

# Perspectives of Physician and Pharmacist Stewards on Successful Antibiotic Stewardship Program Implementation: A Qualitative Study

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**Background.** Antibiotic stewardship programs (ASPs) are required at every hospital regardless of size. We conducted a qualitative study across different hospital settings to examine perspectives of physician and pharmacist stewards about the dynamics within their team and contextual factors that facilitate the success of their programs.

**Methods.** Semistructured interviews were conducted in March–November 2018 with 46 ASP stewards, 30 pharmacists, and 16 physicians, from 39 hospitals within 2 large hospital systems.

**Results.** We identified 5 major themes: antibiotic stewards were enthusiastic about their role, committed to the goals of stewardship for their patients and as a public-health imperative, and energized by successful interventions; responsibilities of pharmacist and physician stewards are markedly different, and pharmacy stewards performed the majority of the day-to-day stewardship work; collaborative teamwork is important to improving care, the pharmacists and physicians supported each other, and pharmacists believed that having a strong physician leader was essential; provider engagement strategies are a critical component of stewardship, and recommendations must be communicated in a collegial manner that did not judge the provider competence, preferably through face-to-face interactions; and hospital leadership support for ASP goals and for protected time for ASP activities is critical for success.

**Conclusions.** The physician-pharmacist team is essential for ASPs; most have pharmacists leading and performing day-to-day activities with physician support. Collaborative, persuasive approaches for ASP interventions were the norm. Stewards were careful not to criticize or judge inappropriate antibiotic prescribing. Further research should examine whether this persuasive approach undercuts provider appreciation of stewardship as a public health mandate.

**Keywords.** antibiotic resistance; antibiotic stewardship; infectious diseases; infection prevention.

The increase in antibiotic-resistant infections has created an urgent public health need to reduce inappropriate antibiotic prescribing [1–3]. Antibiotic stewardship programs (ASPs) can improve antibiotic use and patient outcomes, reduce antibiotic resistance, and result in significant cost savings [4–9]. Some ASPs have been in place for decades, often at academic

institutions with onsite infectious diseases (ID) physicians and pharmacists, whereas other programs have recently been introduced in response to regulatory and accreditation agencies' requirements for an ASP at every hospital, regardless of size [10, 11]. A better understanding of optimal implementation of ASPs across different healthcare settings is essential.

The physician-pharmacist team is central to ASP activities [12, 13], but there are few published data that examine their perspectives about the relationships and dynamics within their team and their insights about contextual factors that facilitate the success of their programs [14–16]. Despite similar ASP strategies, appropriate antibiotic prescribing outcomes vary between facilities. It is essential to explore the factors that might explain those differences. Through individual qualitative interviews, we studied physician and pharmacist steward perceptions within 2 large hospital systems, focusing on satisfaction with role, division of team

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responsibilities, relationships between physician and pharmacist stewards, strategies to engage providers, and organizational culture and leadership support around stewardship.

## METHODS

### Sample and Recruitment

As part of a mixed-methods research project conducted at 134 Veterans Health Administration (VA) and 20 Intermountain Healthcare system (IHC) hospitals, we first conducted a survey using constructs from the Consolidated Framework for Implementation Research (CFIR) [17], (see [Supplementary Appendix 1](#)) to understand how ASPs are implemented within adult general medical/surgical inpatient settings and explore implementation strategies and local factors associated with success. A total of 329 antibiotic stewards were invited to participate. We received 182 responses (55.3%) from stewards (155 of 289 VA responses from 102 pharmacist and 53 physician stewards and 27 of 40 IHC responses from 16 pharmacist and 11 physician stewards) and at least 1 response from 126 hospitals (109 VA and 17 IHC) for a response rate of 81.8%. Included in the survey was a request to opt-in for an individual interview. Between March and November 2018, we invited every steward who had agreed to be contacted (N = 95) to participate in a 30-minute interview; 46 accepted and completed interviews.

### Qualitative Data Collection and Analysis

We developed a semistructured interview guide to explore survey responses in-depth with a particular focus on characteristics of organizational culture and implementation climate (inner setting), characteristics of the interventions, and characteristics of the individual steward. The guide addressed stewardship team structure including team members and day-to-day stewardship tasks, organizational characteristics, available resources, and local ASP implementation strategies (see [Supplementary Appendix 2](#)). During interviews, we probed stewards about personal satisfaction with their role, communications with their program co-leader, and engagement strategies with nonstewardship physicians and pharmacists. All sites approved the parent study at their respective Institutional Review Boards (IRBs); the Boston University Medical Center IRB approved this substudy of steward interviews.

