses' ability to raise concerns is likely to have an effect on their involvement in antimicrobial stewardship

3 | METHODS

An integrative review was undertaken (Whittemore & Knafl, 2005). The five stages of problem identification, literature searching, evaluation, analysis and presentation were adhered to. The qualitative PICO framework (Aveyard & Sharp, 2017, p. 108) was used to identify the research question and to help generate the search strategy. Synonyms were identified by using the suggested alternatives in the databases. Key terms were combined using Boolean operators. This process is shown in Table 1.

Parameters were set to include research published in English in the last 10 years (2010–2020). The following databases were searched: CINAHL, British Nursing Database, PubMed, PsycINFO and Web of Science. Database search was initially undertaken by Kirsty Davey and repeated by Helen Aveyard. ENTREQ guidelines were adhered to (Tong et al., 2012). Please see Appendix S1 for how the ENTREQ guidelines were applied to this review.

3.1 | Inclusion criteria

Studies included in this review were those undertaken in hospital settings, had a research population of more than 50% nurses, undertaken between 2010 and 2020 and written in English.

After duplicates were removed, this search strategy yielded 265 papers. Two hundred and forty-one were rejected on reviewing the abstract. Twenty-four papers appeared to meet these criteria and were read in full. Of these, 18 articles did not meet the inclusion criteria. Six papers were included in the study as documented in the Prisma flow diagram. The reference lists of the final six papers were hand searched to identify any further relevant articles. This process identified several authors (e.g. Greendyke et al. (2018) and Olans et al., (2016)) who have written extensively on nurses and AMS. Therefore, an additional database search was conducted using these authors' names as a search term to see if this process identified any further articles. Neither of these steps identified any further relevant research. This process was undertaken by both researchers who then met to discuss any differences in the identification of relevant papers.

The PRISMA diagram (Figure 1) outlines the search process. Table 2 shows a summary of the six articles included in this review.

TABLE 1 Key terms and synonyms used in the Database searches

	Keyword	Alternatives
Search 1.	antimicrobial stewardship	OR anti-microbial stewardship OR anti microbial stewardship OR antibiotic stewardship OR anti biotic stewardship OR anti-biotic stewardship OR AMS
AND		
Search 2.	nurs*	
AND		
Search 3.	perception*	OR knowledge OR attitude* OR belief* OR opinion* OR view* or experience* OR perspective*

3.2 | Critical appraisal

Critical appraisal was undertaken on each article using a structured and recognised tool. The two qualitative papers were appraised using the Critical Appraisal Skills Programme (CASP) Checklist: 10 questions to help you make sense of a Qualitative research (CASP, 2020). The four surveys were appraised using Boynton and Greenhalgh's 'Critical Appraisal Checklist for a Questionnaire Study' (Boynton & Greenhalgh, 2004).

3.3 | Analysis

Whittemore & Knafl (2005) suggest a systematic approach to analysis without being prescriptive. Following the process of thematic analysis (Braun & Clarke, 2013, p. 174), colour codes were used to identify commonalities from the research. These were then grouped in order to develop common themes and also identify discrepancies in the findings. These initial groups were reviewed for overlap resulting in some themes being combined. Table 3 shows the final themes that were formed.

4 | RESULTS

4.1 | Working in partnership with other healthcare professionals (HCPs)

The importance of working in partnership with other health professionals was identified in all papers. Although a broad range of understanding of the term 'AMS' existed, once the meaning of the term was clarified, there was agreement among nurses that they play a pivotal and important role in antimicrobial stewardship and that this should be acknowledged. As one nurse commented:

"[nurses] are the ones monitoring the patient" and serve as "a testimony of how [prescription and discontinuation] affects the patient."

(Hamdy et al., 2019, p. 11)

Carter et al. (2018) found that nurses see stewardship as an extension to their role as the patient's advocate, the main administrator of antibiotics and their role at the bedside. One nurse said:

Our responsibility is to advocate for the patient, so if we could find a way to limit the amount of... antibiotics that go into the patient...we should...it's highly important that we get involved.

(Carter et al., 2018, p. 493)

Participants in most studies acknowledged that their role was limited by the scope of practice (Abbas et al., 2019) while Carter et al. (2018) and Hamdy et al. (2019) reported that some nurses perceived boundaries in their ability to contribute to AMS due to their limited role in prescribing and the distinction that exists between the physician's role in prescribing and the nurse's role in administering medication. However, a very small minority expressed feelings that AMS was not/could never be part of their nursing role (Mostaghim et al., 2017; Wilcock et al., 2019).

