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COMMENTARY

Leveraging Health Systems to Expand and Enhance Antibiotic Stewardship in Outpatient Settings

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The widespread implementation of antibiotic stewardship programs across all health care settings is critical to slow the development of antibiotic resistance and ensure that patients receive the best medical care. Currently, most hospitals and long-term care facilities have reported implementation of antibiotic stewardship programs (95.0% of hospitals and 76.6% of long-term care facilities in 2021).[1,2] However, more work is needed to expand antibiotic stewardship efforts into outpatient health care practices—including primary care, urgent care, and retail clinics, and within care provided through telemedicine services. These health care settings account for the majority of antibiotics prescribed in the United States, and previous studies have shown high rates of inappropriate prescribing.[3–6]

Successful outpatient antibiotic stewardship implementation requires a coordinated effort between a diverse group of health care stakeholders to ensure that individual practices and clinicians have the resources and support they need to improve their prescribing practices. One key stakeholder group with the ability to support stewardship expansion into outpatient practices is health systems. Health care delivery in the United States has become increasingly consolidated, with one study finding that around 72% of hospitals and 49% of primary care physicians were affiliated with health systems in 2018.[7] Health systems offer the ability to provide resources and infrastructure that can support antibiotic stewardship efforts across multiple outpatient practices.

In 2020 The Pew Charitable Trusts (Pew) and Intermountain Health conducted small-group discussions with 20 health systems and collaborative networks to identify how these organizations were approaching system-based antibiotic stewardship efforts.[8] This work found that 17 (85.0%) of the participating health systems had 75% to 100% participation of their inpatient facilities in system-level antibiotic stewardship efforts, but only 3 (15.0%) had a similar level of participation from their outpatient facilities.

In follow-up to that work, Pew and Intermountain—in consultation with the Centers for Disease Control and Prevention (CDC)—brought together health system stewardship leaders to discuss approaches for health system–led outpatient stewardship activities. This convening occurred on September 7 and 8, 2022, in Salt Lake City and was attended by 37 experts from 15 health systems, Pew, CDC, and The Joint Commission. All health systems represented had at least some outpatient stewardship activities, ranging from newly established efforts to long-standing, complex outpatient programs. During the convening, a primary moderator [D.Y.H.] led participants through several topics, including the benefits of health system–led outpatient stewardship, methods for building leadership support, approaches for health system–led outpatient stewardship, and what is needed for broader uptake of outpatient stewardship at the health system level. A moderator guide was developed [R.H.R., D.Y.H, R.M.Z.] to informally guide the discussion (see Appendix 1, available in online article).

The convening was recorded and transcribed, and the transcript was reviewed to identify key discussion takeaways [R.H.R.]. All authors reviewed these identified takeaways and provided feedback. This commentary will describe these key takeaways and identify next steps for leveraging health systems to enhance outpatient antibiotic stewardship efforts.

BENEFITS OF HEALTH SYSTEM–LED OUTPATIENT ANTIBIOTIC STEWARDSHIP EFFORTS

Participants discussed key benefits to health system–led outpatient antibiotic stewardship efforts, including both the ability to standardize stewardship practices across multiple facilities and to leverage centralized resources to support stewardship interventions.

Standardizing Antibiotic Prescribing Practices

Participants highlighted the important role that health systems can play at ensuring that there is consistency of stew-

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ardship interventions and practices across the entire health system. For example, health systems can develop organizationwide guidelines and standards that detail what is considered appropriate outpatient antibiotic prescribing practices within a given health system context. Participants discussed that institutional guidelines help establish benchmarks for performance that can be used to hold health system providers accountable for their prescribing practices and help ensure that consistent, high-quality care is provided across all outpatient settings. In addition, this type of standardization can help ensure that patients receive consistent messaging on when antibiotics are and are not needed, no matter where they receive care in a health system.

Leveraging Centralized Resources

Participants also emphasized that health systems can leverage centralized resources to achieve economies of scale for stewardship efforts and minimize duplication of efforts across different outpatient practices. For example, clinics within a health system may share an electronic health record (EHR). This type of shared data resource could be used to create antibiotic prescribing dashboards to provide feedback to clinicians. Rather than each individual practice creating its own dashboard—with the personnel time needed to develop and execute this intervention—health systems can leverage shared EHRs or other centralized data resources and personnel to develop these dashboards across multiple practice sites and outpatient settings.