Telephone interviews were conducted by team members experienced in qualitative interviewing and knowledgeable about stewardship. One investigator (E.C.) led all interviews. Investigators T.F.B. and/or M.-L.D. participated in 8 of 11 initial interviews to ensure consistency of the content and interview approach. Interviews were audio-recorded with permission. Interviews were transcribed verbatim by a professional transcription service with all identifiers removed except the steward's role and site.

To analyze the data, the study team implemented a collaborative codebook development and coding process involving several steps [18, 19]. First, 6 research team members read 3

transcripts independently, applying the CFIR constructs and inductively generating emergent themes not identified within the CFIR. After agreement on a preliminary codebook, the same 6 team members then applied these codes to another 3 transcripts independently. Through additional rounds of this process, codes and definitions were refined until consensus was reached. Four team members used the qualitative software program NVivo (QSR International v12) to apply final codes to transcripts, with at least 2 team members coding each transcript.

## RESULTS

We interviewed 46 ASP stewards, 30 pharmacists, and 16 physicians, from 39 hospitals (see [Table 1](#)). The majority of stewards worked at VA hospitals (82.6%). Stewards who participated in an interview were more likely to be male or have an interest in stewardship before their current position compared with those who only completed the survey (see [Supplementary Table 1](#)). The stewards had been at their hospital a median of 7.5 years (standard deviation = 9.2 years). Thirty-five stewards worked at teaching hospitals, most in urban areas, and 21 worked at sites in the western United States. All but 1 physician steward had ID training, and 60% of pharmacist stewards had ID or antibiotic stewardship training. Thirty-three of 39 sites used prospective audit and feedback as a major ASP strategy; IHC sites used telemedicine as an integral part of their program. Eighteen sites had electronic information technology support for ASP. Approximately 50% of respondents had some protected time for stewardship. The VA pharmacist stewards received 0.3–1.0 full-time equivalents (FTEs), but VA physicians and IHC stewards were less likely to have formal FTE support.

### Our Analyses Identified Five Major Themes

(1) Stewards enjoy their role and view it as important to improving patient care

Both physician and pharmacist stewards deemed their activities to be extremely important, crucial for patient management and improving care, and making a positive difference. Stewards enjoyed learning new skills; working with their stewardship co-leader, frontline physicians (“providers”), and pharmacists; and serving as educators for other healthcare professionals. Comments included the following: “*I feel happy to come to work and intervene in these types of ways where these small conversations can hopefully make a big difference in our facility’s antibiotic use.*” (No. 43-Pharmacist) “*I always love doing education and so I feel like a lot of stewardship revolves around education.*” (No. 1-Physician) “*For me, the best is when I feel like I make an intervention that matters to the patient.*” (No. 19-Pharmacist).

Most stewards focused on benefits for individual patients, whereas others discussed benefits on a population-level, public health basis. One steward described the importance of both

**Table 1. Descriptive Statistics of Interview Participants**

Variable	Total Sample		Physicians		Pharmacists	
	N	%	N	%	N	%
Interview Participants	46	100	16	34.8	30	65.2
Intermountain Hospital	8	17.4	1	6.3	7	23.3
VA Hospital	38	82.6	15	93.7	23	76.7
Male	29	63.0	11	68.8	18	60.0
Female	17	37.0	5	31.2	12	40.0
Infectious Diseases or Antibiotic Training <sup>a</sup>						
Yes	33	71.7	15	93.7	18	60.0
No	13	28.3	1	6.3	12	40.0
Residency Training <sup>b</sup>						
Yes	38	82.6	16	100.0	22	73.3
No	8	17.4	0	0.0	8	26.7
Year Licensed <sup>c</sup> (Median, SD)	2006	11.3	1997	12.3	2006	9.7
Length of time at facility (Median, SD)	7.5	9.2	10.0	11.0	7.0	7.1
Facility of Steward <sup>d</sup>						
Teaching Hospital	35	76.1	14	87.5	21	70.0
Nonteaching Hospital	11	23.9	2	12.5	9	30.0
Urban	29	63.0	12	75.0	17	56.7
Suburban	12	26.1	3	18.7	9	30.0
Rural	5	10.9	1	6.3	4	13.3
Region: Northeast	5	10.9	2	12.5	3	10.0
Region: Midwest	11	23.9	6	37.5	5	16.7
Region: South	9	19.6	3	18.7	6	20.0
Region: West	21	45.7	5	31.3	16	53.3

Abbreviations: SD, standard deviation; VA, Veterans Health Administration.

