

Antibiotic Stewardship for Acute Respiratory Infections

The Milstein Toolkit for Ambulatory Care Practices



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The strategies, recommendations, and tools included in this publication are intended to provide a basic framework for improving outpatient antibiotic prescribing practices that can be customized to meet the needs of individual practices regardless of size, academic teaching status, staffing model, patient population, or available resources. United Hospital Fund makes no representations or warranties of any kind regarding the toolkit, including, without limitation, as to the accuracy of the information provided. The information provided is not medical or legal advice and should not be relied upon as such, nor should the information be used as a substitute for clinical or legal judgment. UHF does not assume liability for any damage or injury from the use or misuse of any information provided herein. We ask that you please acknowledge United Hospital Fund in the use of this resource, even if you modify or adapt it. Any use, modification, or adaptation of this resource is done at the user's discretion and the user assumes responsibility for the outcome.

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A Toolkit for Ambulatory Care Practices

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Introduction: The Increasingly Urgent Need for Antibiotic Stewardship

Misuse and overuse of antibiotics has contributed to our current global threat of antibiotic resistance. The U.S. Centers for Disease Control and Prevention (CDC) conservatively estimates that over two million people have antibiotic-resistant infections every year, with at least 23,000 dying as a result.¹ Multi-drug-resistant infections are now common. A pan-resistant infection—in which the bacterium was resistant to all available antibiotics in the United States—was recently found, which has led to even more concern about appropriate antibiotic use.²

Over 150 million outpatient visits a year result in an antibiotic prescription; about a third of these prescriptions are unnecessary. Acute respiratory infections such as sinus infection, bronchitis, influenza, and pharyngitis account for 44 percent of all antibiotics prescribed in the outpatient setting.³ Approximately half of the antibiotics prescribed are unnecessary, especially in the case of illnesses such as influenza and the common cold, for which antibiotics are not indicated and will not work.

In response to the need for appropriate antibiotic use—prescribing the right drug for the right patient at the right dose—in November 2016 the CDC released the *Core Elements of Outpatient Antibiotic Stewardship*.⁴ Antibiotic stewardship programs encompass a set of coordinated strategies to promote the appropriate use of antibiotics. The CDC report provides a framework for the development of antibiotic stewardship programs in outpatient settings using evidence-based approaches. The four core elements of antibiotic stewardship include commitment, action for policy and practice, tracking and reporting, and education and expertise. (See inset box, from the CDC *Core Elements*.)

Outpatient practices are a vital component of antibiotic stewardship in the U.S. and will play an important role in minimizing the threat of antibiotic resistance and improving patient safety. A focus on improving appropriate antibiotic prescribing for acute respiratory infections is important because of the prevalence of antibiotics prescribed for these illnesses in these settings.

The goal of this toolkit is to help outpatient clinics understand their own prescribing patterns to identify priorities and target areas for intervention, in the hope of helping address the growing threat of antibiotic resistance. A brief overview describes the process and thinking that went into developing these tools, along with tips on the tools' use. This overview is followed by a series of tools, templates, surveys, and sample charts.

Commitment
Demonstrate dedication to and accountability for optimizing antibiotic prescribing and patient safety.

Action for policy and practice
Implement at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed.

Tracking and reporting
Monitor antibiotic prescribing practices and offer regular feedback to clinicians, or have clinicians assess their own antibiotic prescribing practices themselves.

Education and expertise
Provide educational resources to clinicians and patients on antibiotic prescribing, and ensure access to needed expertise on optimizing antibiotic prescribing.

¹ <https://www.cdc.gov/drugresistance/pdf/ar-threats-2013-508.pdf>

² <https://www.cdc.gov/mmwr/volumes/66/wr/mm6601a7.htm>

³ <http://www.pewtrusts.org/~media/assets/2016/05/antibioticuseinoutpatientsettings.pdf>

⁴ https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_508.pdf

Developing an Antibiotic Toolkit for Ambulatory Practices

In the spring of 2016, United Hospital Fund (UHF) developed a two-part grant initiative totaling \$665,780 for hospitals and health systems in the greater New York area to participate in a learning collaborative designed to facilitate the development of antibiotic stewardship in the outpatient setting, with a focus on management of acute respiratory infections (ARIs). Initial activities provided clinical teams from selected hospitals and health systems, including over 30 outpatient practices, the opportunity to learn about antibiotic stewardship as well as approaches and challenges to implementing antibiotic stewardship in the outpatient setting. A list of participating health systems is provided in **Appendix A**.

Participants benefited from the input of expert faculty, who shared their knowledge during webinars and onsite meetings over the course of the project. In addition, UHF staff provided technical assistance by developing a series of data collection tools and providing analysis that enabled the health systems to assess the current state of antibiotic prescribing for ARIs, review the status of stewardship activities in their organizations, and elicit information regarding providers' knowledge and interest in stewardship tools. In addition, participants conducted a patient survey to better understand their patients' knowledge of how to use antibiotics and antibiotic resistance.

These data collection tools, and a guide for using them, make up the bulk of this toolkit. They can be easily implemented at other practices and can also be modified for individual organizational needs. We encourage outpatient practices that are beginning to address antibiotic stewardship to use these tools to assess the prescribing practices at their sites.

Following the assessment of their prescribing practices, participants were asked to develop action plans based on the results of their data collection and learnings. The action plans were organized around the CDC Core Elements of Antibiotic Stewardship, discussed above.

The practices implemented interventions that were developed based on their specific facility's needs, as well as the collaborative learning activities. Post-intervention data showed a statistically significant 5 percentage point decline in antibiotic prescribing compared to pre-intervention. Before the intervention, analysis indicated antibiotic prescribing not consistent with clinical guidelines; opportunities for improvement existed particularly for sinusitis and bronchitis. Following the intervention, there was a significant decrease in prescribing for unspecified bronchitis and a decrease in prescribing for acute sinusitis. Overall, the assessment demonstrated the positive impact of the interventions.

The findings from the first phase of our initiative are described on [UHF's website](#) and in *Infection Control & Hospital Epidemiology*.⁵

⁵ Guzik J, et al. (2018). Antibiotic prescribing for acute respiratory infections in New York City: A model for collaboration. *Infection Control & Hospital Epidemiology* 2018, 1–7. doi: 10.1017/ice.2018.227

Learning Collaborative Approach

The learning collaborative included a series of in-person meetings and webinars. Earlier sessions were designed to educate participants on antibiotic resistance and provide a forum for shared learning about antibiotic stewardship practices. Later sessions were focused on instruction in the use of the data collection tools to assess prescribing practices. During the final stage of our project, the sessions focused on strategies and evidence-based interventions for improving prescribing practices.

Selected presentations from the meetings and webinars are included in the resources section of the toolkit.

How to Use the Toolkit?

It is recommended that organizations embarking on outpatient antibiotic stewardship use all the tools provided to get a comprehensive view of policies, practices and prescribing. However, the tools are independent of one another and organizations may opt to administer only selected tools to address a specific aspect of stewardship and may be adapted for different size practices.

Description and Background of Tools

The tools for assessing antibiotic stewardship activities, antibiotic prescribing, and patient knowledge and attitudes around antibiotic use and patient-provider communication are described in Table 1. The tools can be used to conduct a pre- and post-assessment to understand whether antibiotic stewardship interventions have had an impact on antibiotic prescribing, antibiotic stewardship practices, patients' knowledge and attitudes of antibiotic use and resistance, as well as patients' perception of provider-patient communication on antibiotic prescribing.

Table 1. Description of the Antibiotic Stewardship Tools

Tool	Goal	Administration
Assessment of Current Antibiotic Stewardship Practices (Appendix B)	Obtain overview of practice's involvement in managing antibiotic use in adult patients; identify if any antibiotic stewardship practices have been implemented	Administer one survey per practice site with an interdisciplinary team
Survey of Antibiotic Prescribers (Appendix C)	Obtain prescribers' perceptions of antibiotic utilization for adult patients with ARI, focused on decisions to prescribe, and about selection, dose, and duration	Administer to prescribers at practices who see adult patients (PCPs, residents, PAs, NPs)
Chart Abstraction (Appendix D)	Assess antibiotic use for adult patients with an ARI by using a structured format to guide the review of each patient's chart	Randomly sample patients per practice site during influenza season
Patient Survey (Appendix E)	Gather information about what patients know about antibiotic resistance and assess the quality of provider patient communication	Administer to clinic patients during influenza season

Assessment of Antibiotic Stewardship Activities

Purpose

This tool was designed to collect information on the existence of antibiotic stewardship activities and resources at each practice site. This tool provided a baseline assessment as well as a starting point for the development of our learning collaborative activities. The tool was informed by the GNYHA/UHF Outpatient Antibiotic Stewardship Assessment Survey of Hospital Current Practices and the CDC National Healthcare Safety Network's Patient Safety Survey. The tool can be found in **Appendix B**.

Description

The tool is divided into the following sections:

- Practice Site Characteristics: e.g., type of staffing, payer mix, patient volume
- Laboratory Services: location and scope of available services
- Existence of Prescribing Guidelines: policies regarding specific treatment recommendations
- Existence and Utilization of Electronic Medical Record (EMR) for Stewardship
- Antibiotic Stewardship Practices: use of specific strategies

Considerations and Hints

- One survey should be completed for each practice site.
- Since the questions encompass a wide range of topics, the tool should be completed by an interdisciplinary team to allow for accuracy and development of consensus.

Provider Survey

Purpose

The purpose of the provider survey is to better understand the factors that contribute to a provider's decision to prescribe antibiotics for patients with ARIs. The survey also explored provider knowledge of prescribing guidelines using a case scenario and knowledge of broad vs. narrow spectrum antibiotics. In addition, the survey elicited input as to the types of tools that providers would find helpful in improving antibiotic prescribing practices. The tool can be found in **Appendix C**.

Description

The tool is divided into the following sections:

- Prescriber Characteristics: e.g., role, years of practice
- Antibiotic Selection: specific factors that influence the decision to prescribe

- Case Scenario: designed to assess application of practice guidelines to a hypothetical clinical case
- Changing Antibiotic Practice: providers' perceptions of how challenging it would be to change clinical practice in their settings
- Antibiotic Resistance: providers' perceptions of patient knowledge regarding antibiotic resistance

Considerations and Hints

- Obtaining provider survey responses can be challenging. Consider which method of survey administration has worked best for your site in the past—paper or electronic.
- Using a SurveyMonkey link may make it easier to collect the data.
- Clinical and administrative leadership should promote completion of the survey at staff meetings and huddles.