METHODS FOR BUILDING LEADERSHIP SUPPORT FOR HEALTH SYSTEM–LED OUTPATIENT STEWARDSHIP

Participants discussed different approaches needed to build leadership support for health system–led outpatient stewardship at both the health system C-suite and senior leadership level and within individual clinical service lines.

Health System Leadership

Participants agreed that obtaining support from the health system C-suite and other senior administrators within the organization is critical to the development of a health system–led outpatient stewardship program. Making the business case for outpatient stewardship is vital because with this leadership engagement comes the resources and investment needed to expand what are currently primarily hospital-based stewardship efforts into outpatient practices. Participants discussed the need to emphasize the value of outpatient stewardship to the health system through improving the quality of care provided and augmenting population health efforts. Although inpatient stewardship programs were able to successfully leverage institutional cost savings to gain support for hospital-based stewardship efforts, participants discussed that the potential cost savings from outpatient stewardship may be significantly smaller. However, recent studies on the downstream costs of inappropriate outpatient antibiotic prescribing based on claims data showed that inappropriate prescribing does result in both risks to individual patients through the occurrence of adverse events, as well as significant excess health care costs.[9,10] Stewardship leads within a health system can leverage these data to demonstrate to health system administrators that outpatient stewardship efforts support both population health and value-based care efforts and minimize unnecessary health care spending.

Participants also discussed finding success in leveraging external benchmarking—comparing outpatient prescribing practices in their health systems to other, comparable health systems—to garner health system leadership support to implement outpatient stewardship efforts systemwide. This benchmarking can help identify areas in need of improvement and spur competition.

Finally, participants discussed areas where additional work is needed to help health system stewardship leads make the case to leadership about the need to expand efforts into outpatient practices. First, although regulatory and accreditation requirements from the Centers for Medicare & Medicaid Services and The Joint Commission helped spur implementation of hospital antibiotic stewardship programs, those requirements do not encompass most outpatient practices. The Joint Commission did establish a standard for antibiotic stewardship in ambulatory care practices in 2020,[11] but not all outpatient facilities are accredited by The Joint Commission (currently, more than 2,200 ambulatory care organizations receive Joint Commission accreditation[12]). Participants highlighted that modifications to the Joint Commission hospital standards to ensure applicability to outpatient facilities overseen by hospitals or health systems could support broader outpatient stewardship implementation within health systems. In addition, participants discussed how incorporation of outpatient antibiotic stewardship goals into health care facility rankings or recognition programs, such as *US News & World Report*,[13] could further garner leadership support for outpatient stewardship within their institutions. One recommendation was including stewardship staffing requirements within these rankings to help ensure that they could dedicate the necessary staff time to both inpatient and outpatient efforts.

Other tools or resources that would be helpful for the stewardship community to develop included (1) specific guidance on how to develop the business case for outpatient stewardship (similar to what was developed for hospital stewardship),[14] (2) data collaboration efforts between health systems to develop external benchmarks, and (3) sample job descriptions for outpatient antibiotic stewardship leads with specific roles and responsibilities.

Clinical Service Line Leadership

Participants also emphasized the importance of obtaining support for planned stewardship efforts from leaders of

the individual clinical service lines that provide outpatient care—including family medicine, internal medicine, pediatrics, and urgent care. Many noted that outpatient services are already juggling multiple competing priorities and quality improvement efforts, so it is critical for stewardship leads to work with service line leaders to identify how a stewardship program can align with existing priorities and available resources. Participants highlighted from their own experiences that it is important to engage these service line leaders early in the development of an outpatient stewardship program to allow for co-design of an implementation strategy that best fits the clinical workflow and needs of the service line. In particular, involving these leaders in the development of any antibiotic prescribing metrics was seen as critical to ensuring program support.

