

Hospital pharmacists' expertise and cooperation towards antimicrobial stewardship: A qualitative study

Julius Malazarte^a, Ronesa Marie Parba^a, Danlled Javier^a, Lou Diane Manila^a, Sharmaine Dela Cruz^a, Anna Andrea Sabado^c, Rogie Royce Carandang^{a,b,*}

^a Adamson University, Ermita, Manila, Metro Manila 1000, Philippines

^b Department of Public Health Sciences, University of Connecticut School of Medicine, Farmington, CT 06030, USA

^c De Los Santos Medical Center, E. Rodriguez Sr. Ave., Quezon City, Metro Manila 1112, Philippines

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Corresponding author: rogie.royce.carandang@adamson.edu.ph

Abstract

Background

Antimicrobial resistance has compromised the existing antibiotic therapies. The purpose of antimicrobial stewardship (AMS) programs is to encourage and preserve the sustainable use of antibiotics in hospitals. Pharmacists are key members of AMS programs. Pharmacists have been delegated a critical role in antibiotic governance in AMS teams. However, little is known about hospital pharmacists' expertise and cooperation in AMS programs in low-resource settings, such as the Philippines.

Objective

The study aimed to explore the hospital pharmacists' expertise and cooperation in antibiotic use optimization toward AMS practice in the Philippines.

Method

Individual, semi-structured interviews were conducted with 19 hospital pharmacists involved in hospitals with AMS programs in Luzon, Visayas, and Mindanao. Audio-recorded interviews were transcribed verbatim, and MAXQDA was used to code and manage the data. A thematic analysis was used to identify themes from the qualitative data until theme saturation was reached.

Results

Expertise and cooperation are the two main concepts established as the fundamental tenets of AMS practice among hospital pharmacists. Three key themes emerged under expertise: knowledge, skills, and hands-on experience. Under the cooperation, four key themes emerged: AMS advocacy, intraprofessional collaboration, interprofessional relationships, and motivation. Hospital pharmacists' highly specialized knowledge of drugs allowed them to effectively streamline antibiotic therapies. Observations on trends in antibiotic consumption were helpful information to strengthen AMS strategies in hospitals. The need to improve intraprofessional and interprofessional collaboration influenced hospital pharmacists' engagement. Work appreciation and desire for professional growth determined the motivation of hospital pharmacists.

Conclusion

Hospital pharmacists have a crucial role in AMS teams. However, their competency was affected by the level of hospital and position they were in. Moreover, interprofessional dynamics and the

definition of their roles limit their capacity to propose interventions. There is a need to strengthen hospital pharmacists' expertise to increase their cooperation in streamlining antibiotics.

Keywords

Antibiotic use; Antimicrobial stewardship; cooperation; expertise; hospital pharmacist

1. Introduction

In the global context, antibiotics are the primary option for treating infectious diseases. However, an emerging global health threat concerns the healthcare community with antibiotics due to inappropriate behaviors that lead to misuse.^{1,2} Antimicrobial resistance (AMR) is a significant public health concern, with new resistant bacteria developing faster than innovative treatments, affecting the efficacy of existing antibiotic alternative therapies.³ In Southeast Asia (SEA), there is a developing concern about AMR. According to studies, SEA countries have a high risk of the emergence of AMR among all World Health Organization (WHO) regions.^{4,5} In the Philippines, the emergence of AMR is widespread and a major public health concern. Inappropriate behaviors such as antibiotic sharing and self-medication are common challenges in combating AMR in the Philippines.⁶ Poor antibiotic use practices are also a challenge in health institutions in the Philippines. A retrospective review conducted in the Philippines highlighted that 37% of the prescriptions concerning carbapenem therapy in a private hospital were for non-guideline adherents.⁷ Without a proper course of action to address the root problems of AMR, the world will head towards a post-antibiotic era where effective antibiotics cannot treat minor infections.¹

The urgency of AMR has led countries to develop strategies to combat this global threat by implementing national antimicrobial stewardship programs (ASPs).⁸ The primary goal of ASPs is to minimize the consequences of poor stewardship that lead to AMR and drug toxicity.⁹ The Philippines' response to AMR started as early as the 1980s. Following the WHO recommendation, the Department of Health (DOH) created the "Committee on Antimicrobial Resistance Surveillance Program".¹⁰ ASPs' success depends on factors such as public awareness, clinical practice guidelines, and implementing national regulations down to institutional policies.¹¹