Chart Abstraction Tool

Purpose

The chart abstraction tool collects retrospective data on antibiotic prescribing for acute respiratory infections from patients' charts. The chart abstraction tool is used to gather data from patient charts for adults 18 years of age presenting with an acute respiratory infection and were identified using ICD-10 codes that corresponded to several types of common ARIs. The ICD-10 codes were selected based on prevalence of the ARIs, conversations with faculty as well as other expert stakeholders.

The tool can be used before any antibiotic stewardship activities to obtain a baseline understanding of prescribing patterns for patients with ARIs. After the implementation of antibiotic stewardship interventions, the tool can be used again to gather post-assessment data, which can be compared to pre-assessment data to evaluate changes in antibiotic prescribing or can be used periodically to monitor changes.

The chart abstraction tool was partly informed by a point-prevalence survey abstraction form created by the Greater New York Hospital Association and UHF.⁶ The tool can be found in **Appendix D**.

Description

The chart abstraction tool is separated into four distinct sections covering several factors that may influence antibiotic prescribing, such as demographics and clinical characteristics, and captures whether an antibiotic was prescribed as well as any educational interventions.

⁶ <https://www.uhfny.org/assets/1042>

1. Patient characteristics and history. Includes patient demographics, insurance status, and a history of antibiotic allergies.
2. Diagnosis information. Includes the month of diagnosis, ICD-10 codes that correspond to an ARI diagnosis, provider information, symptom, and comorbidities. The specific ICD-10 codes and sub-codes are:
 - J00 (acute nasopharyngitis/common cold)
 - J01 (acute sinusitis)
 - J02 (pharyngitis)
 - J03 (acute tonsillitis +/- pharyngitis)
 - J06.9 (acute URI, unspecified)
 - J20 (acute bronchitis)
 - J40 (bronchitis not specified as acute or chronic)
3. ARI course and treatment information — includes testing information for an ARI, antibiotic prescription, type of antibiotic prescribed and duration, and other medications prescribed.
4. Follow-up and outcomes information — includes details on patient follow-up and education and documentation related to any adverse events resulting from a prescribed antibiotic

Considerations and Hints

- It is recommended that the tool be pilot tested using a small sample before implementation.
- The chart abstraction tool can be administered during influenza season to capture a larger sample of cases with ARIs.
- An initial analysis to understand which ARI conditions antibiotics are being prescribed for can be helpful to tailor the selection of the diagnosis codes.
- Additional diagnosis codes e.g. cough, sore throat can be added to ensure that all patients that are receiving antibiotics are captured.
- Random sampling should be used to obtain an equal number of chart abstractions for each month in the sampling period.
- SurveyMonkey® can be used to collect responses from clinics.
- Soft copies of the chart abstraction tool can be provided to make data collection easier.
- Certain patient populations with an existing primary diagnosis may not show up in the sample from the electronic medical records if the patient presents with an ARI. Either the secondary diagnosis would need to be reviewed or further data would need to be collected from diagnostic tests (e.g., sputum culture or respiratory viral panel) to confirm an ARI case.

- Data can be reported back to the clinic and aggregated by hospital or health system to provide multiple points of comparison.
- Data reports can be shared with clinicians and leadership in different settings such as grand rounds, quality improvement meetings, clinic staff meetings, and hospital-wide quality improvement fairs.

Patient Survey

Purpose

The patient survey assesses patients' knowledge and attitudes around antibiotic use and resistance, as well as their perceptions about patient-provider communication when they present with ARI symptoms. The patient survey is also an educational tool—the responses to the survey questions about antibiotic use and resistance are provided back to the patient after they return their response.

The Centers for Disease Control and Prevention's Antibiotic Quiz informed the development of this patient survey. The tool can be found in **Appendix E**. The patient survey and answer key are also available in six additional languages (Bengali, French Créole, Korean, Mandarin, Russian, and Spanish) on the United Hospital Fund website.

Description

There are three sections to the patient survey:

1. A general knowledge section with questions about antibiotic use and resistance
2. A patient-provider communication section with questions specific for patients with ARI symptoms
3. A demographic section collecting information on age, gender, and preferred language

Considerations and Hints

- It is recommended that the survey be pilot tested using a small sample before implementation.
- Assess what personnel are available to administer the survey, e.g. front desk staff, medical assistants, nurses, and physicians.
- Consider administering the patient survey in the waiting room.
- Incorporate the survey into the existing patient workflow instead of attempting to administer the survey separately.
- Distribute the correct survey responses/answer key to the patient after they hand in a completed survey.

- Ensure that patients who may have questions regarding the correct responses to the survey are able to discuss the survey with someone from the clinical team.
- Paper surveys can be administered to the patients and can then be entered SurveyMonkey® to make the data analysis easier.

Action Plan for Antibiotic Stewardship Interventions

After using the data collection tools, the outpatient practice can develop a comprehensive action plan to test and implement appropriate antibiotic stewardship interventions and best practices. The CDC core elements can serve as a guide for organizing the intervention activities. A review of the data from the tools as a team will help determine priorities for interventions. The data should be provided to the practices to promote awareness of their baseline results. Templates on reporting the data can be found in **Appendix F**, and examples of how to display the data can be found in **Appendix G**. A template for an action plan can be found in **Appendix H**.

It is important to establish a multidisciplinary team that can work on antibiotic stewardship to include different skill sets and unique perspectives. The multidisciplinary team should not just be limited to providers; information technology staff, clinical informaticists, practice managers, public affairs, and data analysts may all play a role in helping with the operational aspects of developing interventions. Vetting some of the interventions beforehand can also help increase buy-in from staff to generate momentum. In addition, obtaining buy-in from senior leadership on these activities and informing them about progress can help encourage different team members to participate and contribute.

Antibiotic Stewardship Interventions

Several types of antibiotic stewardship interventions were implemented as part of the learning collaborative and are organized by the CDC Core Elements of Antibiotic Stewardship (see Table 2). There are different types of interventions that can be implemented, and these often vary based on the practices' needs, capabilities, and resources, as well as patient mix. Additionally, it is important to pilot the interventions to understand which are most effective or relevant for each practice, and to identify operational issues.

Examples of interventions, and accompanying considerations to factor in, are mapped out below. They fall into four categories: commitment; action for policy and practice; tracking and reporting; and education and expertise.

Commitment

Leadership at the executive level's commitment is very important to ensure that antibiotic stewardship is and remains an organizational priority.

Antibiotic stewardship champions can be identified to promote appropriate antibiotic use and obtain buy-in from other clinicians to facilitate changes in prescribing practices. The champions can also be in-

charge of collecting chart abstraction data and help with the provider feedback reports. The type of champions can vary depending on the practice—infectious diseases physicians, medical directors, nurses, pharmacists—who can also act as resources on antibiotic stewardship for other staff members.

Public commitment posters and cards can be displayed or shared in support of antibiotic stewardship. The posters can be posted in waiting rooms, hallways, and exam rooms to show patients that antibiotic stewardship is a priority for the practice. The posters are also intended to remind the prescriber that they have made a commitment to judicious use of antibiotics. The cards can be provided to the patient to show the provider's pledge to prescribe antibiotics only when appropriate. The New York State Department of Health (NYSDOH) developed a "smart use guarantee" [poster](#) and [palm card](#) that the provider can sign and include their photograph.

Other public commitment resources such as buttons that are visible to patients and staff that state "I am an antibiotic steward" or public facing information that highlights the practice's commitment to antibiotic stewardship

Action for Policy and Practice

Clinical decision support (CDS) tools can assist clinicians with specific information about antibiotic prescribing. There are many types of tools that can be integrated into the clinical workflow. These include:

- Evidence-based clinical guidelines, from the CDC, NYSDOH, and professional societies, on prescribing antibiotics for ARIs. These guidelines should be updated as frequently as needed to reflect any changes. The guidelines can be provided to clinicians in multiple ways and formats.
 - Providing hard-copy pocket guidelines
 - Placing posters with the guidelines above computers
 - Saving guidelines on the computer desktop in the exam rooms
 - Uploading guidelines on the intranet/website
 - Incorporating guidelines in the EMR
- Clinical algorithm to help prescribers with decision-making including key features of ARIs, workup, management, and patient education.
- Best practice advisory alerts can be used to provide information based on specific parameters. One example is the use of the alerts with the Strep Pharyngitis Centor Score⁷ which can help providers determine whether the pharyngitis is Streptococcal and suggest a management course such as rapid Strep testing and/or a culture based on recommended guidelines (see **Appendix I**).
- Hard stops which are used to prevent a provider from proceeding with an action can be used to ensure that antibiotics are being prescribed for the appropriate ARI diagnoses (see **Appendix I**). It might be helpful to ensure that the hard stops require that the antibiotic prescribed is associated with a diagnosis to avoid anyone bypassing the hard stop.

Written justification required in the EMR when an antibiotic is prescribed can help hold providers accountable for prescribing antibiotics for ARIs.

⁷ Centor, Robert M., John M. Witherspoon, Harry P. Dalton, Charles E. Brody, and Kurt Link. "The Diagnosis of Strep Throat in Adults in The Emergency Room." *Medical Decision Making* 1, no. 3 (1981): 239-246; McIsaac, Warren J., James D. Kellner, Peggy Aufricht, Anita Vanjaka, and Donald E. Low. "Empirical validation of guidelines for the management of pharyngitis in children and adults." *Jama* 291, no. 13 (2004): 1587-1595.

Delayed prescribing involves providing the patient with a prescription to fill if their symptoms worsen or do not improve within a specific timeframe for diagnoses such as acute sinusitis where antibiotics may be appropriate in certain cases.

Watchful waiting protocol can be used to follow-up with patients over the phone 48 to 72 hours after a clinical visit when the patient was not prescribed an antibiotic. These calls can help monitor the patient if their condition worsens. A script can be created for the person speaking with the patient to ensure that the same protocol is followed across the patient population. The respective provider or practice champion can then receive an update about the patient and follow-up (if needed) accordingly. It is important that providers are aware of this program and know that they should leave a message in the EMR to assure a patient follow-up call.

Call centers and hotlines may be used to triage patients and prevent unnecessary visits in addition to providing opportunities to educate and intervene. Like the watchful waiting protocol, these calls can be set up with a script detailing the best course of action for specific ARI diagnoses. Some interventions may involve calling patients or sending a text message with a link to information, as well as asking questions on patients' progress and redirecting them to a provider if needed.

