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Commentary

Overview of the Participation of Nurses in Antimicrobial Stewardship Activities

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ABSTRACT

Antibiotic resistance is a planetary threat demanding maximum attention from health and social care services worldwide due to the clinical, economic, and human costs. Interventions to address resistance—antimicrobial stewardship (AMS) programs—are multipronged and require the close collaboration of all health care workers involved in antimicrobial decisions and use. Nurses have traditionally been absent from such engagement. This Commentary highlights existing evidence of the need for, and impact of, nursing involvement and leadership in AMS. In addition, four barriers (ie, foundational, ownership, education, and leadership) to the increased involvement of nurses in AMS are discussed, with implications and potential solutions.

Introduction

The planetary threat of drug-resistant infections demands a global and comprehensive commitment from governments, health care system leaders, and private stakeholders, who should increase and expand the funding and mechanisms to engage essential health care workers in addressing antibiotic resistance.¹ This recommendation is logical and desirable, yet its implementation must resolve the multifaceted challenges associated with the dearth of health care workers. For context, estimates by the World Health Organization suggest that by 2035, there would be a worldwide deficit of just under 13 million health care workers.²

As this lack of health care workers is unlikely to go away, it is vital to make the best use of existing workforce cadres, reinforced by imaginative reassessments of clinical pathways always focused on value-based, person-centered care.³ Among all health care workers, nurses represent the largest professional group and, therefore, their optimal engagement and leadership in antimicrobial stewardship (AMS) offers a resource that has yet to be exploited broadly. In this article, I will explore barriers to, and facilitators for, the leadership and participation of nurses in AMS, highlighting evidence about nurse-focused interventions in AMS, and recognizing opportunities and models to galvanize and consolidate this involvement.

Discussion

Nurses are not only the largest health care professional group worldwide,⁴ but they also occupy a higher proportion of the workforce in many health care systems in relation to other health care professionals traditionally leading AMS programs and interventions, such as physicians or pharmacists. In the United Kingdom, for example, the most recent medical register documented just over 150,000 doctors, whereas the comparable register for nurses included ~380,000 nurses. These ratios are comparable with those broadly seen worldwide, although in the Global South the ratio of nurses and midwives to physicians increases, and professional continuity and stability is further threatened by worker migration and inequalities,⁵ among other factors.

The need for, and benefit of, widening the participation of clinical stakeholders in AMS programs is not, however, new. More than 10 years ago there were already calls advocating for the need to expand engagement in stewardship activities,⁶ suggesting that the typical core of infectious diseases—physicians, clinical microbiologists, and clinical pharmacists with expertise in infection—could be supported and enhanced by the inclusion of other team members, such as specialist nurses in infection prevention and control (IPC).⁷ These updates to the clinical team aimed to better reflect the interprofessional effort that occurs naturally across the continuum of care, optimizing the use of existing systems

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and structures, and profiting from legitimate aspirations of professional growth in competencies.

Historically, initial reflections and studies about the participation of nurses in AMS focused on clinical areas, perhaps aligned with views of AMS as mainly a technical task. These articles, for example, advocated for nurses to ensure and improve collection of biological samples, administer antimicrobials, inform patients and families, and even ensure that, on discharge, these medicines were appropriate and reconciled with treatments during care episodes.⁸ Although these actions are undoubtedly vital and ingrained in nursing practice, agreement on roles, competencies, and job profiles has yet to be negotiated.⁹

Although these reviews offered a useful starting point for ideas on AMS nursing, there was a clear emergence of nonclinical roles in stewardship for nurses later on.¹⁰ These emerging roles included leadership and contributions to research, not only on the own role of nurses in this area, but widely evaluating traditional AMS programs,¹¹ as well as in policy development, implementation, and evaluation in AMS.^{12,13} These roles are also intimately connected to the swift and decisive advances worldwide in independent nurse prescribing over the last 20 years,^{14,15} including antimicrobials and particularly in low- and middle-income settings.¹⁶ To illustrate these advances, a review for England from 2014 to 2021 reported how nurses were responsible for 8.6% of the approximately 25 million antibiotic prescriptions dispensed during that period.¹⁷

Increasing and sustaining the number of nurses engaged as legitimate stakeholders in AMS programs would, however, require efforts to overcome four barriers, which are foundational; associated with ownership or branding; educational; and related to leadership.