Antimicrobial stewardship programs can only be defined with the involvement of pharmacists in the hospital. The ASPs have a direct relationship to the duties and responsibilities of a pharmacist since they involve the appropriate selection, dosing, route of administration, and duration of medication therapy.¹² Hospital pharmacists are the drivers of a sustainable, comprehensive prospective audit and feedback initiative that examines the appropriateness of antibiotic orders and provides direct feedback to prescribers to improve prescribing.¹³ Besides delivering medications, pharmacy is increasingly expected to be more active in clinical practice and be physically present in hospital wards.¹⁴

Real-time decision assistance from hospital pharmacists can significantly increase the rate of proper antibiotic selection.¹⁵ In several policies, pharmacists' roles and importance are clearly defined within the healthcare team.³ Despite the shift in the roles of pharmacists, the lack of focus by public regulatory authorities results in a lack of motivation for AMR surveillance and a lack of public health engagement, leading to ineffective ASPs.⁸ Comprehensive strategies should be conducted, such as improving awareness, enhancement of hospital surveillance, and research capacities across different health sectors, that will contribute to a robust ASP in the Philippines.⁸

However, little is known about hospital pharmacists' expertise and cooperation in AMS programs in low-resource settings, such as the Philippines. Antimicrobial stewardship can be strengthened in hospitals by considering the awareness, skills, and perceptions of key team members like hospital pharmacists. This study aimed to explore the hospital pharmacists' expertise and cooperation in antibiotic use optimization toward AMS practice in the Philippines.

2. Methods

2.1. Study design

This study was qualitative and drew on the interpretive paradigm to allow a thorough examination of hospital pharmacists' knowledge and experiences regarding AMS practice. The study was reported following the "Consolidated Criteria for Reporting Qualitative Research" (COREQ) guidelines (Appendix A).¹⁶

2.2. Participants and study setting

Different hospitals where an ASP has already been adopted in their institution located across other parts of the Philippines have been the study's selection criteria, regardless of whether they are primary, secondary, tertiary, private, or public hospitals. The snowball sampling technique was used since hospital pharmacists from different parts of the Philippines were hard to reach and invite for the study.¹⁷ Hospital pharmacists were identified and recruited through referrals from other hospital pharmacists.

2.3. Data collection tool

A semi-structured topic guide was constructed based on an *a priori* conceptual framework created using previous related literature on antibiotic governance and constructs of behavioral changes in implementation challenges,^{3,14,18} and a multidisciplinary study.¹⁹ The conceptual framework consisted of five key themes for hospital pharmacists' expertise and cooperation (Appendix B). Knowledge and skills were the key themes correlated to expertise as hospital pharmacists applied their clinical decisions to improve therapeutic outcomes. Cooperation revolved around how hospital pharmacists promote behaviors for better antibiotic usage, relationships with healthcare providers (HCPs), and motivation to participate in AMS practice. Three clinical pharmacists with extensive experience in AMS practice thoroughly reviewed and certified the prepared guide questions for face and content validity. The topic guide was pretested with two hospital pharmacists by J.M. The pretesting was conducted to evaluate the structure and flow of the interview using the topic guide.

The final topic guide contained 23 questions followed by prompt questions to fully capture and clarify the hospital pharmacists' responses if they could not respond or understand the question (Appendix C).

2.4. Data collection

Interviews were conducted virtually, lasting between 60 and 90 minutes, by one interviewer and a notetaker, and hospital pharmacists were briefed on their roles. During the interview, hospital pharmacists used English, Filipino, or *Bisaya* [a local dialect]. Demographic information from hospital pharmacists was collected before the interviews. They were asked for relevant personal work information such as the number of years they have been working as hospital pharmacists

and their current position, as well as hospital information such as hospital location, hospital level, hospital category, and the number of years the ASP has been adopted in the hospital. During each virtual interview, notes were created by reflecting on some ideas and listing down running thoughts.²⁰ The notes taken facilitated reflexivity and helped improve the subsequent interviews and the validity of theme identification.²¹ Audio recordings were transcribed verbatim.

A total of 19 practicing hospital pharmacists were interviewed for the study. Data saturation was reached after 16 interviews; three more were carried out to guarantee that no important data was missed. Hospital pharmacists were contacted later on to check and verify the accuracy of the collected data.