Tasks that nurses perceived to be part of their role when working in partnership with other HCPs included: questioning the medical necessity of urinary culture; liaising with prescribers to encourage a prompt switch from IV to oral antibiotics; initiating discussions regarding evaluation of care 48 hours after antibiotics are commenced; and questioning de-escalating from broad-spectrum to narrow-spectrum antibiotics (Carter et al., 2018; Hamdy et al., 2019). Similar perceptions were found in the studies undertaken by Mostaghim et al. (2017); Abbas et al. (2019); and Wilcock et al., (2019). The importance of communication was emphasised in all papers and is summarised by one nurse who said that nurses:

have to be keepers of the big picture.

(Hamdy et al., 2019, p. 14)

Consulting and adhering to protocol when working in partnership with other HCPs, was a theme found in four studies (Carter et al., 2018; Hamdy et al., 2019; Mostaghim et al., 2017; Wilcock et al., 2019). However, opinions varied sharply from study to study about nurses' scope of practice; for example, whether it was the nurses' role to consult the hospital's antimicrobial guidelines. At one hospital (Mostaghim et al., 2017) an approval 'traffic light' system had already been put in place whereby antibiotics in the yellow and red categories have to be approved before dispensing and administration is possible and that nurses were supportive of this; indicating that adhering to protocol is something nurses perceive to be within their role and concurs with Carter et al.'s (2018) findings that the implementation

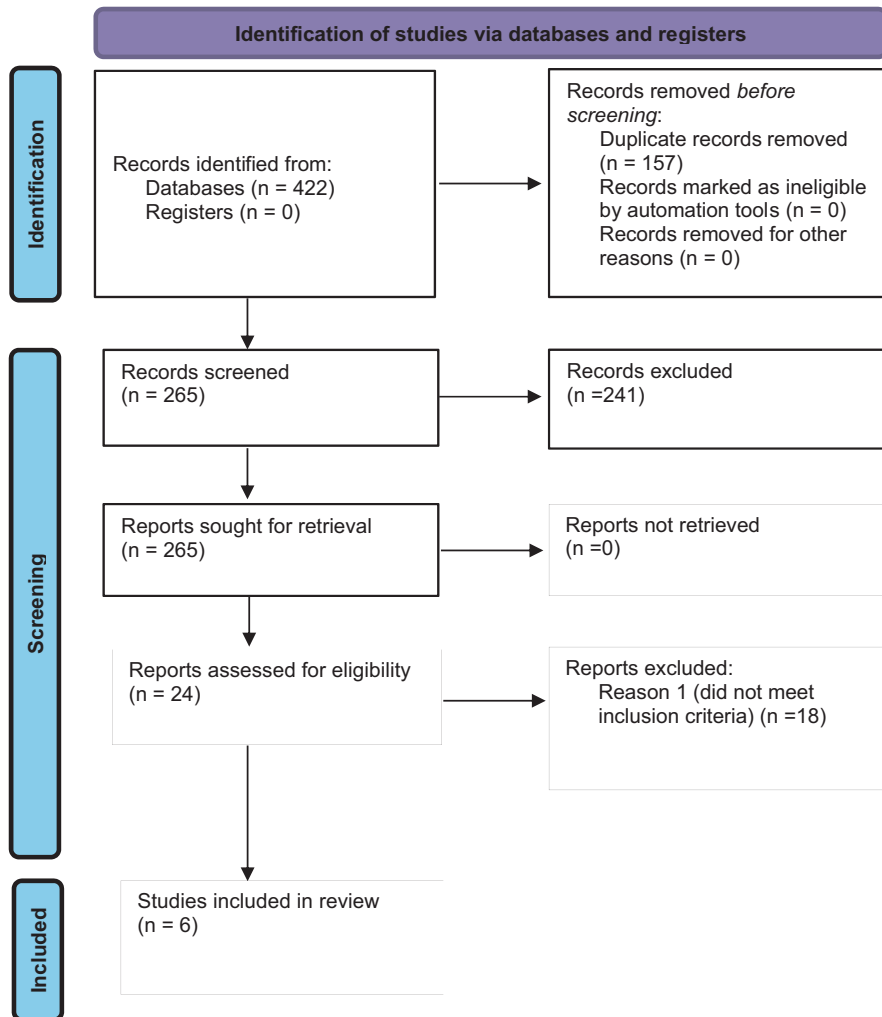


FIGURE 1 PRISMA flow diagram (PRISMA, 2020). (PRISMA (2020) PRISMA flow diagram. Available at: <http://www.prisma-statement.org/PRISMAStatement/FlowDiagram>) [Colour figure can be viewed at wileyonlinelibrary.com]

of AMS protocol would allow nurses to increase their contribution to AMS; this increases nurses' confidence to challenge other HCPs regarding AMS activities (Carter et al., 2018; Hamdy et al., 2019). One nurse stated:

It's a little more tricky when you're trying to fight for something or advocate for something [and] there is nothing you can point to as a reference...