APPROACHES FOR HEALTH SYSTEM–LED OUTPATIENT STEWARDSHIP

Staffing and Resource Needs

When discussing staffing and resource needs for expanding health system stewardship efforts into outpatient health care settings, participants highlighted that this expansion might require a shift in the traditional physician and pharmacist dyad leadership model found in hospital-based stewardship. The previous assessment of health system–led antibiotic stewardship efforts found a consistent use of this dyad model in the inpatient context.[8] Participants at this convening highlighted that outpatient stewardship may call for an adapted leadership dyad of an antibiotic stewardship expert (either a physician or a pharmacist) paired with an outpatient clinician (such as a primary care physician or advanced practice provider). This model would pair together the stewardship expertise with the needed expertise in outpatient care delivery.

Participants discussed other expertise that should also be involved in the development and implementation of an outpatient stewardship program, including expertise in marketing to support patient and community educational efforts, data analytics, and quality improvement. In particular, participants recommended that health system stewardship leads interested in expanding their program into outpatient practices engage with their health system's quality improvement team. This team often has a well-established relationship with outpatient clinics and providers through previous quality improvement initiatives. They also have a wealth of expertise in analyzing and providing feedback to outpatient providers related to performance. By incorporating these teams into an outpatient stewardship program, stewardship leads can build on these established relationships and trust to help ensure the effectiveness of stewardship interventions.

Health system–led outpatient stewardship efforts are still relatively new compared to inpatient programs, and more work is needed to understand the full staffing and resource requirements to support this work. Participants acknowledged that many stewardship programs do not have the full funding or staffing needed to support inpatient programs, and that issue is exacerbated when wanting to expand into outpatient settings. In addition, those participants that had expanded into outpatient settings highlighted that much of their initial work was funded through external grants, which helps with initial implementation but can affect long-term sustainability. Overall, participants recommended that additional research—such as time in motion studies—could help identify what the ideal resource needs are to support health system–led outpatient stewardship efforts.

Priority Settings

Urgent care clinics and primary care clinics—including pediatric, family medicine, and internal medicine practices—were seen as key settings to target for initial expansion of health system–led stewardship into outpatient health care settings. These clinics often treat patients with acute respiratory conditions, which previous research has shown to be an area where significant inappropriate antibiotic prescribing occurs.[4–6]

Virtual care, provided through outpatient telemedicine services, was another priority setting discussed by participants. The COVID-19 pandemic dramatically increased virtual care use in the United States. This modality of care offers convenience and opportunities for patients living in more rural areas, but certain aspects of care delivery in these settings—such as limited access to diagnostic testing—makes telemedicine services an important priority for outpatient stewardship efforts.

Finally, although emergency departments are another setting where outpatient care is often provided, the discussion did not focus on these settings as a target for outpatient antibiotic stewardship efforts because emergency departments are often incorporated into hospital antibiotic stewardship programs.

Participants also highlighted that initial target settings may vary by health system. For example, some health systems may have few or no affiliated urgent care clinics, so it may be more effective to begin with the primary care service line. Stewardship leads should review antibiotic prescribing data across the health system to identify outpatient services where a large volume of prescribing originates and there is clear room for improved prescribing and begin implementation in these settings.

Stewardship Activities

The types of outpatient stewardship activities discussed largely aligned with the CDC's Core Elements of Outpatient Antibiotic Stewardship: (1) Commitment, (2) Action for Policy and Practice, (3) Tracking and Reporting, and (4) Education and Expertise.[15] Participants believed that these

Table 1. Summary of Health System–Led Outpatient Antibiotic Stewardship Activities