Smartphrases can be incorporated in the EMR so that when the patient does not require an antibiotic, the provider can enter a "shortcut" phrase into the EMR that will populate with specific instructions on symptom management in the patient's after-visit summary.

Tracking and Reporting

Hard stop override reports can be used to show any deficiencies in prescribing when antibiotics are inappropriate. In addition, some provider education information can also be included to remind the provider about the clinical guidelines for prescribing (see **Appendix I**).

Provider feedback reports can be used to assess and show the provider's prescribing rate to highlight the provider's antibiotic prescribing practices. (see **Appendix I**).

There are several suggestions for developing these reports:

- Provide a comparison to peers, the outpatient clinic, or the health system
- Understand how other quality reports at the provider level are prepared and distributed by others in the clinic or health system
- Get a sense of the "n" for the report cards—for example, whether to include providers with a minimum number of ARI patients, or whether it makes more sense to report on a quarterly basis to have more data points
- Consider including data on types of antibiotic prescribed because choosing the right antibiotic is also very important
- Consider the timeframe for the reports—e.g., monthly or quarterly
- Show the numerator and denominator so that the providers understand the basis of their prescribing rate
- Think about who should send out the provider reports given organizational processes — it may be more effective to have them sent by someone in a clinical leadership position
- Tailor messages to specific providers as needed and provide opportunities for discussing the data

Education and Expertise

Provider Education

Grand rounds and other departmental meetings can be used to disseminate knowledge about antibiotic stewardship, share prescribing data, and provide a forum for discussion about specific topics. Some topics that seemed to have been helpful include an overview of antibiotic stewardship and why it is necessary, methods of diagnosing ARIs, appropriate and inappropriate use of antibiotics for ARIs, review of clinical guidelines for specific diagnoses, review of the local antibiogram, and adverse effects of overprescribing (e.g., *Clostridium difficile*).

Departmental meetings can be held to invite the infectious disease team to present these topics in conjunction with other topics such as influenza before the influenza season. Continuing medical education credits may be offered as an additional incentive for providers to attend a session. Protected time to attend these meetings or encouragement to attend from leadership may also be needed as additional incentives.

Training on antibiotic stewardship can be a requirement to ensure that newly hired providers are exposed to antibiotic stewardship activities and incorporated as part of resident orientation.

Provider knowledge surveys can be coupled with grand rounds or a meeting where the providers are asked to complete a “pre-test” by responding to a few questions on antibiotic prescribing for ARIs before the educational portion of the meeting, and then asked the questions again as a “post-test” after the meeting.

Online educational tutorial can be incorporated into any learning platforms that providers have access to. The tutorial can be used to provide an overview of antibiotic stewardship for new providers upon hire and others as needed. The CDC has developed a [training course](#) on antibiotic resistance, antibiotic stewardship, and antibiotic adverse events that provides continuing education credits.

Communications training can be offered to providers to learn techniques of discussing antibiotic prescribing with patients, especially in situations where antibiotics are not indicated. The Mangione-Smith Lab at Seattle Children’s Hospital has developed a [seven-part learning module](#) geared towards provider discussions with parents about ARI treatments; however, the same techniques can be applied to discussions with adults.

Journal club can be another way to introduce new literature on antibiotic stewardship and prescribing to interested providers and provide a forum for discussions around interventions. Online resources from the [Center for Infectious Disease Research and Policy at the University of Minnesota](#) provide updates on the latest research as well as other relevant content.

Patient Education

Antibiotic awareness materials can be used in various ways to educate patients about the appropriate use of antibiotics. There are different types of materials available that can be used e.g. Antibiotic Awareness posters, fact sheets about the use of antibiotics, and viral prescription pads for symptom management that are available in multiple languages through the [NYSDOH](#). It might be helpful to have the printed education materials readily accessible. Additionally, reminders or check-ins about the availability of these materials might be useful before and during influenza season.

Waiting room videos can be used to educate patients about antibiotic prescribing and resistance, especially during influenza season when patients may think they need antibiotics. The [NYSDOH](#) has a video available that can be played in the waiting room.

Patient engagement software can be used to send educational materials and videos to the patients about antibiotic prescribing. Software such as Emmi® can be used to track metrics such as how many patients received an email from the software, how many patients clicked on the link, and how many patients watched the video until the end.

Workflow for patient education can be developed by the antibiotic stewardship team to ensure that the patient receives appropriate education about antibiotic stewardship and that the relevant team members know that they will be responsible for educating the patient.

After-visit summary templates can be developed and incorporated to provide to patients with specific instructions about how to manage their ARI symptoms. The templates can also be pre-populated in the EMR when a certain diagnosis is entered. Usage of the after-visit summary can be tracked through the EMR.

Sustainability

Developing a sustainability plan for the antibiotic stewardship program is important. Several approaches to sustaining interventions were shared by the participants in UHF's learning collaborative:

Leadership buy-in

- Share findings and key learnings from antibiotic stewardship activities with leadership
- Leverage existing regulatory/institutional requirements for antibiotic stewardship e.g., from The Joint Commission
- Evaluate patient outcomes to demonstrate the impact of the program on patients
- Explore how outpatient antibiotic stewardship fits into the broader hospital or health system performance improvement umbrella (e.g., high reliability, population health)

System competencies

- Understand how to continue to fit interventions into workflow and care management
- Learn about the capacity and barriers to implementing interventions and modify them as needed for each practice
- Follow up with outpatient antibiotic stewardship teams and front-line staff to solicit feedback on interventions
- Continue to tweak interventions with any changes to the internal and external environment

Information technology

- Understand how information technology can be leveraged for various interventions
- Ensure that staff are aware of existing resources available on the EMRs, intranet, and other technology platforms
- Incorporate training on any tools that may require additional context or explanation (e.g., hard stops)
- Build-in provider feedback reports into the automated reporting system

Communication

- Disseminate results and highlight impact via quality councils, performance improvement councils, quality improvement fairs, and infection control meetings
- Share information to promote public awareness through external affairs or newsletters
- Improve communications and linkages between the inpatient and outpatient antibiotic stewardship programs

Patient and provider engagement

- Continue to share appropriate resources, tools, and other reminders—especially during influenza season
- Explore different approaches to broaden public awareness through partnerships (e.g., libraries, community-based organizations)
- Ensure the stewardship team is interdisciplinary to promote various perspectives
- Integrate prescriber feedback reports into provider-specific performance metrics

Conclusion

Before the UHF learning collaborative on antibiotic stewardship, only a few of the outpatient practices had antibiotic stewardship guidelines, even those with robust inpatient antibiotic stewardship programs.

The use of the tools helped the practices understand practice characteristics, provider perspectives on antibiotic prescribing and stewardship, and antibiotic prescribing rates for a sample population. After developing an action plan for antibiotic stewardship and implementing interventions, the practices could use the tools again to reassess whether antibiotic prescribing rates were affected.

Antibiotic stewardship programs can help address the growing threat of antibiotic resistance. As a start, outpatient clinics need to know what their prescribing rates are and understand gaps in prescriber and patient knowledge to identify priorities and target areas for intervention.

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Resources

Centers for Disease Control and Prevention

Be Antibiotics Aware Educational Resources for Patients, Providers, and Public Health Organizations
<https://www.cdc.gov/antibiotic-use/week/promotional-materials/index.html>

Core Elements of Antibiotic Stewardship
https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_508.pdf

Evidence for Interventions Supporting the Core Elements
<https://www.cdc.gov/antibiotic-use/community/improving-prescribing/evidence/index.html>

Public Service Announcement on Antibiotics Video
<https://www.youtube.com/watch?v=dETK7Jc-XWA>

Training on Antibiotic Stewardship with CEs for Providers
<https://www.train.org/cdctrain/course/1075730/compilation>

Greater New York Hospital Association and United Hospital Fund

Antimicrobial Stewardship Toolkit for Acute and Long-Term Care Facilities
<https://www.uhfnyc.org/assets/1042>

Mangione-Smith Lab

Dialogue Around Respiratory Illness Treatment: Optimizing Communication with Parents
<http://www.seattlechildrens.org/research/child-health-behavior-and-development/mangione-smith-lab/dart-learning-modules/>

New York State Department of Health

Adult and Pediatric Antibiotic Prescribing Guidelines
https://www.health.ny.gov/publications/1174_11x17.pdf

Video on Educating Patients About Antibiotic Use
<https://www.youtube.com/watch?v=OWJcrRHnFEg&feature=youtu.be>

Viral Prescription Pad in Multiple Languages
https://www.health.ny.gov/professionals/protocols_and_guidelines/antibiotic_resistance/viral_prescription_pad.htm

Quality Improvement Organization (QIO) Program

MITIGATE Antimicrobial Stewardship Toolkit
https://qioprogram.org/sites/default/files/editors/141/MITIGATE_TOOLKIT_final_approved%281%29_508.pdf

Presentations from Webinars Hosted by UHF

Belinda Ostrowsky, Priya Nori, and Gopi Patel: “Sniffle, Sneeze...No Antibiotics Please: Ambulatory Stewardship Strategies for Acute Respiratory Infections (ARI)” (May 2016)
<https://uhfnyc.org/publications/881345>

Guillermo Sanchez: “Antimicrobial Stewardship in Outpatient Facilities” (September 2016)
<https://uhfnyc.org/publications/881160>

Katherine Fleming-Dutra: “Core Elements of Outpatient Antibiotic Stewardship Implementing Antibiotic Stewardship into Your Outpatient Practice” (July 2017)
<https://uhfnyc.org/news/881241>

Appendix A. List of Participating Hospitals and Health Systems

Interfaith Medical Center*

MediSys Health Network

Memorial Sloan Kettering Cancer Center

Montefiore Medical Center

Mount Sinai Health System

NewYork-Presbyterian/Queens

NYU Langone Health

Northwell Health*

Wyckoff Heights Medical Center

*These facilities were not part of the second stage (intervention stage) of the initiative

Appendix B. Assessment of Antibiotic Stewardship Practices

Goal: The goal of this survey is to obtain an overview of your outpatient practice site and its involvement in managing antibiotic use in adult patients, as well as to identify whether or not outpatient antibiotic stewardship practices have been implemented.

Instructions: Please complete this survey **as an interdisciplinary team** to provide us with information about your practice site's current practices. **Please only complete one survey per outpatient practice site.** Please ensure you enter this information into SurveyMonkey by **XX**.