The first barrier, foundational, is underpinned by notions that nurses still think that AMS is not a nursing role or function. Early studies have highlighted how, in comparison with other health care professionals, there was a lower proportion of nurses who had heard about AMS. Moreover, nurses reported less willingness to participate in AMS activities compared with other groups. In the study by Cotta et al,¹⁸ 43% of nurses were willing to participate in AMS compared with 48% of surgeons or 51% of anesthetists. All of these responses were, perhaps unsurprisingly, far lower than the 100% reported among pharmacists. There are multiple reasons for these views on AMS among nurses, but perhaps the earlier emphasis on decision making, for example, diagnosing, therapeutics, and prescription of antimicrobials, could have deterred nurses from being interested in the area or embracing AMS as a central nursing role.¹⁹

The conceptual gap in decision making links well with the second barrier of ownership and branding of AMS for nurses. The reticence to collaborate in optimal antimicrobial management and use when asked about it seems misaligned with their actual leadership and involvement in many of the typical and essential activities included in AMS. This dichotomy was highlighted elegantly in the study by Bulabula et al,²⁰ which surveyed nurses on AMS involvement across the African continent in 2016. The depth and breadth of AMS-related activities reported by participants were striking, with a range of clinical as well as organizational and managerial outputs. For example, just under 40% of nurses reminded treating prescribers to review the need for antimicrobials; ~50% of nurses were members of committees making decisions about antimicrobial prescribing; equally, ~50% of nurses reminded treating prescribers to review the need for any devices, such as urinary catheters, daily; ~60% of nurses were teaching about appropriate use of antimicrobials; and, finally, virtually all participants taught about IPC.

This breadth of activities, and the number of nurses engaged with them, suggest that the AMS or stewardship labels may be counterproductive to nurses' recognition of their own involvement and leadership of AMS activities. This position is further strengthened when considering the suite of interventions included in frameworks such as the "Start Smart then Focus" in the United Kingdom,²¹ where most of the actions (eg, ensuring adequate timing of drug administration, adoption of necessary IPC messages, obtaining biological samples for microscopy and cul-

ture and sensitivity, and reviewing microbiology results daily, to name a few) are not just optimal AMS behaviors, but essential and fundamental nursing care work. Other areas with tremendous alignment between nursing work and AMS would include tissue viability and wound management, as well as vascular device care.²²

In fact, the most powerful synthesis of the close alignment between nursing and stewardship may be the motto coined by Olans et al²³: "good stewardship is good nursing care, and good nursing care is good stewardship." This should be a central pillar of sustaining efforts in AMS across nursing education, leadership, research, and clinical practice and, at the same time, a powerful argument against concerns regarding AMS nursing work as an additional, "nice to have" yet unrealistic extra task, which is hampered by staffing shortages or not reflected in pay packets. Similarly, studies benchmarking the administration of antimicrobials, which reported that approximately 50% of the prescribed dose was left in the intravenous giving set, do not just reflect suboptimal AMS performance, but overall poor nursing care.¹⁹

Other consistent examples of the influence of nurses on antimicrobial prescribing behaviors and, by extension, AMS, are seen around the use of urine analysis. Often, but particularly among older patients and residents in long-term or skilled nursing care facilities, nurses may ignite a therapeutic cascade when investigating clinical situations, like a newly confused patient or a patient passing urine that is offensive in smell or looks cloudy. These heuristic-driven decisions, likely to result in findings that are not abnormal or significant, may, however, be a powerful encouragement for prescribers and clinical decision makers to prescribe an antibiotic.²⁴ This unnecessary therapeutic cascade may reflect myths and traditions, as well as misunderstandings or education gaps, for example, ignoring the difference between asymptomatic bacteriuria and pyuria. The presence of isolated bacteriuria often prompts antimicrobial prescription despite the lack of symptoms; pyuria on urine analysis is also associated with an increase in antimicrobial use, regardless of culture.²⁵

The importance of improving nurse-sensitive AMS outcomes, such as urinary tract infection in care homes, becomes even more obvious when reviewing some of the interventions that have aimed to address dehydration among residents in these settings, by implementing structured drink rounds, increasing staff training and awareness, and completing drink diaries for residents at risk of dehydration. All of these activities led to a reduction of urinary tract infections requiring antibiotics and hospital admissions for urinary tract infection by 58% and 36%, respectively.²⁶ Other multipronged interventions focused on improving the quality, capability, and capacity of nurses to engage with AMS suggest that increased education via structured quality improvement approaches improved the proportion of antibiotic treatments discussed on clinical rounds²⁷ or increased nursing self-efficacy in AMS.²⁸ However, nursing activities in AMS are not static, and there are already interesting reflections about the evolution of nurses' roles in AMS in nursing homes and at end of life.^{29,30}