<sup>a</sup>Includes a range of training from educational activities to formal postgraduate program.

<sup>b</sup>Includes any residency training and is not limited to infectious diseases.

<sup>c</sup>Results from 45 stewards due to missing data.

<sup>d</sup>There was a total of 39 facilities—both pharmacist and physician stewards were interviewed at 7 sites and a pharmacist operating room physician steward was interviewed at 32 sites.

components: “*There are those who really focus on the individual patient and interventions at that level, and there are those who are more program managers and population managers and spend a greater portion of their time in developing systems that support the decision making by providers rather than developing programs that intervene with providers one-by-one on a personal level... we need the combination of people.*” (No. 40-Physician)

### (2) Responsibilities of pharmacist and physician stewards are markedly different

Pharmacy stewards performed the majority of the day-to-day stewardship work—conducting chart reviews, interacting with providers and other pharmacists, and making interventions. The physician steward’s role varied somewhat, but only 1 facility had a physician complete most of the ASP work. At that site, the physician performed regular review of patients on targeted antibiotics, and then he either communicated interventions to the inpatient pharmacists to discuss with the teams or communicated with the teams directly. For some hospitals, the physician steward’s activities were confined to serving on the stewardship multidisciplinary committee and being available for questions. “[*The ID doctor*]

*frankly [is a steward] mostly in name only. I think with their schedules and current workload they do not do just a ton of the day-to-day activities.*” (No. 2-Pharmacist) However, most physician stewards reviewed cases with the pharmacists regularly, from once weekly up to 5 times weekly. The pharmacist typically would pre-review cases for discussion to maximize efficient use of physician time. “*We do daily from Monday through Friday. Once a day for an hour. Depends how many patients we have, but, usually, I will make sure I have all the information available, what they need, so we don’t take that much of [the physician’s] time, say about an hour.*” (No. 42-Pharmacist) Some programs focused only on complex patients while others reviewed patient lists more comprehensively.

### (3) Collaborative teamwork is important to improving care

Despite differences in day-to-day workload, the pharmacists and physicians generally felt they worked as a team and supported each other. Pharmacist stewards believed that having a strong physician leader was essential and the program would suffer without that leadership. Only 1 pharmacist had a negative comment about the physician steward co-leader, specifically the physician signed pharmacist notes as their own, without proper

credit or attribution. Otherwise, the feeling of mutual support and collaboration was universal. “[The ID doctor] is genuinely interested in doing stewardship, likes to teach, is very big on trying to see improvements with these processes, wants to do more, is always looking for different opportunities..., it’s been very good to work with her and feel like this is important and matters and it’s done the right way.” (No. 45-Pharmacist)

(4) Provider engagement strategies are a critical component of stewardship

The most frequently described component of the steward role related to provider engagement. The steward’s sense of self-efficacy (confidence they can accomplish their tasks and interventions), personal familiarity with the provider, provision of evidence-based interventions that respect provider autonomy, physician steward support for pharmacist interventions, and face-to-face communications with providers encouraged positive provider engagement and are discussed below.

- (a) Self-efficacy: Most pharmacy stewards felt comfortable communicating with providers directly to make interventions. Sometimes the pharmacist had a great deal of experience in the field and/or longstanding relationships at the hospital. “I feel pretty comfortable. I think just because I’ve been doing it for so long for, like, 10 years. Now, I think in the beginning, it was harder because you didn’t really know how they were going to react or what to say. But I think over time, you kind of have the same issues that you run into with patients and same things that you’re calling people about.” (No. 48-Pharmacist)
- (b) Familiarity: When stewards did not know the provider, communication and having recommendations accepted was more challenging. This was evident at teaching facilities where house officers rotated frequently, or with large physician groups that provided care at multiple facilities. As one steward explained: “Being a teaching hospital, usually you have the providers—if they don’t know you or are only rotating through and don’t know you well, don’t necessarily want to listen as much or trust you, because they don’t know you.” (No. 45-Pharmacist)
- (c) Evidence-based recommendations: When contacting providers, stewards deemed it important to take an evidence-based approach backed up by data and be candid when the evidence was not clear-cut. “[Providers] are really receptive to evidence-based recommendations. Once you can justify that, they’ll really enjoy making the change because it’s sound, sound change.” (No. 12-Pharmacist) “It’s been to make sure that I develop a... trust in them. So I’m really careful to never say—to give a fact or say something that can’t be supported in literature and that I can’t show.” (No. 24-Pharmacist) Even with evidence-based recommendations, advice must be communicated in a way that