Note: This Outpatient Antibiotic Stewardship Assessment of Current Practices was developed using both the GNYHA/UHF Antibiotic Stewardship Survey of Hospital Current Practices and the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN) Patient Safety Component—Annual Hospital Survey.

Practice Site Characteristics

1. Practice site name:
2. Hospital or health system affiliation:
3. How many total **adult patients (≥ 18 years of age)** does your practice site see annually?
4. Approximately how many total **adult patients with acute respiratory infections** does your practice site see from **October to March** (estimate)? How many total **adult patients with acute respiratory infections** does your practice site see from **April to September** (estimate)?
5. How many total Full Time Employees are at the practice site?
6. Please quantify the number of on-site employees:
 - a. Physician Attendings:
 - b. Residents:
 - c. Nurses:
 - d. Pharmacists:
 - e. Nurse Practitioners/Physician Assistants:
 - f. Managers/Directors:
 - g. Medical Assistants:
 - h. Administrative Assistants/Clerks:
 - i. Other (please describe):
7. What type of practice site is this?
 - a. Family Practice Clinic (with residents)
 - b. Family Practice Clinic (without residents)
 - c. Internal Medicine Clinic (with residents)
 - d. Internal Medicine Clinic (without residents)
 - e. Specialty Clinic (with residents)
 - f. Specialty Clinic (without residents)
 - g. Other (please describe):

8. Who prescribes at this practice site (please check all that apply)?
 - a. Physician Attendings
 - b. Residents
 - c. Nurse Practitioners
 - d. Physician Assistants
 - e. Other (please describe):

9. What is the general payer mix at this practice site (please provide percentages of each)?
 - a. Medicare: _____%
 - b. Medicaid: _____%
 - c. Commercial: _____%
 - d. Uninsured: _____%
 - e. Other: _____%
 - f. Unknown: _____%

Microbiology/Virology

10. Where are your practice site's microbiology services performed?
 - a. On-site laboratory
 - b. Laboratory at affiliated hospital
 - c. Laboratory at an off-site vendor (e.g., commercial laboratory)
 - d. Other (please describe):

11. What laboratory testing is used at your practice site to decide on prescribing for adult acute respiratory infections (please check all that apply)?
 - a. Strep Screen _____
 - b. Rapid Flu Testing _____
 - c. Respiratory Viral Panels (including more than flu) _____
 - d. Throat Cultures _____
 - e. Respiratory Cultures _____
 - f. Procalcitonin _____

12. Does your microbiology service produce an antibiogram, i.e., a cumulative antimicrobial susceptibility report, for **outpatient** practice sites (excluding cultures taken in inpatient settings)?
 - a. Yes
 - b. No
 - c. Not Sure

13. If yes, how often is the report shared with your practice site?
 - a. Quarterly
 - b. Semi-Annually
 - c. Annually
 - d. Not applicable (N/A)
 - e. Other (please describe):

14. If yes, are data stratified so you can see your practice site's data?
 - a. Yes
 - b. No
 - c. Not Sure
 - d. Not applicable (N/A)

Policies and Clinical Practice Guidelines for Antibiotic Use

15. Does your practice site have a policy to follow treatment recommendations for antibiotic use for acute respiratory infections, based on national guidelines and local susceptibility, to assist with antibiotic selection and the decision to use antibiotics?
- Yes
 - No
 - Not Sure
 - Not applicable (N/A)

*If yes, please **email** a copy of your practice site's policy or clinical practice guidelines for antibiotic use for acute respiratory infections to xxxx@xxxx.com.*

Electronic Systems

16. Does your practice site have an electronic medical record?
- Yes
 - No
 - Not yet, in the process of being implemented.

If yes, please specify which EMR your practice site uses:

17. Is your practice site's electronic medical record connected to the hospital's inpatient electronic medical record?
- Yes
 - No
 - Not yet, in the process of being connected.
18. Is your practice site currently using computer decision support to monitor antibiotic use?
- Yes
 - No
 - Not sure
 - Not yet, but we plan to.
19. If yes, does this practice site use alerts within the computer decision support to change the dose and the duration of the antibiotic prescribed?
- Yes
 - No
 - Not yet, but we plan to.
 - Not applicable (N/A)

Antibiotic Stewardship Practices for Outpatient Settings

20. Does your hospital or health system have an antibiotic stewardship program in place?
- Yes
 - No
21. If yes, does your antibiotic stewardship program include **outpatient-specific activities**?
- Yes
 - No
 - Not yet, but we plan to.
 - Not applicable (N/A)
22. How long has your hospital or health system had **outpatient** antibiotic stewardship practices in place?
- Less than 1 year
 - 1 year to less than 2 years
 - 2 years to less than 5 years
 - 5 years or more
 - Not applicable (N/A)
23. Is there a clinical leader to facilitate antibiotic stewardship activities at your practice site (before the United Hospital Fund Initiative began)?
- Yes
 - No
24. If yes, what position is the clinical leader (before the United Hospital Fund initiative began) (please check all that apply)?
- Physician (Infectious Disease trained)
 - Physician (Primary Care Provider)
 - Clinical Pharmacist
 - Co-led by Clinical Pharmacist and Physician (either Infectious Disease trained or Primary Care Provider)
 - Not applicable (N/A)
 - Other (please specify):

25. Which of the following strategies has your practice used to improve outpatient antibiotic prescribing, if any (please check all that apply)?

Outpatient antibiotic stewardship strategy	Do you currently have the strategy in place at your practice to improve outpatient antibiotic prescribing? (Check all that apply.)
a. Communication skills training for health care providers to address benefits and harms of antibiotic treatment and management of patient expectations for antibiotics	
b. Audit and feedback systems with prescribers to promote adherence to clinical practice guidelines for antibiotic use	
c. Use of clinical decision support to facilitate accurate diagnoses and management of clinical conditions	
d. Face-to-face educational training (academic detailing) by respected colleagues to facilitate changes in antibiotic prescribing	
e. Explicit written justification in the medical record for non-recommended antibiotic prescribing	
f. Method for delaying antibiotic prescriptions (“wait and see” prescriptions)	
g. Call centers or nurse hotlines to reduce unnecessary visits for conditions not necessitating a provider visit	
h. Shared provider-level antibiotic prescribing rates, with peer comparisons for high-priority conditions	
i. Patient education on appropriate antibiotic use	
j. Continuing medical education for clinical staff on appropriate antibiotic prescribing	
k. Formulary restrictions for certain antibiotics	
l. Use of Centers for Disease Control and Prevention’s <i>Get Smart: Know When Antibiotics Work</i> tools and resources, including:	
11. Public commitment posters in exam rooms, describing appropriate antibiotic use	
12. Fact Sheets about the evaluation and diagnosis of antibiotic allergies and describing the impact of overusing antibiotics	
13. Prescription adherence tools to promote adherence to antibiotic therapy and raise awareness of the importance of appropriate use	
14. Symptomatic Relief for Viral Illnesses prescription pad for providers to use, with checklist to describe relief for viral illness	
m. Other outpatient antibiotic stewardship activities (please describe):	

26. Where would your practice site like to focus to improve antibiotic management and stewardship (please check all that apply)?
- a. Avoid unnecessary treatment
 - b. Reduce length of treatment
 - c. Improve antibiotic selection
 - d. Develop clinical guidelines for appropriate antibiotic use for common clinical conditions
 - e. Institute methods for improving communication between prescribers and patients and families about appropriate use of antibiotics
 - f. Institute better methods for providing prescribers with feedback about their antibiotic use
 - g. Other (please describe):

Measuring Antibiotic Use

27. Does your practice site monitor antibiotic use (consumption) for specific clinical conditions?
- a. Yes
 - b. No
 - c. Not Sure

28. If yes, please describe how you monitor antibiotic use, and what is known about antibiotic use in the outpatient setting: _____

Appendix C. Provider Survey

Goal: The goal of this survey is to obtain information from prescribers (including primary care physicians, residents, physician assistants, and nurse practitioners) regarding an important public health issue having to do with antibiotic utilization, specifically for adult patients with acute respiratory infections (ARIs). We have some questions to ask you about antibiotic prescribing, such as clinical reasoning leading to the decision to prescribe an antibiotic, and, once the decision is made, decisions about antibiotic selection, dose, and duration. The goal is to understand more about decisions providers make in antibiotic prescribing, antibiotic selection, dose, and duration.

Instructions: Please survey prescribers within your practice site to obtain an assessment of antibiotic prescribing practices and identify key drivers of decisions providers make in prescribing, antibiotic selection, dose, and duration for adult patients at your outpatient setting. We recommend including all prescribers in your practice who see adult patients, including primary care physicians, residents, physician assistants, and nurse practitioners. Prescribers can complete this survey either on paper or via SurveyMonkey. This survey will take approximately 30 minutes to complete.

Note: The development of this form was informed in part by the Centers for Disease Control and Prevention's Interview Tool: Knowledge, Attitudes, and Practices Used by Primary Care Providers in Antibiotic Selection, United States. DOI: <http://wwwnc.cdc.gov/eid/article/20/12/14-0331-techapp1.pdf>.

Practice and Prescriber Characteristics

1. Practice site name:
2. Hospital or health system affiliation:
3. How much of your time do you spend in direct patient care in this practice?
 - a. Greater than or equal to 50% of your time
 - b. Less than 50% of your time
4. Which of the following describe your role in the practice?
 - a. Physician Attending
 - b. Resident
 - c. Nurse Practitioner
 - d. Physician Assistant
 - e. Other (Please specify: _____)
5. How many years have you been practicing medicine?
 - a. <5 years
 - b. 5-10 years
 - c. >10-20 years
 - d. 21-30 years
 - e. 31 or more years

8. Does your practice have a policy or practice guideline in place for the **dose** of antibiotics used for clinical conditions?

- a. Yes
- b. No
- c. Sometimes
- d. Unknown
- e. Other (please explain):

9. Does your practice have a policy or practice guideline in place for the **selection** of antibiotics used for clinical conditions?

- a. Yes
- b. No
- c. Sometimes
- d. Unknown
- e. Other (please explain):

10. Does your practice have a policy or practice guideline in place for the **duration** of antibiotics used for clinical conditions?