2.5. Data analysis

The interview transcripts were subjected to combined deductive and inductive thematic analysis.²² Deductive analysis was guided and coded using an *a priori* conceptual framework, and inductive codes were assigned as they were not recognized in the framework. Saturation occurred when no new insights were gained with the predetermined notions and there was repetition in identifying new codes, groups, or themes.²³ The transcripts were analyzed in the language (native or English) used during the interview, and each transcript was analyzed independently by the first four authors. MAXQDA 2022 (Udo Kuckartz, VERBI software, Berlin), a qualitative software, was used to support the data analysis of transcripts, allowing contrast within and across categories while maintaining the analytical complexity of the participants' statements.²⁴ Assigning codes was done by pairs, J.M., D.J. and R.M.P., L.D.M. The results of the analysis were discussed deliberately with A.A.S. and R.R.C. to organize and establish key themes and subthemes before presenting them to hospital pharmacists for review.

2.6. Ethical considerations

The study was conducted and approved by the Adamson University Ethics Research Committee (2022-02-PHA-02). The purpose of the study was discussed with hospital pharmacists, and both written and oral consents were secured before interviews. Confidentiality was upheld by not using identifiable information in the study, and pseudonyms were used in quotations.

3. Results

Table 1 shows the general characteristics of hospital pharmacists. Of 19 hospital pharmacists, eight were from Luzon (42.1%), six were from Visayas (31.6%), and five were from Mindanao (26.3%). Most of those interviewed have worked as hospital pharmacists for two to three years (47.4%), are currently in tertiary (73.7%), private hospitals (73.7%), or were clinical pharmacists (63.2%).

Three key themes emerged under expertise: knowledge, skills, and experiences with antibiotic use, whereas four key themes emerged under cooperation: AMS advocacy, intraprofessional collaboration, interprofessional relationships, and motivation. Tables 2 and 3 summarize the themes and subthemes identified regarding hospital pharmacists' expertise and cooperation with AMS.

3.1. Hospital pharmacists' expertise towards AMS practice

Hospital pharmacists' expertise was the first important consideration in optimizing antibiotic use. Key themes identified were knowledge, skills, and hands-on experience.

3.1.1 Knowledge

Knowledge of hospital pharmacists was the first theme under hospital pharmacists' expertise. Three sub-themes emerged under knowledge: medication experts, antibiotic use, and reference materials. Hospital pharmacists expressed that being knowledgeable allowed them to suggest medication-related recommendations and encourage HCPs to follow guidelines.

a. Medication experts

Hospital pharmacists expressed that their in-depth expertise with drugs greatly differs from that of physicians and nurses.

“We've studied drugs to mitigate patients' diagnoses [illness]... we don't diagnose, that's the doctor's expertise. But we assist in the construction of an appropriate treatment plan.” (HP_AMS4, Clinical pharmacist)

Hospital pharmacists shared that, as medication experts, knowing the pharmacodynamics and kinetics was helpful in streamlining antibiotic therapies.

“I know quinolones, such as Levofloxacin, are known—the known side effects of quinolones are insomnia. So as a pharmacist, I have to make an intervention out of it. So, the usual dosing of Levofloxacin is once a day, or sometimes it is given more than a 24-hour dosing schedule. I have to remind my patient about the dosing frequency of the antibiotic to adhere to the treatment and to never miss a dose.” (HP_AMS8, Clinical pharmacist)

b. Antibiotic use

Hospital pharmacists described the importance of being aware of antibiotic consumption. Antibiotic dispensing was highly common in their settings, as stated by hospital pharmacists. All have reported that antibiotics should be used correctly and accordingly because they can cause potential harm to patients when not taken as intended. Few mentioned that they should be aware of the trends in antibiotic consumption within their institution. One hospital pharmacist commented on the importance of being aware of that:

“We have data on how much we have dispensed and the trend of consumed antibiotics... so with that chunk of data, we have an idea of how to improve the monitoring strategies based on the data...” (HP_AMS8, Clinical pharmacist)

c. Reference materials

When making recommendations, hospital pharmacists used several evidence-based references and guidelines. Hospital pharmacists highlighted the importance of using various and multiple references, such as national antibiotic guidelines (NAG), evidence-based electronic databases, books, and even hospital data, to support their knowledge when providing information and doing interventions. Hospital pharmacists shared that they used references to double-check the therapy’s appropriateness and mitigate potential harm from the misuse of antibiotics.