Centers for Disease Control and Prevention Outpatient Core Elements Framework[15]	Goal	Examples of Activities
Commitment	Demonstrate organizational commitment to and accountability for appropriate antibiotic prescribing.	• Distribute systemwide letters from health system C-suite or other leaders detailing organizational culture of appropriate antibiotic prescribing. • Incorporate antibiotic stewardship quality measures into system-level quality goals and scorecards. • Implement compensation alignment to reward clinicians who achieve antibiotic stewardship quality goals. • Display antibiotic stewardship commitment posters in individual outpatient clinic waiting areas and exam rooms.
Action for Policy and Practice	Implement at least one stewardship intervention aimed at improving antibiotic prescribing practices.	• Develop a multidisciplinary systemwide outpatient antibiotic stewardship committee/subcommittee to identify priority activities and aid in building support for stewardship efforts institutionally. • Identify clinical service line champions to aid in management of stewardship activities and to lead site visits when rolling out new efforts. • Review organizational nurse and electronic triage systems to ensure alignment with antibiotic stewardship protocols. • Develop systemwide electronic health record tools, such as institutional guideline-based order sets, delayed prescribing order sentences, or justification alerts when prescribing azithromycin.
Tracking and Reporting	Monitor antibiotic prescribing practices across the health systen and offer ongoing feedback to clinicians.	• Evaluate antibiotic prescribing across all outpatient settings within health system to identify key targets for antibiotic stewardship interventions. • Work with organizational service line leads within identified clinical settings to select antibiotic stewardship metrics and goals that align with service line priorities. • Select and implement a suite of antibiotic prescribing metrics that can capture the full scope of antibiotic prescribing within the health system. • Develop an antibiotic prescribing dashboard that provides benchmarking of individual health care provider prescribing performance compared to their peers within the health system.
Education and Expertise	Provide education and access to expertise on appropriate antibiotic prescribing to both health care providers and patients within the health system.	• Implement patient education efforts leveraging systemwide marketing approaches, such as sending e-mails/newsletters to patients or placing branded printed marketing materials within individual clinics. • Provide over-the-counter prescription pads to clinics that health care providers can use to talk to patients about approaches for symptomatic relief for their viral illnesses. • Use academic detailing to disseminate antibiotic stewardship approaches and best practices to clinics across the health system.

same elements applied whether in the context of an individual outpatient practice or implemented across an entire health system. However, discussions did touch upon a few approaches that are particularly suited to a health system–led program, and participants shared specific stewardship strategies and activities they successfully employed at their systems to achieve each of the core elements. Table 1[15] summarizes these examples of health system–led outpatient antibiotic stewardship activities based on the CDC's core elements framework.

Commitment. The goal of this core element is to ensure consistent and clear commitment from both individual clinicians and health care administrators in support of appropriate antibiotic prescribing. Within the health system context, participants viewed clear commitment from system administrators as critical to helping clinicians feel supported. For example, participants found it effective when letters from their health system leadership emphasized the importance of antibiotic stewardship from an organizational perspective. This can help motivate frontline clinicians to make the best prescribing decisions for their patients. Another example discussed was the incorporation of outpatient stewardship goals into overall health system quality goals, to ensure consistency and prioritization of stewardship across the institution.

Action for Policy and Practice. Within the health system context, actions in support of antibiotic stewardship efforts can range from leveraging shared resources, such as EHRs, to implementing clinical decision support tools, to developing institutional clinical guidelines. Participants

also shared examples of improving organizational triage systems to minimize unnecessary health care visits, thereby limiting the potential for unnecessary antibiotic prescribing. Because of their centralized infrastructure, health systems are well-positioned to implement these activities in ways that impact a wide range of outpatient practices.

Tracking and Reporting. The role of health systems in tracking and reporting outpatient antibiotic prescribing practices was a central point of discussion among participants. As previously highlighted, this core element was seen as an area that was particularly well-suited to the centralized nature of health systems. Through implementing a systemwide approach for tracking and reporting antibiotic prescribing, health systems can help minimize the burden on individual practices from having to implement their own individual tracking and reporting systems. Several participants shared their examples of effectively creating and using electronic dashboards to provide individual prescribing data with peer comparison to clinicians in urgent care and primary care settings.[16,17] One health system developed modifiable statistical codes—which they have made freely available on the Web—to create an automated information system that electronically abstracts data from EHRs, analyzes the prescribing patterns, and generates individualized and peer-compared feedback reports to clinicians.[18]

Participants discussed different aspects of implementing an outpatient tracking and reporting program, including which prescribing metrics a health system should include. Overall, participants recommended that health systems identify a few key metrics that show room for improvement and are important and motivating to outpatient service line leaders and individual providers. Several participants found it effective to formally include outpatient service line leaders and practice site leaders in the development stages of their outpatient stewardship programs to ensure selection of antibiotic prescribing metrics that are relevant and valuable to their clinical practice.[17,19] When a stewardship program can demonstrate impact on these initial metrics, consideration can be given to expand to a more complete suite of metrics that can fully assess antibiotic prescribing practices.[20] Potential targets for health system–led outpatient stewardship include unnecessary prescribing for select viral diagnoses, overall antibiotic prescribing for acute respiratory conditions,[21] appropriate antibiotic selection and/or duration, and overall antibiotic prescribing for select antibiotic types (such as azithromycin or fluoroquinolones).