(Carter et al., 2018, p. 494)

Another commonly reported barrier was prescriber pushback and nurses' confidence to speak up when they feel something is not right. In Wilcock et al. (2019) study, 52% of participants perceived lack of confidence in challenging medical staff/prescribing decisions as a challenge to their role in AMS. Specific examples given of when nurses do not speak up for fear of prescriber pushback included: questioning the need for a urine culture; suggesting an IV to PO switch (Carter et al., 2018); and nurse-led discussion regarding the appropriateness of an antibiotics prescription once culture results have been received (Greendyke et al., 2018). Nurses felt that challenging prescribers could be

perceived by other HCPs as outside of the nursing role (Carter et al., 2018) while others stated that their willingness to speak up was related to the seriousness of their concern with nurses confirming:

for a gross error they would readily contact the physician and felt confident that their voice would be well heard; however, for protocol deviations that did not clearly pose harm to the patient, they would be less likely to voice their input.

(Hamdy et al., 2019, p. 12)

Another nurse in the same study stated that in order to minimise drug errors nurses must:

feel empowered and assertive to speak.

(Hamdy et al., 2019, p. 14)

Overall, nurses felt a duty and a commitment to contribute to antimicrobial stewardship, while acknowledging some of the barriers such as their scope of practice that might limit this.

TABLE 2 Summary of the six articles included in this review

Authors	Title	Database retrieved from	Methodology	Country	Population	Analysis
Hamdy et al. (2019)	<i>Pediatric Nurses' Perceptions of Their Role in Antimicrobial Stewardship: A Focus Group Study</i>	CINAHL	Qualitative focus groups	United States	90 nurses	Coding and theme grouping by multiple research team members. Discrepancies discussed and resolved by consensus
Carter et al. (2018)	<i>Exploring the nurses' role in antibiotic stewardship: A multisite qualitative study of nurses and infection preventionists</i>	CINAHL	Qualitative focus groups and interviews	United States	49 clinical nurses, five nurse managers and seven infection preventionists	Coding by multiple research team members. Codes derived from transcripts in NVivo software. Discrepancies discussed and resolved by consensus
Mostaghim et al. (2017)	<i>Nurses are underutilised in antimicrobial stewardship - Results of a multisite survey in paediatric and adult hospitals</i>	Web of Science	Online survey	Australia	142 nursing staff	Descriptive statistics performed in IBM SPSS® Statistics for Windows Version 23
Abbas et al. (2019)	<i>Knowledge, attitudes, and practices of bedside nursing staff regarding antibiotic stewardship: A cross-sectional study</i>	CINAHL	Online survey	United States	159 nursing staff	REDCap (Research Electronic Data Capture)
Wilcock et al. (2019)	<i>Antimicrobial stewardship and the hospital nurse and midwife: how do they perceive their role</i>	CINAHL	Online survey	United Kingdom	76 nurses and four midwives	Descriptive statistics
Greendyke et al. (2018)	<i>Exploring the Role of the Bedside Nurse in Antimicrobial Stewardship: Survey Results From Five Acute-Care Hospitals</i>	CINAHL	Online survey	United States	451 nurses	Quantitative analysis

TABLE 3 Themes

	Theme 1: Working in partnership with other healthcare professionals (HCPs)	Theme 2: Engagement in education with patients and the general public
Hamdy et al. (2019)	X	X
Carter et al. (2018)	X	X
Mostaghim et al. (2017)	X	X
Abbas et al. (2019)	X	X
Wilcock et al. (2019)	X	X
Greendyke et al. (2018)	X	

4.2 | Engagement in education with patients and the general public

The importance of education was emphasised in five of the studies; nurses perceived they could contribute to antimicrobial stewardship through educating both patients and the public. Participants in Hamdy et al.'s (2019) study believed education should include: risks of medication; reviewing discharge instructions; and the rationale for antibiotics, including when antibiotics would not be appropriate. The authors wrote:

In addition to explaining why antibiotics are not needed for viral infections, she explains potential consequences of using antibiotics unnecessarily.

(Hamdy et al., 2019, p. 15)

Nurses reported that they tailored the information given depending on the family's knowledge, literacy and language. Participants recognised that education given went beyond the immediate setting. One nurse stated:

I like to think that teaching goes beyond just that moment. ... Everything that you say to them, they take it home and they tell all their family and friends.