“I have reviewed the laboratory results and seen the serum creatine results. If I observed that there is a decline in the kidney function of the patient, I will now evaluate the dose ordered. In references I’ve used, there it states the safe and appropriate dosing frequency of the antibiotics correlating the lab results.” (HP_AMS12, Clinical pharmacist)

3.1.2 Skills

The second identified theme under hospital pharmacists' expertise was skills. Two sub-themes emerged under skills: technical and soft skills. Hospital pharmacists shared that they need skills to implement AMS strategies.

a. Technical skills

Hospital pharmacists enumerated that proper counting of antibiotic days, dose calculation, and drug utilization review were some of the basic skills needed for antibiotic optimization. Some shared that clinical judgment skills helped streamline antibiotic therapies.

“We are very involved in antibiotic monitoring because it is our way of life here at the institution—we monitor antibiotics daily and have designated areas for endorsement on antibiotic monitoring. We calculate doses and count doses to ensure that they are administered on a daily and timely basis.” (HP_AMS6, Clinical pharmacist)

b. Soft skills

All hospital pharmacists expressed that communication and diplomatic skills are essential for pharmacists to showcase their expertise to other HCPs.

“As pharmacists, we are now more patient-centered... we must closely monitor their antimicrobials... as for us, we must notify and communicate with their doctors. For example, if a medication was prescribed incorrectly, we should ask the physician for clarifications in order to provide safe and efficacious treatment to the patient.”

(HP_AMS6, Clinical pharmacist)

While some, particularly dispensing pharmacists, shared that it is necessary to be attentive to details to reduce errors in dispensing antibiotics.

“In dispensing, we give attention to the medication requests. If we observe that there is a double indication, initially we won't dispense the antibiotics that have the same indication, or it is under the same class...” (HP_AMS15, Dispensing pharmacist)

3.1.3 Hands-on experience

This theme emerged when hospital pharmacists shared their daily responsibilities and challenges when monitoring antibiotics and implementing the ASP policies. One sub-theme emerged under "hands-on experience": the area of practice.

a. Area of practice

Different position-based experiences led to various developments in their professional competencies. It was acknowledged by some hospital pharmacists, specifically clinical pharmacists and those working with well-established ASPs, that their involvement in the AMS practice developed their expertise. In contrast, others needed clarification on whether their hands-on experiences improved their knowledge and skills.

“There was a time around last year that I wondered if I was learning enough because my routine work in AMS was basically the same every day.” (HP_AMS18, Clinical pharmacist)

One hospital pharmacist commented on the competency gained by having experience assigned in both the dispensing and clinical areas of pharmacy.

“When I was still a dispensing pharmacist, with the name position itself, I was just mainly involved in dispensing... I have no access to the charts, which limits my knowledge of important patient information... So, I usually just follow the orders... but when I practice clinically as a pharmacist, it really is more patient-centered. I got to exercise my analytical skills now as a clinical pharmacist. Having exposure and experience in both departments [dispensing and clinical], there’s a difference in the improvement of my expertise when it comes to ensuring proper use of antibiotics...” (HP_AMS12, Clinical pharmacist)

3.2. Cooperation in strengthening the AMS practice in the hospital

Cooperation from hospital pharmacists was the second major element in effectively implementing the AMS practice in hospitals. During the interviews, hospital pharmacists defined some of their roles in the AMS team to establish the ASP’s strategies.

3.2.1 AMS advocacy

Hospital pharmacists' cooperation was determined by their responsibilities in supporting and encouraging the safe and effective use of antibiotics. Two sub-themes emerged under AMS advocacy: shared vision and AMS educators.

a. Shared vision

Hospital pharmacists regarded patients' safety as the most crucial factor when working in AMS. All have expressed that pharmacists' participation in AMS is needed to promote behavioral change in the public. Hospital pharmacists reported that AMS is to aid patients' welfare and quality of life.

“Whenever a patient is admitted, I can help ensure the patient will not be in a critical situation and have a shorter length of stay, receive appropriate treatment for infection and not develop resistance from treatment, and lastly, make treatments cost-effective.” (HP_AMS8, Clinical pharmacist)

b. AMS educators

Hospital pharmacists have expressed that through patient counseling, one can ensure that antibiotics will still be effective and available for generations to come. Aside from patient behaviors, hospital pharmacists described how their education and promotion could encourage better prescribing patterns of antibiotics by physicians.