- a. Yes
- b. No
- c. Sometimes
- d. Unknown
- e. Other (please explain):

11. What makes antibiotic selection most challenging for you?

- a. Patient Allergies
- b. Complicated medical histories
- c. Recurrent infections
- d. Other (please describe):

12. Do you know the difference between broad spectrum and narrow spectrum antibiotics?

- a. Yes
- b. No

Please explain:

13. Is antibiotic spectrum (broad versus narrow) a consideration when you prescribe an antibiotic?

- a. Yes
- b. No
- c. Sometimes

Please explain:

14. *Please indicate if you agree with this statement:* Broad spectrum antibiotics are more likely to cure an infection than narrow spectrum antibiotics.

- a. Agree
- b. Disagree
- c. Other (please explain):

15. What do you think are the pros and cons of using broad spectrum antibiotics?

Pros:	Cons:

16. When do you think it is appropriate to prescribe broad spectrum antibiotics instead of narrow spectrum antibiotics?

17. Do you think your colleagues can uniformly define the differences between broad versus narrow-spectrum antibiotics?

- a. Yes
- b. No

Please explain:

Internists Sinusitis Case Scenario:

You are in the Internal Medicine clinic seeing Michelle, an otherwise healthy 36-year-old female, who complains of fever and increasing nasal discharge over the past 5 days. She is concerned because her symptoms have not improved. Physical exam reveals the patient is afebrile (temperature <100°F), has erythematous and enlarged nasal turbinates, with cloudy discharge on the right and tenderness over her right maxillary sinus. Her lung exam is clear.

18. What would the work up for this patient include (please check all that apply)?

<input type="checkbox"/> Testing for Acute Respiratory Illness (e.g., PCR)	<input type="checkbox"/> Sinus radiographs or CT imaging
<input type="checkbox"/> Blood culture	<input type="checkbox"/> Completing a thorough history
<input type="checkbox"/> Urinalysis	<input type="checkbox"/> Other, please specify: _____
<input type="checkbox"/> Complete Blood Count (CBC) test	_____

19. Would you prescribe an antibiotic to this patient?

- a. Yes
- b. No

If yes, which antibiotic would you prescribe, and why?

If no, what would the treatment for this patient look like?

Antibiotic Prescribing Habit Changes

20. How challenging would it be to change you and your colleagues' antibiotic prescribing behaviors?

- a. Very challenging
- b. Challenging
- c. Somewhat Challenging
- d. Not Challenging

21. What do you think are some of the key reasons for the challenges in trying to change antibiotic prescribing habits? Please answer on a scale of 1 (small factor) to 4 (large factor):

- a. Prescribers are just reluctant to change their antibiotic prescribing practices:
1 (small factor) 2 3 4 (large factor)
- b. Prescribers are used to the way they have been prescribing medications for years:
1 (small factor) 2 3 4 (large factor)
- c. Prescribers can't change their practices because of pressure from patients:
1 (small factor) 2 3 4 (large factor)
- d. Prescribers are challenged by a mix of patients with multiple comorbidities, making it difficult to change prescribing habits:
1 (small factor) 2 3 4 (large factor)
- e. Prescribers don't need to change their prescribing practices because they are sufficient:
1 (small factor) 2 3 4 (large factor)
- f. Other (please describe):
1 (small factor) 2 3 4 (large factor)

22. What methods would help in improving appropriateness of decisions about antibiotic use in patients with acute respiratory infections (check off all that you think could help)?

- a. Improved methods for using electronic medical records and clinical decision support to assist providers with antibiotic selection, dose, and duration
- b. Improved use within practice setting of established clinical practice guidelines for antibiotic selection, dose, and duration
- c. Data showing antibiotic prescribing practices among providers in the practice setting
- d. Access to a quick reference guide for each major diagnosis, including antibiotic indications
- e. Access to better educational materials for patients and families about antibiotic use and resistance
- f. Improved access to antibiotic resistance data for local area(s) where patients are served
- g. Delayed antibiotic prescribing, i.e. "wait and see" prescriptions
- h. Use of shared decision-making tools in your practice
- i. Communication skills training for health care providers to address benefits and harms of antibiotic treatment and management of patient expectations for antibiotics
- j. Access to the Centers for Disease Control and Prevention's Get Smart: Know when Antibiotics Work materials and tools to help learn about antibiotic resistance and appropriate antibiotic prescribing and use for common infections
- k. Other, please describe:

Antibiotic Resistance

23. Do you think antibiotic resistance is a concern for your patients?

- a. Yes
- b. No

Please explain:

24. Do you think your patients understand what antibiotic resistance is?

- a. Yes
- b. No

Please explain:

25. Do you think antibiotic prescribing in outpatient settings is contributing to infections like *Clostridium difficile*?

- a. Yes
- b. No

Please explain:

26. Could you please provide us with any other information that can help to improve antibiotic prescribing in your practice setting?

Appendix D. Chart Abstraction Tool

Goal: The goal and purpose of this form is to provide a structured format to assess antibiotic use for adult patients with an acute respiratory infection (ARI).

Instructions: Please use this patient-level chart abstraction tool to guide your chart review of 30 patients' medical records for **adult patients (≥ 18 years of age)** with ARIs. For sites completing the chart review for the first time, please conduct a random sample of 30 patients between the period of XX and XX. Five patients from each month during that period should be randomly sampled for a total of 30 patients. The abstraction tool should be used once per chart review. **Do not** send protected health information or patient identifying information.

IMPORTANT: Please use only the following ICD-10 codes to identify your adult patients with acute respiratory infections: **J00** (acute nasopharyngitis/common cold); **J01** (acute sinusitis); **J02** (acute pharyngitis); **J03** (acute tonsillitis +/- pharyngitis); **J06.9** (acute URI, unspecified); **J20** (acute bronchitis); **J40** (bronchitis not specified as acute or chronic).

Note: The development of this Outpatient Antibiotic Stewardship Abstraction Form was informed in part by the GNYHA/UHF Antimicrobial Stewardship Program Point Prevalence Survey Abstraction Form.

Section 1 - Patient Characteristics/History:

1. Practice site name:
2. Hospital or health system affiliation:
3. Patient age (in years) at time of the ARI:
 - a. 18-29
 - b. 30-39
 - c. 40-49
 - d. 50-59
 - e. 60-69
 - f. 70 or older
4. Does the patient have a documented history of allergies to antibiotics?
 - a. Yes
 - b. No
 - c. UnknownIf yes, please specify which antibiotics:
5. Patient Sex:
 - a. Female
 - b. Male
 - c. Other (Please specify: _____)

6. What is the patient's race? (if this information is available in this patient's chart)
 - a. White
 - b. Black or African American
 - c. American Indian or Alaskan Native
 - d. Asian
 - e. Native Hawaiian or Other Pacific Islander
 - f. Mixed
 - g. Other (Please specify: _____)
 - h. Unknown

7. Is the patient of Hispanic, Latino, or Spanish origin? (if this information is available in this patient's chart)
 - a. Yes
 - b. No
 - c. Unknown

8. What is the primary language spoken by this patient? (if this information is available in this patient's chart)
 - a. English
 - b. Spanish
 - c. Unknown
 - d. Other (Please specify: _____)

9. Was an interpreter used during the visit? (if this information is available in this patient's chart)
 - a. Yes
 - b. No
 - c. Unknown

10. What type of insurance does this patient have? (if this information is available in this patient's chart)
 - a. Medicare
 - b. Medicaid
 - c. Commercial
 - d. Uninsured
 - e. Unknown
 - f. Other (Please specify: _____)

Section 2 - Diagnosis Information:

11. During which month was this patient diagnosed with an ARI?
 - a. October 2016
 - b. November 2016
 - c. December 2016
 - d. January 2017
 - e. February 2017
 - f. March 2017
 - g. Other (please specify:) _____

12. What is this patient's ICD-10 ARI diagnosis code?
- a. J00 (acute nasopharyngitis/common cold)
 - b. J01 (acute sinusitis)
 - c. J02 (acute pharyngitis)
 - d. J03 (acute tonsillitis +/- pharyngitis)
 - e. J06.9 (acute URI, unspecified)
 - f. J20 (acute bronchitis)
 - g. J40 (bronchitis not specified as acute or chronic)
 - h. Not applicable (N/A)

13. Is the diagnosis code from Q12 the patient's primary or secondary diagnosis?
- a. Primary
 - b. Secondary
 - c. Unknown
 - d. Not applicable (N/A)

14. What type of provider prescribed the antibiotic for this patient (If more than one provider prescribed the antibiotic, please check all that apply)?

Note that if this patient was prescribed an antibiotic, the provider who prescribed the antibiotic may be different than the provider who performed the assessment. The prescribing provider should be indicated in Q15.

- a. Physician Attending
- b. Resident
- c. Nurse Practitioner
- d. Physician Assistant
- e. Student
- f. Not applicable (N/A) — no antibiotic prescribed
- g. Other _____

15. What type of provider prescribed the antibiotic for this patient (If more than one provider prescribed the antibiotic, please check all that apply)?

Note that this provider may be different than the provider in Q14.

- a. Physician Attending
- b. Resident
- c. Nurse Practitioner
- d. Physician Assistant
- e. Student
- f. Not applicable (N/A) — no antibiotic prescribed
- g. Other _____

16. Was this patient a scheduled patient or a walk-in?
- a. Scheduled
 - b. Walk-in
 - c. Unknown

17. What symptoms were present when the patient was diagnosed (please check all that apply)?

<input type="checkbox"/> Nasal congestion or discharge	<input type="checkbox"/> Cough
<input type="checkbox"/> Ear aches	<input type="checkbox"/> Shortness of breath
<input type="checkbox"/> Muscle aches or body aches	<input type="checkbox"/> Cervical lymphadenopathy
<input type="checkbox"/> Headache, facial, or sinus pain	<input type="checkbox"/> Sore throat
<input type="checkbox"/> Fever	<input type="checkbox"/> Other (please specify): _____
<input type="checkbox"/> Unknown	_____

18. For the symptom which was present for the longest period of time, indicated in Q17 above, how long did the patient report experiencing that symptom?