(Hamdy et al., 2019, p. 15)

In order to engage in this educational role with patients and the general public, nurses need to be confident in their own knowledge. A nurse in Carter et al.'s (2018) study stated:

We're not there with antibiotics. We're not knowledgeable enough to have that conversation.....

(Carter et al., 2018, p. 496)

Participants from several studies concurred with this and felt this knowledge deficit could be addressed by the introduction of formal training, protected teaching time and ongoing support from other health professionals (Greendyke et al., 2018; Mostaghim et al., 2017; Wilcock et al., 2019). A nurse who participated in Carter et al.'s (2018) study said:

Any kind of education or demonstration is a good thing, and it should be standard everywhere across the board... maybe yearly, just a refresher.

(Carter et al., 2018, p. 495)

Nurses are in a unique position to educate patients and the wider public about antimicrobial stewardship but this assumes they themselves have the training and understanding to do so.

5 | DISCUSSION

This review has identified that nurses perceive they have a role in antimicrobial stewardship. This role is endorsed by other healthcare professionals in the wider literature (Abbo et al., 2012; Firouzabadi & Mahmoudi, 2020; Greendyke et al., 2019). Antimicrobial stewardship education has traditionally targeted doctors and pharmacists (McGregor, 2015). There is a growing recognition that if nurses are to be empowered to fully contribute, including confident to raise concerns about antibiotic management practices, they must first obtain a greater knowledge of the subject area (Jones-Berry, 2018; Merrill et al., 2019). One Scottish survey (NES, 2014) found that almost 75% of nurses surveyed believed that education regarding AMS should begin preregistration, with additional training introduced for qualified nurses. Yet, research has shown that gaps exist in both undergraduate and postgraduate education (Broom et al., 2017; Castro-Sánchez et al., 2019); an issue identified in this review. Efforts to address this are included in the NMC's new educational standards (NMC, 2018b) which specifically mention the requisite for preregistration education to cover both antimicrobial stewardship and resistance. This is encouraging as research has found a positive correlation between nurses' AMS education and their contribution to successful antibiotic management, and confidence in discussing antibiotic management with prescribers (Broom, Broom, Kirby, Gibson, et al., 2017; Monsees et al., 2019) thus strengthening the argument that education will help overcome some of the barriers identified in this literature review.

This review has identified that nurses acknowledge their role within antimicrobial stewardship and are keen to play their part in this

worldwide challenge. This is a welcome finding, giving clear indication that nurses are keen to work together in partnership in order to achieve this. However, in order to achieve such participation, nurses have to be confident to raise their concerns. Speaking up is recognised as an important part of upholding patient safety and fulfilling the nurse's role as the patient's advocate (Tarrant et al., 2017). It can be defined as making someone in authority aware of a previously undisclosed issue for patient safety reasons (Lyndon et al., 2012).

Research indicates that nurses can be hesitant to speak up due to fear of not being taken seriously (Churchman & Doherty, 2010; Okuyama et al., 2014), or a desire to belong to the ward team by not creating conflict (Mansour & Mattukoyya, 2019). More specifically, nurses are reluctant to question antibiotic prescribers (Sumner et al., 2018) with reports that any challenge to GPs' prescribing practices would not be well received (NES, 2014) and that challenging prescribing decisions is considered to be one of hardest part of working on a ward (Broom et al., 2017). Thus, nurses may find themselves choosing between their personal psychosocial well-being and patient safety (Okuyama et al., 2014).

Research has shown that antibiotic prescribing behaviour is strongly influenced by hospital culture and has a number of psychosocial determinants (Charani et al., 2013). The traditional hierarchical structure of the ward environment assumes that those in power have knowledge that others do not, with a higher status given to medics (Churchman & Doherty, 2010). This perception of nurses' contribution to antibiotic management practices having little value is underlined by everyday practices such as not being included on ward rounds, or their opinions not being proactively pursued (Monsees et al., 2019). These factors can create an environment where those of a perceived lower status are reluctant to raise concerns (Best & Sim, 2019). This culture may be a contributing factor to nurses' reluctance to raise concerns regarding AMS, and research shows that some nurses are hesitant to cross what they see as a clear boundary between the nursing and medical role in this field (Broom, Broom, Kirby, Gibson, et al., 2017).