“The promotion of AMS practice—which could start small until it improves in our society—could start slowly. I can start by educating my family with regard to the proper use of antibiotics. I promote safe antibiotics not only to employees but also to our patients through patient counseling. And it would be a good opportunity to give talks in the community as well, especially in far-flung areas or those that have no real access to education and knowledge about this type of information.” (HP_AMS5, Clinical pharmacist)

3.2.2 Intraprofessional collaboration

Intraprofessional collaboration has influenced hospital pharmacists' cooperation in strengthening AMS practice in their institutions. Two sub-themes emerged: healthy work environment and beyond the hospital setting.

a. Healthy work environment

Hospital pharmacists enumerated the tasks delegated and shared among themselves in ASP. Hospital pharmacists expressed that their workload determined their capability to function toward ASP. Many shared that there needed to be a larger workforce in their institutions. They also have other responsibilities besides implementing AMS.

“Besides monitoring antibiotics for AMS, I have other roles and commitments that I need to perform in the pharmacy. There are times that I will be very busy, especially if I am on ‘solo duty,’ and I will not be able to religiously monitor and review the charts. What usually happens is that we can update our data the following day and sometimes we can no longer monitor the antibiotic, which is a challenge to us.”

(HP_AMS10, Clinical pharmacist)

Despite the heavy workload and lack of workforce experience, healthy working environments were cultivated among hospital pharmacists.

“Simple gestures or ways of concern through ‘kumusta’ [how are you?] from my colleagues make things bearable. We try to understand each other’s weaknesses and strengths. This way we know in what ways we can help each other.” (HP_AMS1,

Dispensing pharmacist)

“In our area, we lack hospitals and manpower... so we created a group chat, which allows us to have constant communication with each other... I guess I can already consider the hospital my second home and an extension of my family.” (HP_AMS9,

Chief Pharmacists)

b. Beyond the hospital setting

Many hospital pharmacists voiced their opinion that other pharmacists should make an effort to work together in enforcing and practicing ASP policies. Some pointed out that the monitoring and safekeeping of antibiotics should be exercised beyond the hospital

setting, and the success of AMS also lies in the practice of community pharmacists and pharmacy owner-pharmacists.

“In most cases, patients initially visit drugstores to ask for medical advice for their health concerns. Community pharmacists are likely to be asked first by patients when they’re going to buy medications... A sad reality is that some are lenient when dispensing antibiotics... The efforts of hospital pharmacists towards stewardship could be wasted due to some pharmacists’ malpractice, especially in small owned pharmacies.” (HP_AMS12, Clinical pharmacist)

3.2.3 Interprofessional relationship

The interprofessional relationship was another key theme that may have influenced hospital pharmacists’ cooperation with AMS. Two sub-themes emerged under interprofessional relationships: decision-making and arguments.

a. Decision making

Most hospital pharmacists expressed that they can influence physicians’ decision-making through their recommendations, making treatments more pragmatic and cost-effective. Hospital pharmacists highlighted that physicians have the final say on whether they will consider the recommendations.

“In hospitals, there is this hierarchy or structure for decision making. As a pharmacist, I can only do so much to intervene or suggest to doctors. However, at the end of the day, the physicians will have the final say whether it will be for the best or for the worst for our patients.” (HP_AMS12, Clinical pharmacist)

Some have challenges communicating with physicians due to the time constraints of both physicians and hospital pharmacists.

“To anchor the practice of AMS here, I try my best to talk with the physician, and encourage them rather than impose on them to follow the policies. Usually, we will just text the prescribing physician if we need some clarification on the order or update them with regards to their requests.” (HP_AMS1, Dispensing pharmacist)

b. Arguments

Many have expressed that it was inevitable to encounter some challenges, primarily with nurses, during the strict dispensing of antibiotics. Each hospital pharmacist shared that they have to be professional whenever issues arise, and most were able to resolve the misunderstandings with HCPs.

“When nurses request, I politely probe why they are requesting because a 24-hour supply of the patient’s antibiotics was already given.” (HP_AMS19, Dispensing pharmacist)

3.2.4 Motivation

Motivation was the last key theme that emerged under hospital pharmacists’ cooperation towards AMS practice. Three sub-themes emerged: appreciation, training, and professional growth.

a. Appreciation

Hospital pharmacists, specifically clinical pharmacists, who have interacted much more with other HCPs, remarked that the appreciation they received for their involvement in AMS made them feel fulfilled and more confident about participating. While dispensing pharmacists were appreciated more by patients, especially those from the out-patient pharmacy.