- Less than 3 days (< 3 days)
- Between 3 and 7 days (3 days -- ≤ 7 days)
- Between 8 and 14 days (8 days -- ≤ 14 days)
- Greater than 14 days (> 14 days)
- Unknown

Note: Questions 19 -23 are optional

19. What comorbidities were present when the patient was diagnosed (please check all that apply)?

<input type="checkbox"/> HIV infection	<input type="checkbox"/> Diabetes/other endocrine disease
<input type="checkbox"/> AIDS	<input type="checkbox"/> Rheumatologic or connective tissue disease (e.g., SLE, RA)
<input type="checkbox"/> Liver/gastrointestinal disease	<input type="checkbox"/> Malignancy
<input type="checkbox"/> Pulmonary disease (e.g., COPD, asthma)	<input type="checkbox"/> Transplant (solid or stem cell)
<input type="checkbox"/> Chronic kidney disease (including dialysis)	<input type="checkbox"/> Chronic immunosuppression for other disorder
<input type="checkbox"/> Cardiovascular disease	<input type="checkbox"/> Neurologic disorder (e.g., multiple sclerosis)
<input type="checkbox"/> Dementia	<input type="checkbox"/> None
<input type="checkbox"/> Unknown	<input type="checkbox"/> Other (please specify): _____

20. *If malignancy* is selected as a comorbidity for this patient, please indicate whether solid or hematologic (if known).

- Solid
- Hematologic
- Unknown
- Not applicable (N/A)

21. *If transplant* is selected as a comorbidity, please indicate type and date of transplant below (if known).
Type of transplant:
Date of transplant:

22. *If this patient also has cancer*, is this patient on chemotherapy?
a. Yes (Please specify the last day patient received chemotherapy: _____)
b. No
c. Not applicable (N/A)

23. *If this patient also has cancer*, is this patient neutropenic?
a. Yes
b. No
c. Not applicable (N/A)

Section 3 - ARI Course and Treatment Information:

24. Did this patient get testing for Acute Respiratory Illness in the clinic?
 Yes (check all that apply)
 No
 Unknown

25. If yes, please indicate which type(s) of testing the patient received (please check all that apply):
a. Strep screen
b. Rapid flu testing
c. Rapid RSV testing
d. Sputum cultures
e. Nasopharyngeal cultures
f. Nasopharyngeal PCR testing for viruses
g. Nasal cultures
h. Oropharyngeal cultures
i. Not applicable (N/A)
j. Other _____

26. Was this patient prescribed an antibiotic for the diagnosis specified in Q12?
a. Yes
b. No
c. Deferred, pending culture results

27. Was there a 14-day “look forward” to see if there was a documented telephone encounter or a revisit for the same reason/complaint?
a. Yes
b. No
c. Unknown

28. Please select all antibiotics and corresponding duration that the patient was prescribed after the ARI diagnosis: (please check all antibiotics prescribed and indicate appropriate duration for each)

<u>Antibiotic</u>	<u>Duration</u>				
	Less than or equal to 5 days (≤ 5 days)	Greater than 5 days but less than or equal to 7 days (> 5 days -- ≤ 7 days)	Greater than 7 days but less than 10 days (> 7 days -- < 10 days)	Greater than or equal to 10 days but less than 14 days (≥ 10 days -- < 14 days)	Greater than or equal to 14 days (≥ 14 days)
<input type="checkbox"/> Penicillin or Amoxicillin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Amoxicillin/Clavulanic acid (e.g., Augmentin)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 1 st generation Cephalosporins (e.g., Cephalexin, Cefadroxil)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 2 nd generation Cephalosporins (e.g., Cefaclor, Cefprozil)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 3 rd generation Cephalosporins (e.g., Cefpodoxime, Cefdinir, Cefditoren)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Fluoroquinolones (e.g., Levofloxacin, Moxifloxacin)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Macrolides (e.g., Azithromycin, Clarithromycin)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Clindamycin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other (please specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Unknown/unavailable					

29. Aside from antibiotics, was any other medication (either in addition to or in lieu of antibiotics) prescribed or recommended to the patient (please check all that apply)?

- a. Nasal irrigation
- b. A decongestant (e.g., Sudafed)
- c. An antiviral (e.g., Tamiflu)
- d. An antitussive agent
- e. An analgesic/anti-inflammatory medication
- f. NSAIDS/acetaminophen (antipyretic)
- g. A steroid
- h. An antihistamine
- i. Other (please specify): _____
- j. None

Section 4 — Follow Up and Outcomes Information:

30. What type of follow up was scheduled or recommended, as documented in the patient's chart (please check all that apply)?
- a. Phone call
 - b. In-person visit
 - c. No follow up provided
 - d. Unable to tell
 - e. Other (please specify): _____
31. What type of follow up actually took place (please check all that apply)?
- a. Phone call
 - b. In-person visit
 - c. No follow up provided
 - d. Unable to tell
 - e. Other (please specify): _____
32. Was any patient education provided to this patient regarding the diagnosis or treatment?
- a. Yes (please specify): _____
 - b. No
 - c. Unknown
33. *If this patient was prescribed an antibiotic to treat their ARI*, is there any documentation in the month following their diagnosis that indicates any complications with the antibiotic prescribed that required further action (e.g., such as stopping or changing treatment)?
- a. Yes (please specify): _____
 - b. No
 - c. Unknown
 - d. Not applicable — patient was not prescribed an antibiotic

Appendix E. Patient Survey

Antibiotics are medicines prescribed by a healthcare provider to treat some illnesses. Examples of common antibiotics are penicillin, amoxicillin, and Z-Pak.

[Insert Hospital Name] is committed to improving our patients' health and ensuring that antibiotics are used properly. Your responses to the survey below will help us as we work on patient education around antibiotic use. Your responses are anonymous.

1. Please select the reason for your visit.
 - a. Upper respiratory infection symptoms (e.g. cough, runny nose, sore throat)
 - b. Other condition
2. If you are here today because of upper respiratory infection symptoms (e.g. runny nose, cough, sore throat), do you think you need an antibiotic?
 - a. Yes
 - b. No
 - c. I don't know
 - d. Not applicable (I am here for something else)
3. Antibiotics fight infections caused by:
 - a. Viruses
 - b. Bacteria
 - c. Viruses and bacteria
4. Most coughs and colds get better without antibiotics
 - a. True
 - b. False
5. Which of these illnesses should be treated with antibiotics? (Note: more than 1 answer may apply)
 - a. Runny nose
 - b. The flu
 - c. Cold
 - d. Strep throat
 - e. Bronchitis
6. In general, if antibiotics are used too much they may not work in the future.
 - a. True
 - b. False
7. I can use leftover antibiotics to treat infections in the future
 - a. True
 - b. False
8. If I feel better after a few days, it is OK to stop my antibiotics early
 - a. True
 - b. False
9. It is OK to take antibiotics from relatives or friends or others without having to see a healthcare provider
 - a. True
 - b. False
10. Please select your age
 - a. 18-29
 - b. 30-49
 - c. 50-64
 - d. 65 or older
11. Please select your gender
 - a. Male
 - b. Female
 - c. Other
12. Please select your preferred language
 - a. English
 - b. Spanish
 - c. Russian
 - d. Chinese
 - e. Other: _____

If you are here for something other than upper respiratory infection symptoms (e.g. runny nose, cough, sore throat), your survey is complete. Thank you for completing this survey.

If you **ARE** here today because of upper respiratory infection symptoms (e.g. runny nose, cough, sore throat), please complete the next five questions **AFTER** your visit.

1. Did your healthcare provider prescribe an antibiotic for you today?
 - a. Yes
 - b. No
 - c. I don't Know
2. My healthcare provider took the time to explain how the antibiotic prescribed should be used
 - a. Yes
 - b. No
 - c. Not applicable (I did not receive a prescription for an antibiotic)
3. My healthcare provider took the time to explain why an antibiotic was not prescribed
 - a. Yes
 - b. No
 - c. Not applicable (I received a prescription for an antibiotic)
4. I understood my healthcare provider's decision to either prescribe or not prescribe an antibiotic
 - a. Yes
 - b. No
 - c. I don't know
5. If no antibiotics were prescribed, my healthcare provider gave me other treatment options for my symptoms
 - a. Yes
 - b. No
 - c. I don't know

Appendix F. Data Report Templates

Pre-Intervention Data Template

Antibiotic Stewardship in Outpatient Clinics

UHF Outpatient Antibiotic Stewardship Initiative Goals

1. To engage hospital-owned outpatient practices in understanding and analyzing the primary factors that affect antibiotic prescribing practices for adult patients with acute respiratory infection (ARI).
2. To develop a comprehensive action plan to test, implement and evaluate antibiotic stewardship best practices or interventions.

How to Read This Report

Survey data are reported at either the individual practice site level or the health care system level in addition to a peer group comparison (median or frequency of response) with 31 outpatient clinics across nine New York health care systems or hospitals that participated in the initiative.

This report is organized by data source as follows:

1. Practice Characteristics — data from the UHF Assessment of Current Antibiotic Stewardship Practices in Outpatient Sites (Tables 1 and 2)
 2. Patient Characteristics — data from the UHF Outpatient Antibiotic Stewardship Chart Abstraction (Tables 3, 4 and 5)
 3. Prescriber Characteristics — data from the UHF Survey of Antibiotic Prescribers (Tables 6 and 7, Figures 1 and 2)
-

Antibiotic Stewardship — Current Practices and Areas of Interest

Current strategies to improve outpatient antibiotic prescribing at Hospital X reported in the assessment of current practices:

N/A

Antibiotic stewardship strategies of interest at Hospital X reported in the assessment of current practices:

- Avoid unnecessary treatment (2/2 practices)
 - Improve antibiotic selection (2/2 practices)
 - Develop clinical guidelines for appropriate antibiotic use for common clinical conditions (2/2 practices)
-

Practice Characteristics

Table 1. Demographic characteristics among all outpatient practices

Practice Sites	Site 1	Site 2	Site 3	Site 4	All Outpatient Practices (Median or %)
Patients per Year					
ARIs (Oct – March)					
ARIs (April – Sept)					
Rate of ARI					
Full Time Employees					
Type of Practice					
Payer Mix					
Medicare					
Medicaid					
Commercial					
Uninsured					
Other/Unknown					
Antibiotic Prescribers					
Physician					
Resident					
Nurse Practitioner					
Physician Assistant					

Table 2. Current antibiotic stewardship policies, practices and technologies among all outpatient practices

Practice Sites	Site 1	Site 2	Site 3	Site 4	All Outpatient Practices (%)
Policy guidelines for antibiotic use and selection for ARIs					
Electronic Medical Record (EMR)					
Outpatient EMR connected to inpatient EMR					
Computer decision support for antibiotic use					
Antibiotic stewardship program in the hospital or health system					
Outpatient-specific activities in the antibiotic stewardship program					
Clinical leader available to facilitate antibiotic stewardship activities					
Strategies currently in place to improve antibiotic prescribing					

Patient Characteristics

Table 3. Demographic characteristics among a sample of adult patients diagnosed with an ARI from October 2015 – March 2016

Practice Sites	Site 1	Site 2	Site 3	Site 4	All Outpatient Practices (%) n =
Age					
18-39					
40-59					
60 or older					
Sex					
Female					
Male					
Primary Language					
English					
Spanish					
Other					
Unknown					
Type of Appointment					
Scheduled					
Walk-In					
Unknown					

Table 4. Follow-up information and education for a sample of adult patients diagnosed with an ARI

Practice Sites	Site 1	Site 2	Site 3	Site 4	All Outpatient Practices (%) n =
Other medications prescribed aside from an antibiotic ¹					
Yes					
No					
Follow up recommended					
Yes					
No					
Follow up received					
Yes					
No					
Patient education for diagnosis or treatment					
Yes					
No					

¹ The most commonly prescribed medications among all health care systems for these diagnoses were antitussive agents, antihistamines and decongestants (e.g., Sudafed).