is collaborative and respectful, stewards cannot be viewed as “antibiotic police.” “...you wanna give people feedback but you don’t wanna be overbearing. You don’t wanna come across as if you’re the antibiotic police.” (No. 29-Physician) Stewards, especially pharmacist stewards, were careful not to undercut the provider’s view of their own expertise. “I always present, intervene by saying, “You probably already know this, but—then I’ll give them the literature or the data. My goal is to try to maintain their integrity. Not make them look bad.” (No. 24-Pharmacist) “They (physicians) are the top of the hill. They’re the final say. Even though I know I know something they don’t, I have to be extremely careful with that because if I embarrass them or push too hard and make them mad, then they’re not going to be receptive to the next thing that comes along.” (No. 14-Pharmacist)

- (d) Physician steward support for pharmacist interventions: Pharmacists noted the benefit of having physician support and endorsement for their stewardship interventions because providers trust other physicians’ expertise more than that of pharmacists. Physician steward endorsement legitimized the pharmacy steward’s recommendations. “I think, for me, the turning point was when [ID physician] got involved with me. That really made a difference because I was doing the same thing, but they had doubts. I mean by the hospitalists would have doubt that ‘he’s a pharmacist, and I don’t know how much he knows. They are physicians. They know more.’ Things like that.” (No. 42-Pharmacist)
  - (e) Face-to-face communication with providers: Stewards generally agreed that face-to-face communications with physicians were most effective and improved recommendations: “Face to face interaction is by far the best in my mind just because you can have more of a conversation and understand their perspective, get more of the context and the back story.” (No. 28-Pharmacist) “I think face-to-face communication is very important. People say, “Oh, it takes too much time.” You also have to consider the output. The output is much better in terms of accepting recommendations and developing positive attitudes.” (No. 6-Physician) Some physician and pharmacist stewardship teams physically rounded together on patients before making a recommendation. “We not only do a chart review, but we see the patient, especially if it’s not a very busy day, in terms of consults... After seeing the patient, and we go, and talk to the team, and say, ‘It was a good idea, initially, but based off of this, this, and this, we would recommend actually putting a patient on this.’ ” (No. 10-Pharmacist)
- (5) Hospital leadership support for ASP goals and for protected time for ASP activities is a critical ingredient for success

Although interviewees indicated there was general support for the concepts of stewardship within their facilities, they believed that frequent reinforcement by hospital leadership

about the role of the ASP, the importance of stewardship for patient care, and visible support of hospital leaders were necessary. One pharmacist explained: *“I think a program would not be successful...without the backing of the upper management. For instance, the chief of staff, the chief ID attending, the chief of ID. Without them, not going to be successful. They have to be intimately involved.”* (No. 46-Pharmacist) Another spoke about how leadership could better support them to deal with difficult providers: *“There are certainly things we wish...had more support for or more forceful kind of people in positions or authority or departments that would really say to those services, ‘you have to do these things. You have to follow.’”* (No. 45-Pharmacist)

Moreover, leadership support for the ASP was not viewed as sufficient unless it included adequate protected time to conduct stewardship activities. One pharmacist steward described the challenge of multiple responsibilities: *“I wish I had more time to increase my proficiency in that area, but I have a lot of competing factors too because my site’s so small, and we have so few clinical pharmacists that we all have multiple responsibilities... usually, the time factor is what weighs on me the heaviest.”* (No. 31-Pharmacist) A physician steward noted: *“I’ve always wished that I had more time to dedicate to it. If there were such a thing as a full-time position for an MD to do it, I’d probably like that kind of job. In most settings, it isn’t a full-time position for a doc.”* (No. 41-Physician)

## DISCUSSION

Across 2 major healthcare systems, antibiotic stewards were enthusiastic about their role, committed to the goals of stewardship for their patients and as a public health imperative, and energized by successful interventions. Most stewards worked at VA hospitals; the VA system has supported the need for ASPs and adequate ASP staffing in directives since 2014 [20, 21]. Daily stewardship activities were led by pharmacists at virtually all sites whereas the physician’s role was much more variable. Most stewards had been at their hospital for many years; there is likely a benefit for ASPs to have at least 1 core member well established at the facility to develop necessary relationships with providers. Relationships between pharmacist and physician co-leads in stewardship were supportive. Pharmacist stewards appreciated and understood the benefit of visible support by the stewardship physician, who endorsed the skill set and advice of the pharmacist; the pharmacists believed this helped other providers trust their interventions. Both physician and pharmacist stewards were cognizant of the importance of engagement with providers and communicating their recommendations in a collegial manner that did not judge the provider competence. Most stewards stressed the importance of face-to-face interactions.