These educational gaps reflect well the third barrier to resolve to improve nursing engagement in AMS, which is centered on education. The disinterest or apathy of nurses to collaborate in AMS, noted often by other health care professionals as well as, increasingly, nurses themselves, may simply reflect deficits in education about antimicrobial resistance, pharmacology, therapeutics, and, in essence, the core components of AMS practice. For example, the nationwide survey of undergraduate programs dealing with antibiotics and stewardship in the United Kingdom,³¹ which investigated, among several items, content, teaching, and evaluation methods, and faculty involved in all universities offering dentistry, pharmacy, nursing, medicine, and veterinary medicine courses, highlighted how only 31 of 49 (63.2%; 95% CI, 49.69%–76.70%) nursing schools incorporated any teaching about stewardship and, of these, only 4 (12.9%; 95% CI, 11%–24.69%) included all recommended AMS principles, in stark contrast to the 16 of 23 (69.5%; 95% CI, 50.68%–88.31%) medical schools. The median time dedicated to AMS in nursing courses was 10 hours (interquartile range [IQR], 4.5–13.5 hours), much

shorter than in other disciplines (eg, 17.75 [IQR 8.87–42.62] hours in medical schools [n = 13]; 15.5 [IQR 12.25–40.87] hours in veterinary medicine schools [n = 4]; and 12 [IQR 7–25] hours in pharmacy schools [n = 12]).

These results were replicated later,³² with the evidence on this gap and its impact on clinical and interprofessional practice likely encouraging the nursing regulatory body in the United Kingdom to recognize a need to include specific statements about AMS among the standards required for registration of all nursing practitioners, particularly “protecting health through understanding and applying [...] antimicrobial stewardship and resistance.”³³ Furthermore, such gaps have been addressed by transdisciplinary work, developing national and international AMS competencies for undergraduate nursing and other health care professionals, articulated around key domains of AMS practice (eg, “infection prevention and control,” “antimicrobials and antimicrobial resistance,” “the diagnosis of infection and the use of antimicrobials,” “antimicrobial prescribing practice,” “person-centered care,” and “interprofessional collaborative practice”).³⁴ Other emerging competency frameworks for health care workers, education, and training on antimicrobial resistance developed by an international group of experts and stakeholders and promoted by the World Health Organization have resulted in a clear statement of behavior, knowledge, and attitudes applicable and relevant to nurses in AMS.³⁵

A plethora of nurse-specific educational resources have been developed since the identification of these gaps. The recently funded Erasmus+ Intensive program on AMS nursing “Antimicrobial Stewardship: Managing Antibiotic Resistance,” led by the University of Malta, with faculty from Finland, Italy, Belgium, Slovenia, and the United Kingdom, is launching in 2024 as a hybrid learning experience aiming to educate undergraduate nursing students across different European organizations, which could serve as a template for future pan-European efforts. Other resources range from eBooks and electronic publications commissioned or developed by professional and scientific societies, such as the European Specialist Nurses Organisation or the British Society for Antimicrobial Chemotherapy. In addition, technology-based resources, such as serious games addressing AMS, prescribing behaviors, and decisions related to the management of antibiotics, have been incorporated into education and training for health care professionals, including nurses,³⁶ as well as e-learning modules.³⁷ Some interventions have opted to strengthen the communication of nurses with prescribers and decision makers, whether developing conversational “scripts” that reduce inherent anxiety approaching these interactions³⁸ a barrier to engaging in AMS highlighted by nurses³⁹ or understanding the traffic of communication and information during ward rounds related to antimicrobial use, so nurses understand and profit from intervening at optimal points during clinical conversations and decisions.⁴⁰

A final obstacle to nurses’ contributions to AMS refers to the chasm between clinical tasks and leadership, with a clear need for more and better professional and institutional leadership. Although more guidelines, documents, and statements are unequivocal about the vital need for nurses to engage and lead AMS efforts, significant policy documents have yet to place this nurse participation sufficiently high in priority or with enough emphasis,^{41,42} particularly considering the contextual differences for the nursing profession and the milieu of health care systems, nursing traditions, practices, and interprofessional relations.⁴³ Without a doubt, fostering networking opportunities for knowledge mobilization and seeding of communities of practice, such as international summits and national and international networks, should be encouraged. Some exemplars of these international collaboratives include nursing summits on AMS sponsored by the Imperial College London in 2017 and Brunel University London in 2023, the Nursing AMS Forum hosted by the British Society for Antimicrobial Chemotherapy (<https://nursing-ams-forum.co.uk>), and the impressive Brazilian Nurses Network Tackling Antimicrobial Resistance, which connects more than 200 nurses across Brazil; they are already co-producing impactful events and interventions and supporting professional progress in AMS.