Table 5. Differences in antibiotic prescription by demographic and clinical characteristics among a sample of adult patients diagnosed with an ARI

Characteristic	Antibiotic Prescription — Hospital A		Antibiotic Prescription - All	
	Yes (%)	No (%)	Yes (%)	No (%)
Total Sample				
Practice Site				
Site 1				
Site 2				
Site 3				
Site 4				
Patient Age				
18-39 years				
40-59 years				
60 or older				
Patient Language				
English				
Spanish				
Other				
Unknown				
Patient Sex				
Female				
Male				
Patient Diagnosis				
J06.9 Acute URI				
J02 Acute Pharyngitis				
J01 Acute Sinusitis				
J40 Bronchitis, unspecified				
Patient Comorbidities ⁸				
0				
1				
2 +				
Antibiotic Type				
Macrolides				
Amoxicillin/Clavulanic Acid				
Fluoroquinolones				
Antibiotic Duration				
≤ 5 days				
6-9 days				
≥ 10 days				

⁸ The most common comorbidities reported across all outpatient practices were a, b, and c.

Prescriber Characteristics

Table 6. Demographic characteristics among providers who prescribe antibiotics

	Hospital A	All Outpatient Practices (%) n =
Direct Patient Care		
< 50% of time		
≥ 50% of time		
Provider Type		
Physician Attending		
Resident		
Nurse Practitioner		
Physician Assistant		
Other		
Years Practicing		
< 5 years		
5-10 years		
11-20 years		
21-30 years		
31 years or more		

Table 7. Prescriber knowledge about broad versus narrow spectrum antibiotics at all outpatient practices

	Hospital A	All Outpatient Practices (%) n=
Do you know the difference between broad and narrow spectrum antibiotics?		
Yes		
No		
Is spectrum a consideration when prescribing an antibiotic?		
Yes		
No		
Sometimes		
Broad spectrum antibiotics are more likely to cure an infection than narrow		
Agree		
Disagree		
Do you think your colleagues can uniformly define the differences between broad and narrow spectrum?		
Yes		
No		
Case: Would you prescribe an antibiotic to this patient? ¹		
Yes		
No		

¹The case scenario in the UHF survey of antibiotic prescribers described a healthy, 36-year-old patient with fever and nasal discharge for 5 days with a temperature < 100°F, erythematous and enlarged nasal turbinates, cloudy discharge on the right, and tenderness over the right maxillary sinus.

Figure 1. Most important and least important factors in the decision to prescribe antibiotics to a patient diagnosed with an ARI, reported by antibiotic prescribers at Hospital X outpatient practices (n = xx)

Factors for Antibiotic Selection	Often Impacts the Decision to Prescribe – N (%)	Rarely Impacts the Decision to Prescribe – N (%)	All Outpatient Practices N =
Illness severity			
Clinical practice guidelines			
Patient request and/or patient satisfaction			
Sample access			
Patient medical history and/or comorbidities			
Patient compliance			
Concern for antibiotic resistance			
Time pressure			

¹ Only the “often impacts the decision to prescribe” category is included in aggregate for all systems — all percentages in this figure were calculated by dividing the number of prescribers who marked a given response by the number of prescribers who completed Question 7 in the UHF Survey of Antibiotic Prescribers (prescribers were allowed to mark more than one response).

Patient Survey Data Template

Antibiotic Stewardship in Outpatient Clinics

Patient Survey Report

Patient Survey Goals

1. Obtain information from patients regarding their knowledge and attitudes about antibiotic use.
2. Learn about acute respiratory infection patients' perceptions of the provider-patient communication regarding antibiotic prescribing.

How to Read this Report

Survey data was collected from a sample of patients from xx outpatient clinics across seven New York health care systems or hospitals that participated in the initiative. The data (percent response) are reported in at the individual practice site level and the health care system level in addition to a peer group comparison.

This report is organized as follows:

1. Patient's knowledge and attitude about antibiotic use
2. Provider-patient communication around antibiotic prescribing

Part 1 — General Survey of Patients

Table 1. Visit information among [Insert Hospital Name] outpatient practices (n=x) versus all outpatient practices (n=xx)

<i>Practice Sites</i>	<i>Site 1</i>	<i>Site 2</i>	<i>All Outpatient Sites</i>
<i>Reason for visit</i>			
<i>Upper respiratory infection symptoms</i>			
<i>Other</i>			
<i>If you are here today because of upper respiratory symptoms, do you think you need an antibiotic?</i>			
<i>Yes</i>			
<i>No</i>			
<i>I don't know</i>			
<i>Not applicable</i>			

Table 2. General knowledge about antibiotics among [Insert Hospital Name] outpatient practices (n=x) versus all outpatient practices (n=xx)

<i>Practice Sites</i>	<i>Site 1</i>	<i>Site 2</i>	<i>All Outpatient Sites</i>
<i>Antibiotics fight infections caused by</i>			
<i>Viruses</i>			
<i>Bacteria</i>			
<i>Viruses and bacteria</i>			
<i>Most coughs and colds get better without antibiotics</i>			
<i>True</i>			
<i>False</i>			
<i>Which of these illnesses should be treated with antibiotics*</i>			
<i>Runny nose</i>			
<i>The flu</i>			
<i>Cold</i>			
<i>Strep throat</i>			
<i>Bronchitis</i>			
<i>In general, if antibiotics are used too much they may not work in the future</i>			
<i>True</i>			
<i>False</i>			
<i>I can use leftover antibiotics to treat infections in the future</i>			
<i>True</i>			
<i>False</i>			
<i>If I feel better after a few days, it is OK to stop my antibiotics early</i>			
<i>True</i>			
<i>False</i>			
<i>It is OK to take antibiotics from relatives or friends or others without having to see a healthcare provider</i>			
<i>True</i>			
<i>False</i>			

*Note: More than one response was allowed

Table 3. Demographic characteristics among [Insert Hospital Name] outpatient practices (n=x) versus all outpatient practices (n=xx)

<i>Practice Sites</i>	<i>Site 1</i>	<i>Site 2</i>	<i>All Outpatient Sites</i>
<i>Age</i>			
18-29			
30-49			
50-64			
65 or >			
<i>Gender</i>			
Male			
Female			
Other			
<i>Preferred Language</i>			
English			
Spanish			
Russian			
Chinese			
Other			

Part 2 — Survey of Patients with Acute Respiratory Infection Symptoms

Table 1. Patient-provider communication among [Insert Hospital Name] outpatient practices (n=x) versus all outpatient practices (n=xx)

<i>Practice Sites</i>	<i>Site 1</i>	<i>Site 2</i>	<i>All Outpatient Sites</i>
<i>Did your healthcare provider prescribe an antibiotic for you today?</i>			
Yes			
No			
I don't know			
<i>My healthcare provider took the time to explain how the antibiotic prescribed should be used</i>			
Yes			
No			
Not applicable			
<i>My healthcare provider took the time to explain why antibiotic was <u>not</u> prescribed</i>			
Yes			
No			
Not applicable			
<i>I understood my healthcare provider's decision to either prescribe or not prescribe an antibiotic</i>			
Yes			
No			
I don't know			

If no antibiotics were prescribed, my healthcare provider gave me other treatment options for my symptoms

Yes

No

I don't know

Table 2. Demographic characteristics among [Insert Hospital Name] outpatient practices (n=x) versus all outpatient practices (n=xx)

<i>Practice Sites</i>	<i>Site 1</i>	<i>Site 2</i>	<i>All Outpatient Sites</i>
<i>Age (n =</i>			
<i>18-29</i>			
<i>30-49</i>			
<i>50-64</i>			
<i>65 or ></i>			
<i>Gender (n=</i>			
<i>Male</i>			
<i>Female</i>			
<i>Other</i>			
<i>Preferred Language (n=</i>			
<i>English</i>			
<i>Spanish</i>			
<i>Russian</i>			
<i>Chinese</i>			
<i>Other</i>			

Post-Intervention Data Template

Antibiotic Stewardship and Prescribing in Outpatient Clinics

UHF Outpatient Antibiotic Stewardship Initiative Goals

1. To engage hospital-owned outpatient practices in understanding and analyzing the primary factors that affect antibiotic prescribing practices for adult patients with an acute respiratory infection (ARI)
2. To develop a comprehensive action plan to test, implement and evaluate antibiotic stewardship best practices or interventions, and assess whether the interventions have affected antibiotic prescribing

How to Read This Report

This report includes pre- and post- intervention survey data at the individual practice site level and health system level, in addition to a comparison (median or frequency of response) with all 34 outpatient clinics across seven New York health care systems that participated in this initiative.

Clinics collected pre-intervention data for patients with ARIs from October 2015 to March 2016. The new clinics that were added during the second phase of the project completed pre-intervention data collection from October 2016 to March 2017.

The hospital and health systems developed action plans for interventions to reduce inappropriate antibiotic use and the clinics implemented these interventions between the pre- and post- assessment periods.

Post-intervention data was collected for patients with ARIs from these clinics from January 2018 to March 2018 to assess differences in the rate of potentially inappropriate prescriptions before and after antibiotic stewardship initiatives were implemented.