Education and Expertise. Finally, education and expertise were seen as another core element that health systems could implement at the system level to provide consistent systemwide messaging on antibiotic prescribing practices for both patients and providers. Organizations can leverage freely available patient education materials, such as those developed by the CDC's Be Antibiotics Aware campaign,[22] to distribute across outpatient settings to emphasize the importance of appropriate antibiotic prescribing to patients and parents. In addition, health systems can use internal outpatient stewardship champions to provide academic detailing to providers or practices where there are opportunities to improve prescribing practices. Through leveraging this type of internal expertise, health systems can move toward consistent care delivery across outpatient practices.

WHAT'S NEXT FOR HEALTH SYSTEM–LED OUTPATIENT STEWARDSHIP EFFORTS

This convening of health system stewardship leads demonstrated a clear need for and interest in expanding current health system–led stewardship programs into outpatient practices. Participants agreed that health systems are well positioned to provide the resources and support needed for outpatient stewardship implementation. Previous research has clearly demonstrated the potential impact of health system–led antibiotic stewardship programs within hospital settings.[23–28] Studies have also found that outpatient antibiotic stewardship implemented across a health system or practice network can improve antibiotic prescribing.[16,19,29–31] More research is needed to ensure widespread expansion of health system efforts into outpatient practices.

Participant discussions highlighted additional areas of research and other support needed from the stewardship community to help build the business case for expanded health system–led outpatient stewardship efforts. A previous article discussed approaches for gaining buy-in from a hospital's C-suite to provide funding and support for inpatient stewardship efforts.[14] Developing a model specifically for use by outpatient stewardship champions is needed, as the elements of a business case may differ for these settings. For example, the inpatient business models commonly leveraged drug cost savings from the reduction of antibiotic use in hospitalized patients to justify funding for stewardship programs. However, drug cost savings from outpatient stewardship efforts are likely to be significantly smaller for most nonintegrated health systems because they do not typically bear the costs for outpatient antibiotic prescriptions, which are commonly dispensed in community pharmacies. Cost savings for outpatient antibiotic stewardship may be better captured from the reduction of health care costs associated with adverse events from antibiotics that were unnecessarily prescribed or with escalating care provided for worsening of bacterial infections due to inappropriate selection of antibiotics. Antibiotic stewardship leads may also have better success in making the business case by examining value-based reimbursement programs from commercial health plans or public payers for outpatient practices in which their health systems participate, and leveraging any antibiotic prescribing quality measures that

are part of these reimbursement programs. Other research that could be helpful to support the development of a business case for expanding stewardship efforts into outpatient settings includes a better understanding of the resources and personnel support required for expansion into outpatient practices, developing resources such as national or regional data collaboratives or a standardized suite of antibiotic prescribing metrics to allow for external benchmarking between health systems, and modifications of current stewardship requirements to better encompass outpatient practices within health systems. In addition, participants highlighted a need to build a community of practice where stewardship leads from different health systems can come together to share best practices and identify potential areas of collaboration. Through this community of practice, stewardship leads from health systems beginning to expand into outpatient settings could learn from the experience of others. Antibiotic stewardship leads at state health departments may be a valuable resource for establishing a community of practice. All state health departments have received CDC funding to support stewardship program activities,[32] and many have or are developing collaboratives that may be leveraged for a community of practice.

It is imperative that health system and antibiotic stewardship leads partner with outpatient leaders and clinicians to prioritize outpatient antibiotic stewardship efforts as part of health system–level programs. By developing a health system–led approach, stewardship leads will be able to affect many outpatient facilities and ensure that appropriate, consistent care is provided across the care continuum—improving population health and patient safety and reducing unnecessary health care spending.

Disclaimer. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or the US Department of Veterans Affairs.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jcjq.2023.10.007.

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