Furthermore, C-suite executives and board members interested in supporting the implementation of nursing roles and posts in AMS practice may struggle to identify both the economic evidence necessary to lobby and negotiate for such roles (as the issue would not be the return on investment of AMS programs, but AMS nursing roles embedded in these programs), or data about the configuration and skill mix of these roles and nursing teams. Depending on the organizational commitment to AMS, overall staffing, and robustness of existing IPC and patient safety programs, institutions may opt to deploy “vertical,” highly visible, nurse consultant-type roles.⁴⁴ Their visibility would signal a clear organizational effort to improve nursing and further clinical practice in AMS; however, the impact of organizational, clinical, and patient outcomes may be difficult to realize or sustain by a single person. Alternatively, organizations may prefer to increase the skills and competencies of all nursing personnel, offering “horizontal” AMS improvement programs incorporating interventions addressing antibiotics as well as other connected areas, such as vascular access and catheter care. This approach would likely achieve greater and more sustained impacts, increasing the resilience of any improvements, as well as against nurse attrition and replacements.⁴⁵ However, the explicit contribution of nurses toward AMS would lack visibility and even recognition. Combined approaches, where the increase in AMS skills is applied to cadres already specialists in IPC or patient safety, may offer the impact, sustainability, and visibility required.

Regardless of whether these barriers are considered and addressed or not, much if not all the focus of the nursing participation in AMS remains anchored in clinical, health facility-based actions and interventions, ensuring that antibiotics are used optimally whenever that is the case. Concentrating on preventive roles may, again, encourage those nurses hesitant about trespassing professional demarcations⁴⁶ or disagreeing to accept externally imposed roles to act as mere reminders to prescribers, when such approaches do not seem to be advocated in other clinical areas using time-sensitive drugs. Bonding AMS nursing work with wider concerns of sustainability and green health care (eg, regarding intravenous antimicrobials),⁴⁷ as well as time savings for these same antibiotics,⁴⁸ could further promote nursing actions against drug resistance.

In any case, there is an unrealized benefit to expanding the scope of AMS nursing toward preventing infections by addressing the wider socioeconomic determinants that drive them,⁴⁹ including factors acting in synergy.⁵⁰ Thinking about unjust inequalities, there is still much to explore about the international nursing AMS landscape and low- and middle-income settings in particular, with most studies revisiting evidence generated in, and relevant to, high-resource settings, less disturbed by staffing challenges, lack of antibiotic access, or other wider structural deficits.⁵¹ Furthermore, the disquieting trend requiring nurses to “challenge” inappropriate prescribing would benefit from recognizing those intersectional gradients that also exist worldwide between those asked to challenge and those being challenged—nurses are much more likely to reflect lower socioeconomic position,⁵² be affected by secular power struggles and differentials,⁵³ and be chained to structural racism and sexism.⁵⁴

Conclusions

Undoubtedly, AMS programs aiming to be successful and sustainable must consider interdisciplinarity to profit from the individual and collective expertise and synergy of all health care workers involved in antibiotic management. Nurses have traditionally been absent from decision making in this area, but the last decade has seen sustained and decisive advocacy toward changes in nursing behaviors, perceptions, and attitudes related to antimicrobials. The increased educational content on antimicrobial stewardship included in undergraduate and postgraduate nursing courses worldwide could undoubtedly foster the involvement of future nurses in AMS efforts. Of particular importance in this area would be the development of educational interventions aiming to

improve the communication, confidence, and assertiveness of nursing students, as well as those already qualified to participate in multidisciplinary decisions about antibiotic management as, despite the progress already achieved, most experiences of nurse participation in AMS seem circumscribed to a clinically oriented, bedside-placed, ancillary arena. Nursing work and expertise in such an arena are vital and valuable. Anchoring nurses in such roles risks underusing their full potential, limiting professional growth, and ultimately fueling dissatisfaction. Organizational characteristics, professional traditions, and interprofessional relations must nevertheless be evaluated carefully before promoting the start, or expansion, of any nursing interventions in AMS, and appeals for nurses to embrace stewardship must align the benefits for the profession, patients, health systems, and society with the holistic, person-centered values so rightly ingrained in nursing paths, art, and science.

Declaration of competing interest

None.

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