Position statements by professional ID societies have called for ASP leadership by a physician; preferably ID-trained [22–24]. The Centers for Disease Control and Prevention’s “Core

Elements of Hospital Antibiotic Stewardship Programs” guidance suggests accountability for ASPs should be assigned to a physician leader with a pharmacist co-lead [25], recognizing the central role of pharmacists. In our study, within 2 diverse hospital systems, the pharmacy steward was often the face of the ASPs, leading day-to-day operations and performing the majority of the daily interventions. This is consistent with our prior findings that ID fellows view pharmacists as the ASP leads [26]. Given the prominent role of pharmacists, it is not surprising that a recent report suggests an approximately 3:1 pharmacist to physician staffing ratio for ASPs [27].

Pharmacists’ routine practice is to review prescribed medications to verify dose, indication, guideline concordance, and drug-drug interactions, similar to ASP activities. In contrast, physicians do not typically review other provider’s charts or critique their prescribing when not consulted to do so. Thus, pharmacist leadership within ASPs is more closely aligned with their scope of practice and culture than that of the physician. This distinction should be considered as physician and pharmacist roles in ASPs continue to evolve and as facility leaders decide how to dedicate resources when implementing ASPs. The most appropriate model may be one in which physicians support their stewardship program with a population health perspective, being available for regular patient review and consultation as needed, with pharmacists leading and performing day-to-day activities.

Increasingly, ASP implementation publications identify the importance of recognizing a hospital’s antibiotic prescribing etiquette, the use of nonthreatening and nonjudgmental communication, and the use of persuasive rather than restrictive strategies [28–32]. Similar themes were identified in our study. Stewards did not want to be seen as antibiotic police. Physician stewards worry about relationships with their peers and interfering with the autonomy of frontline physicians [33, 34], whereas pharmacists deal with a physician-pharmacist hierarchy and are careful not to outright challenge a provider’s decision. In our interviews, stewards believed that face-to-face communication and an educational, evidence-based persuasive and collaborative approach were directly linked to the acceptance of the ASP at their institution [32, 35]. This strategy leads to a visible presence of ASP team members and establishes antibiotic stewards as essential members of the team. However, it is very resource-intensive, requires frequent interventions, and focuses on improving care for the individual patient rather than on the population perspective of containing antibiotic resistance. Framing stewardship in this way may limit the degree to which changes in practice can be implemented as a public health mandate because it suggests all interventions are voluntary and it is not appropriate to challenge the provider’s autonomy. This is in contrast to other public health interventions, such as for infection control, where the public health imperative supersedes individual provider practice. Although prescribing

decisions rely on provider assessment and clinical judgment, many are straightforward and the ASP could be assigned greater authority to intervene when evidence-based practice is not followed. Research is needed to examine whether the current focus on using persuasive strategies, which are careful not to criticize or judge inappropriate antibiotic prescribing, may undercut provider appreciation of the critical importance of stewardship [36, 37].

This study has several limitations. As with any qualitative study, the results are not meant to be generalizable, although our high survey response rate suggests good internal generalizability within these 2 healthcare systems. Although we found widespread expressions of enthusiasm by stewards for their ASP role, we may not have captured stewards who would have expressed more negative thoughts due to lack of initial interest, inadequate FTE support, or burnout. The VA hospitals may not be typical of nonfederal facilities and have demonstrated support as a healthcare system for ASP implementation. Intermountain Healthcare is nonfederal, but it operates over a limited geographic area, predominantly in Utah. Interviews were primarily with stewards at urban, teaching hospitals in the western United States, and our results might differ if our sample were more geographically diverse.

## CONCLUSIONS

Despite this, our interviews provide important perspectives of physician and pharmacy stewards across hospital settings that vary by geographic location, academic affiliation, bed size, and patient acuity. These findings can be used to inform the implementation of stewardship programs. The interviews raise important differences between the physician and pharmacist perceptions and roles in implementing an ASP. This should be fully considered to ensure full participation and professional satisfaction of stewards, ultimately resulting in improvement to health systems and patient care.

## Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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