“Being appreciated is a big help; it made me realize that I was doing my part effectively in the healthcare team and makes me more certain and motivated to share my knowledge.” (HP_AMS17, Clinical pharmacist)

b. Training

All hospital pharmacists have agreed that additional training would motivate them to become more involved in AMS. Some hospital pharmacists, particularly those from private hospitals, have shared that they have yet to be formally trained or educated in implementing AMS strategies. In contrast, pharmacists working in more prominent hospitals with established ASPs focused on expanding their AMS strategies, such as point-of-care interventions.

“I would really like to have more training regarding those AMS strategies... I think more training can help me gain more knowledge and be more confident to talk with and eager to suggest...” (HP_AMS15, Dispensing pharmacist)

c. Professional growth

Some hospital pharmacists, particularly dispensing pharmacists, shared their interests and felt motivated to improve their competency and be more involved in AMS. Some shared that when the physicians did not follow the interventions, they considered improving their knowledge and skills challenging.

“Actually, I am super interested when it comes to AMS. Because I really want to expand my knowledge. And also, I want to share with others [the knowledge] that I will be learning because I know they are lacking, especially those at the wards. Whenever I’ll be in a difficult situation, I will ask myself and acknowledge that I need some areas of my expertise that need to be improved.” (HP_AMS19, Dispensing pharmacist)

“Whenever my recommendations are questioned by the doctor, I take it as a lesson that next time I should impress them. I take it as a challenge and a motivation for myself.” (HP_AMS12, Clinical Pharmacist)

4. Discussion

This study provided valuable insights into hospital pharmacists' expertise and cooperativeness in implementing ASP policies and strategies. The key themes that revolved around expertise were knowledge, skills, and hands-on experience, while for cooperation were AMS advocacy, intraprofessional collaboration, interprofessional relationship, and motivation.

For AMS to succeed, expertise from hospital pharmacists is needed in implementing AMS strategies for streamlining antibiotic therapies. Hospital pharmacists consider themselves medication experts. As medication experts, hospital pharmacists expressed that their expertise in optimizing antibiotics relied on their extensive knowledge of drug information, pharmacodynamics (PD), and pharmacokinetics (PK), which they applied to the AMS's

strategies and policies. Having concepts of PK-PD optimizes the selection and duration of therapy, which is essential in modern treatment and addresses AMS practice.²⁵

However, hospital pharmacists' knowledge could have been improved due to their engagement in AMS practice. The amount of exposure to the activities in AMS within the hospital influenced their expertise concerning monitoring and optimizing antimicrobial therapies. Some hospital pharmacists, particularly clinical pharmacists, were more competent with their knowledge of the policies and procedures of ASPs. These findings were also observed among Australian pharmacists, wherein gaps in practice, knowledge, and confidence among hospital pharmacists in reviewing antibiotic prescriptions were evident.¹³ A qualitative study highlighted that pharmacists' practice-based knowledge was produced about the routinely performed tasks in their practice area. Exposure of hospital pharmacists to AMS activities would make them more knowledgeable and acquainted with ASP strategies and policies.²⁶

Hospital pharmacists shared that the availability of different information resources has been helpful in their knowledge of antimicrobial therapies. They expressed that their references enabled them to verify the proper selection of antibiotics in de-escalating treatments and dose considerations for renal and pediatric patients. According to a cross-sectional study conducted in Jordan using an online survey,²⁷ utilization of available drug information resources benefited pharmacists in improving patient outcomes. In contrast, a questionnaire survey in Hong Kong highlighted that personal knowledge was the most important source of information.²⁸ Therefore, the accessibility and utilization of different drug information resources were essential to the stored knowledge of hospital pharmacists in streamlining antibiotic therapies.

Hospital pharmacists assigned to the clinical area have done chart rounds and shared that they could apply their expertise and show their skills in reviewing the appropriateness of antimicrobial therapies and performing drug dose calculations. These mechanisms allowed hospital pharmacists to do their clinical interventions and promote the effective use of antibiotics. A systematic review that evaluated pharmacist-led interventions in hospitals demonstrated the better use of medications, reducing the number of hospital visits and length of

hospital stay.²⁹ The increased visibility of hospital pharmacists around the wards enabled them to exhibit their expertise on proper antibiotic usage in hospitals.