Churchman and Doherty (2010) argue that in order to encourage speaking up by all health professionals, regardless of role, a change to the culture of the hospital environment must take place with leadership positively encouraging and endorsing a culture of raising concerns. Evidence shows that nurses are more likely to challenge the practice of others if they work in psychologically safe environments where the leadership supports, demonstrates and actively encourages speaking up to promote patient safety (Alingh et al., 2019). An example of how leadership in the United States has underlined the importance of nurses speaking up is the 'Agency for Healthcare Research and Quality Safety Program for Improving Antibiotic Use' (Monsees et al., 2019) which urges prescribers to recognise and value the contributions that nurses can make to antimicrobial stewardship.

It has been proposed that education on the value of speaking up generally, and of AMS more specifically, may be more effective when given on an interprofessional basis (Merrill et al., 2019) as, in addition to imparting knowledge, it would contribute to efforts to

breakdown traditional hierarchies, promote interprofessional collaboration (Broom, Broom, Kirby, Gibson, et al., 2017) and allow for an understanding of each other's perspectives (Merrill et al., 2019). The TARGET (Treat Antibiotics Responsibly, Guidance, Education, Tools) toolkit is aimed at GP practices and asks all HCPs within a practice to commit to AMS (RCGP, 2020).

In response to the Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry (Francis, 2013), the NMC published updated guidance for nurses on raising concerns (NMC, 2014). Furthermore, nurses' duty to speak up and to keep their knowledge up-to-date is enshrined in codes and standards of practice globally (NMBA, 2016; NMC, 2018a). Data from the most recent NHS Annual Staff Survey (NGO, 2020) concluded that confidence to speak up has increased nationally but that there is still room for improvement. Further work needs to be done to ensure that nurses feel confident to be part of a culture where concerns can be raised.

5.1 | Limitations

The authors concede that a limitation of this review is that it only included studies undertaken in the hospital setting. Further research examining nurses' perceptions in other healthcare settings may offer different insights.

Although this review was undertaken in a systematic manner, it is always possible to miss relevant papers. Furthermore, of the papers identified, four studies were online, quantitative surveys. Additional qualitative research might have led to a greater quantity of rich data, perhaps giving greater insights into the research topic. Efforts were made to address this issue through a thorough process of critical analysis, building a hierarchy of evidence and thus being able to weight each article in how it contributed to the overall findings. Doherty and Smith (1999) raise the issue that claims made by some researchers are too broad and do not arise directly from their research's findings. To address this, efforts were made to ensure that the discussion has been grounded in the true findings of this review. This is of particular importance in any study where the findings may lead to changes in clinical practice.

6 | CONCLUSION

There is clear evidence that many nurses are engaged and active in antimicrobial stewardship and this finding is to be welcomed. Nurses' contribution is identified in a number of areas, namely: working with other HCPs and contributing to decisions about prescribing, adhering to protocols and educating patients and the public. Their contribution is limited by a hesitancy to speak up and a lack of education. The importance of pre- and postregistration education in antimicrobial stewardship, including to importance of raising concerns and strong hospital leadership to facilitate this have been discussed. If implemented successfully, nurses' contribution to AMS and, therefore,

progress in both upholding patient safety and addressing AMR, would be maximised.

7 | RECOMMENDATIONS

1. *AMS to be actively taught to qualified nurses as part of their continuing professional development.* With the introduction of the new NMC educational standards (NMC, 2018b), student nurses are being taught about the importance of AMS. It would be valuable if similar training was made available to qualified nurses.
2. *Track frequency of speaking up via the NHS Staff Survey.* Some work-based staff surveys (e.g. the NHS Staff Survey) ask staff to rate on a scale from 'strongly disagree' to 'strongly agree' issues regarding speaking up; providing insight into how staff feel about raising concerns in a hypothetical context. Rewording such surveys so they ask about actual rather than hypothetical behaviours (e.g. 'how many times have you raised concerns in the last month?') would provide a greater insight into the reality of speaking up.
3. *Conduct further research to identify the most effective interventions to increase speaking up behaviour regarding AMS.* Research comparing the success of different educational approaches would enable funding to be invested most effectively; would maximise patient safety; and would make great progress towards improving AMS efforts.

8 | RELEVANCE TO CLINICAL PRACTICE

Nurses have a clear role to play in antimicrobial stewardship. To play their role, nurses need to be fully cognisant of the issues involved. The inclusion of AMS in the new NMC educational standards (NMC, 2018b) is a positive step towards this. What is less clear is exactly how nurses should enact their role in the complex working environments in which nurses work. The NMC guidance on raising concerns (NMC, 2019) recognises the importance of nurses speaking up. It is essential that both students and qualified nurses are familiar with the content of this publication not only to maximise patient safety and fulfil their professional duty but also to promote the overall effectiveness of AMS if they witness poor antibiotic management practices.

CONFLICT OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

Data openly available in a public repository that issues datasets with DOIs.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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