Hospital pharmacists showed that being knowledgeable about antibiotic consumption recognized the importance of AMS in hospitals. Hospital pharmacists shared that they have observed inappropriate prescribing patterns of antibiotics, leading to overprescribing antibiotics. Thus, they expressed that a crucial component of efficient monitoring of antibiotics was being vigilant and aware of their dispensing practices. Hospital pharmacists indicated that data and trends on antibiotic usage provide new knowledge that can be examined to improve strategies for AMS. Awareness of the new body of knowledge on antibiotic consumption in hospitals allowed them to apply their expertise, participate in clinical decisions, and encourage HCPs to follow guidelines. These findings agreed with a retrospective observational multicenter study that concluded that antibiotic consumption was significantly reduced when pharmacists thoroughly reviewed the prescriptions and applied their observations and knowledge to intervene.³⁰

Hospital pharmacists have a role in promoting behavioral changes in the public with antibiotic use. Hospital pharmacists have claimed they are crucial in ensuring patients will not abuse or misuse antibiotics. Pharmacists were committed to enhancing patient care by educating patients on the proper use of antibiotics and counseling patients to adhere to their full course of antibiotic therapies. Moreover, hospital pharmacists were critical in providing education on the regulations and tactics of AMS to HCPs, and discussing with physicians their unnecessary overprescribing of antibiotics. A systematic review concluded that education from pharmacists led to changes in the behaviors of prescribers, such as increased compliance with the AMS policies and reduced extension of therapies.³¹ These initiatives improve patient outcomes and reduce risks for AMR in hospitals.

Hospital pharmacists' contributions highlight the importance of intradisciplinary practice in achieving effective AMS. The study signified the importance of a collaborative approach, with fellow pharmacists recognizing that they can learn from each other and improve patient outcomes by sharing best practices. There was a concern among some hospital pharmacists that many community pharmacists may need to be fully aware of the strict AMS practices required in

hospitals, as some community pharmacists dispense antibiotics without prescriptions. This malpractice concerns hospital pharmacists' value in their rigid AMS efforts. An explorative qualitative study in Denmark indicated that insight into each other's work would allow a thriving collaborative culture among pharmacists working in different fields.³² Intraprofessional collaboration among practicing pharmacists would make AMS practice more visible and effective.

Motivation was determined to influence hospital pharmacists' cooperation toward AMS practice. Hospital pharmacists who were involved in AMS were more appreciated for their efforts, increasing their motivation to perform their responsibilities. Acknowledgement of pharmacists' work involvement in ASPs enhanced their work performance and job satisfaction. There is suggestive evidence from a mixed-method study conducted in Italy that appreciation was linked to increased motivation.³³ In contrast, hospital pharmacists, specifically dispensing pharmacists, were more likely to feel overwhelmed and underprepared. They were more inexperienced with the practice since most of their responsibilities focused on traditional practices, which were dispensing and compounding. This led to an increased desire to develop their competency, as this was essential in the implementation of ASPs. A secondary analysis using a qualitative descriptive approach in Canada supported the result of the study, that lack of training increased the desire of pharmacists to undergo multiple training sessions that would make them feel more confident in their abilities and knowledge.³⁴ By acknowledging their work and continuously improving their expertise, hospital pharmacists can provide better care and contribute more effectively to the overall health system.

Lastly, hospital pharmacists emphasized the importance of maintaining professionalism while handling disagreements. They recognized that maintaining a professional demeanor can help navigate conflicts and reach resolutions that benefit both parties. Mutual trust, the ability for effective communication, and having a good grasp of other HCPs roles and competencies have been supported as desirable factors in developing healthier interprofessional relationships.³⁵ By handling disagreements respectfully, pharmacists can maintain positive working relationships with the healthcare team and provide high-quality patient care. A positive workplace made them motivated to immerse themselves more in the multidisciplinary approach of AMS practice. A

qualitative study conducted in Sweden supported the results that a positive and healthy working environment promotes virtue, commitment, and happiness at work, and improves work performance, which is favorable to patients and the community.³⁶ Communication and interpersonal skills play a role in maintaining a culture of collaboration in hospitals that enabled pharmacists to effectively review and facilitate the streamlining of antibiotic therapies, thus improving patient outcomes.

This study has some limitations. First, the small sample size limited generalizability. However, the hospital pharmacists recruited were from different parts of the Philippines, in line with the study's criteria, and saturation of themes was achieved. Second, interviews were conducted virtually. This may have limited the participants' observations during the interview and not fully established rapport. Follow-up questions and probing techniques encourage hospital pharmacists to express and share their insights freely. Lastly, some hospital pharmacists who participated were interviewed in Visayas and Mindanao. Though it was clearly stated before the interviews that they could use *Bisaya* [a local dialect], they might have felt embarrassed and had difficulty sharing their insights and experiences. Despite the limitations, this study is the first step to highlight hospital pharmacists' expertise and cooperation on AMS in the Philippines.

Conclusion

Pharmacists' highly specialized knowledge and skills are essential, as they executed most of the ASPs' duties and significantly contributed to implementing AMS strategies in the hospitals. Combating AMR and the success of AMS lie in hospital pharmacists' collaboration with fellow pharmacists inside and outside the hospital setting, as well as with physicians and nurses. Although there is an existing definition of roles for pharmacists in ASPs in the Philippines, clearly defining the roles of hospital pharmacists in AMS with the provision of training will increase their engagement in striving to maintain the AMS strategies and optimize the use of antibiotics. Future interdisciplinary studies may be conducted to triangulate results from the perspectives of physicians, nurses, and pharmacists.

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Authorship contribution statement

Conceptualization, J.M., D.J., R.M.P, and L.D.M; Data collection, J.M., R.M.P., D.J. and L.D.M.; Thematic analysis, J.M., R.M.P., D.J. and L.D.M.; Interpretation, J.M., R.M.P., S.D.C., A.A.S, and R.R.C; Writing—original draft, J.M.; Writing—review & editing, J.M., S.D.C., A.A.S. and R.R.C. All authors approved the final manuscript.

Declaration of competing interests

The authors declared that they have no competing interests.

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Appendix A. Supplementary data

- A. COREQ Checklist (attached in a separate file)
- B. Conceptual framework (attached in a separate file)
- C. Interview guide (attached in a separate file)

Table 1. General characteristics of hospital pharmacists (n = 19)

General characteristics	n	%
Sex		
Male	2	10.5
Female	17	89.5
Number of years as a hospital pharmacist		
Less than a year	2	10.5
2 - 3	9	47.4
> 3	8	42.1
Hospital category		
Public	5	26.3
Private	14	73.7
Hospital level		
I	2	10.5
II	3	15.8
III	14	73.7
Number of years since the ASP was implemented in the hospital		
1-2	6	31.6
> 3	10	52.6
No idea	3	15.8
Location of the hospital		
Luzon	8	42.1
Visayas	6	31.6
Mindanao	5	26.3
Current position		
Chief pharmacist	2	10.5
Dispensing pharmacist	5	26.3
Clinical pharmacist	12	63.2

ASP, Antimicrobial Stewardship Program

Table 2. Different aspects of hospital pharmacists' expertise on AMS

Key Themes	Sub-themes	Description
Knowledge	Medication experts	Hospital pharmacists shared some of their in-depth knowledge of the pharmacodynamics and pharmacokinetics of drugs.
	Antibiotic use	Hospital pharmacists described the importance of being aware of antibiotic consumption.
	Reference materials	When making recommendations, hospital pharmacists used several evidence-based references and guidelines.
Skills	Technical skills	The technical skills (e.g., calculation of dose, reviewing of indication, counting of antibiotic days, etc.) of a hospital pharmacist.
	Soft skills	Hospital pharmacists highlighted that they should be able to communicate well in AMS practice.
Hands-on experience	Area of practice	Different position-based experiences led to various developments in their professional competencies.

AMS, Antimicrobial Stewardship

Table 3. Factors that influence the cooperation of hospital pharmacists

Key Themes	Sub-themes	Description
AMS advocacy	Shared vision	Hospital pharmacists regarded patients' safety as the most important factor when working in AMS.
	AMS educators	Hospital pharmacists shared what needs to be taught and what their ways would be to disseminate information about malpractices leading to AMR.
Intraprofessional collaboration	Healthy work environment	Hospital pharmacists enumerated the tasks delegated and shared among themselves in ASP.
	Beyond the hospital setting	AMS practice was also dependent on other pharmacy settings.
Interprofessional relationship	Decision-making	Hospital pharmacists were mostly involved in providing recommendations.
	Arguments	Some HCPs experienced challenges in implementing AMS policies.
Motivation	Appreciation	Appreciation made hospital pharmacists acknowledge their own efforts in AMS.
	Training	While many hospital pharmacists have insufficient training in ASP policies and strategies, those who had enough training were motivated to strengthen the AMS practice in the hospital.
	Professional growth	Hospital pharmacists strived to improve their competency.

AMS, Antimicrobial Stewardship; AMR, Antimicrobial Resistance; ASP, Antimicrobial Stewardship Programs; HCPs, Healthcare Professionals

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