This report is organized by data source as follows:

1. Antibiotic Stewardship Strategies — data from the UHF Assessment of Current Antibiotic Stewardship Practices in Outpatient Sites (Table 1)
 2. Chart Abstraction Results — data from the UHF Outpatient Antibiotic Stewardship Chart Abstraction (Tables 2, 3, and 4)
-

Antibiotic Stewardship Strategies

Table 1. Antibiotic stewardship strategies implemented among [Hospital Name] outpatient practices (n=x) versus all outpatient practices participating in the initiative (n=xx)

Practice Sites	Site 1	Site 2	All Outpatient Practices (%)
Communication skills training			
Audit and feedback			
Clinical decision support			
Face-to-face educational training			
Explicit written justification in EMR			
Delayed antibiotic prescribing			
Call centers or nurse hotlines			
Provider feedback reports			
Patient education			
Continuing medical education			
Formulary restrictions			
CDC tools			
Commitment posters			
Fact sheets			
Prescription adherence tools			
Viral prescription pads			
Other			

Chart Abstraction Results

Table 2. Demographic characteristics among a sample of adult patients diagnosed with an ARI, pre-intervention and post-intervention, in [Hospital Name] outpatient practices versus all outpatient practices participating in this initiative

Practice Sites	Site 1		Site 2		All Outpatient Practices	
	Pre % n = xx	Post % n = xx	Pre % n = xx	Post % n = xx	Pre % n = xxxx	Post % n = xxxx
Age						
18-39						
40-59						
60 or older						
Sex						
Female						
Male						
Primary Language						
English						
Spanish						
Other						
Unknown						
Appointment Type						
Scheduled						
Walk-In						
Unknown						

Table 3. Follow-up information and education for a sample of adult patients diagnosed with an ARI, pre-intervention and post-intervention, in [Hospital Name] outpatient practices versus all outpatient practices participating in this initiative

Practice Sites	Site 1		Site 2		All Outpatient Practices	
	Pre % n = xx	Post % n = xx	Pre % n = xx	Post % n = xx	Pre % n = xxxx	Post % n = xxxx
Other medications prescribed aside from an antibiotic ¹						
Yes						
No						
Follow-up recommended						
Yes						
No						
Other						
Follow-up received						
Yes						
No						
Other						
Patient education for diagnosis or treatment						
Yes						
No						
Unknown						

¹ Prior to implementation of antibiotic stewardship initiatives, the most commonly prescribed medications among all health care systems for these diagnoses were x, y, and z. After implementation of the initiatives, the most commonly prescribed medications were a, b, and c.

Table 4. Pre- and post-intervention antibiotic prescription rates by demographic and clinical characteristics among a sample of adult patients diagnosed with an ARI in [Hospital Name] outpatient practices versus all outpatient practices¹

Characteristic	[Hospital Name] Antibiotics Prescribed		All Outpatient Practices Antibiotics Prescribed	
	Pre (%)	Post (%)	Pre (%)	Post (%)
Total Sample				
Practice Site				
Practice 1				
Practice 2				
Patient Age				
18-39 years				
40-59 years				
60 or older				
Patient Language				
English				
Spanish				
Other				
Unknown				
Patient Sex				
Female				
Male				
Patient Diagnosis				
J00 Acute Nasopharyngitis				
J01 Acute Sinusitis				
J02 Acute Pharyngitis				
J03 Acute Tonsillitis				
J06.9 Acute URI				
J20 Acute Bronchitis				
J40 Bronchitis, not specified				
N/A				
Patient Comorbidities ²				
0				
1				
2				
3 +				
Antibiotic Type				
Amoxicillin/Clavulanic Acid				
Fluoroquinolones				
Macrolides				
Penicillin				
Antibiotic Duration				
≤ 5 days				

Characteristic	[Hospital Name] Antibiotics Prescribed		All Outpatient Practices Antibiotics Prescribed	
	Pre (%)	Post (%)	Pre (%)	Post (%)
6-9 days				
≥ 10 days				

¹ Sampling specifications for chart abstractions were based on patient diagnosis and time period of diagnosis, which may have resulted in different sampling methodologies (i.e. random vs. convenience) across practices.

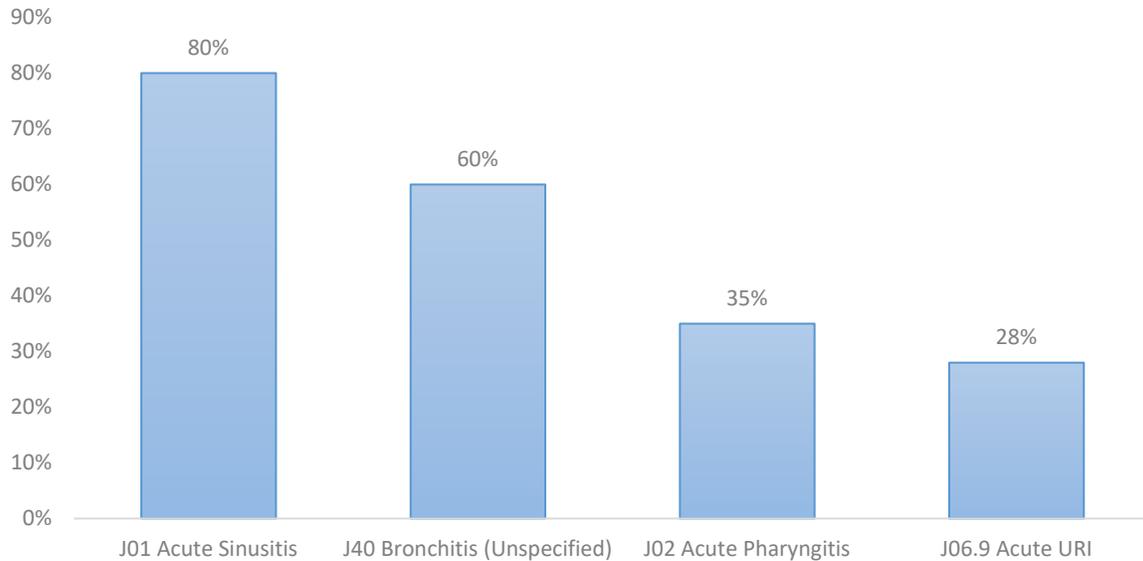
Note: There were antibiotic prescription responses missing from the total sample of patients with ARIs, xx responses from the pre-intervention data and xx from the post-intervention data, because they were marked as “deferred, test pending.”

² The most common comorbidities reported across all outpatient practices pre- and post-intervention were a, b, and c.

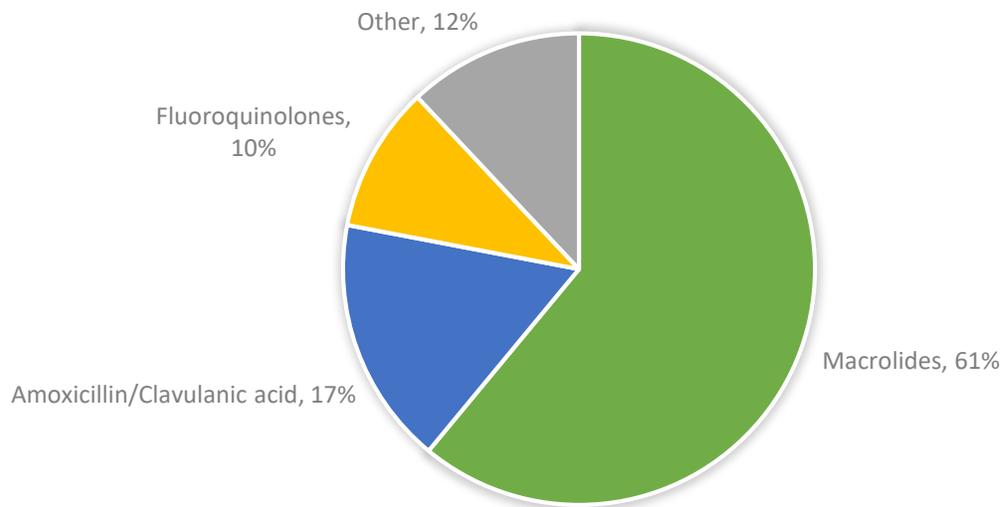
Appendix G. Sample Charts to Display Data

Below are some examples that show how to display data from the chart abstraction. Pre- and post-intervention rates can be added to show any changes in prescribing rates. The data in the charts below have been made up for the purposes of display.

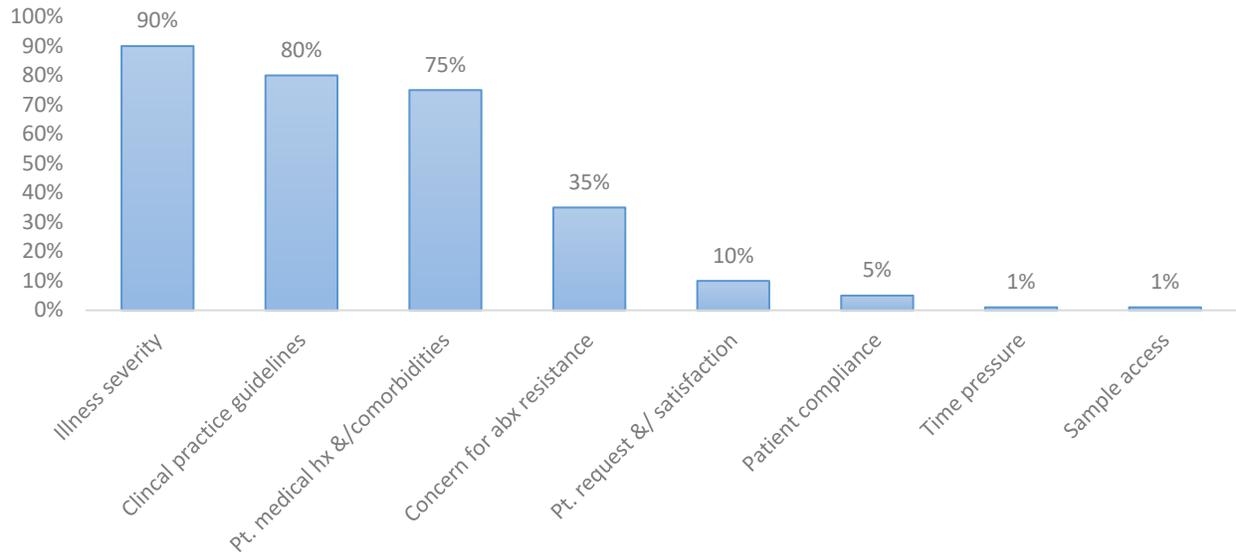
Diagnoses with antibiotics prescriptions



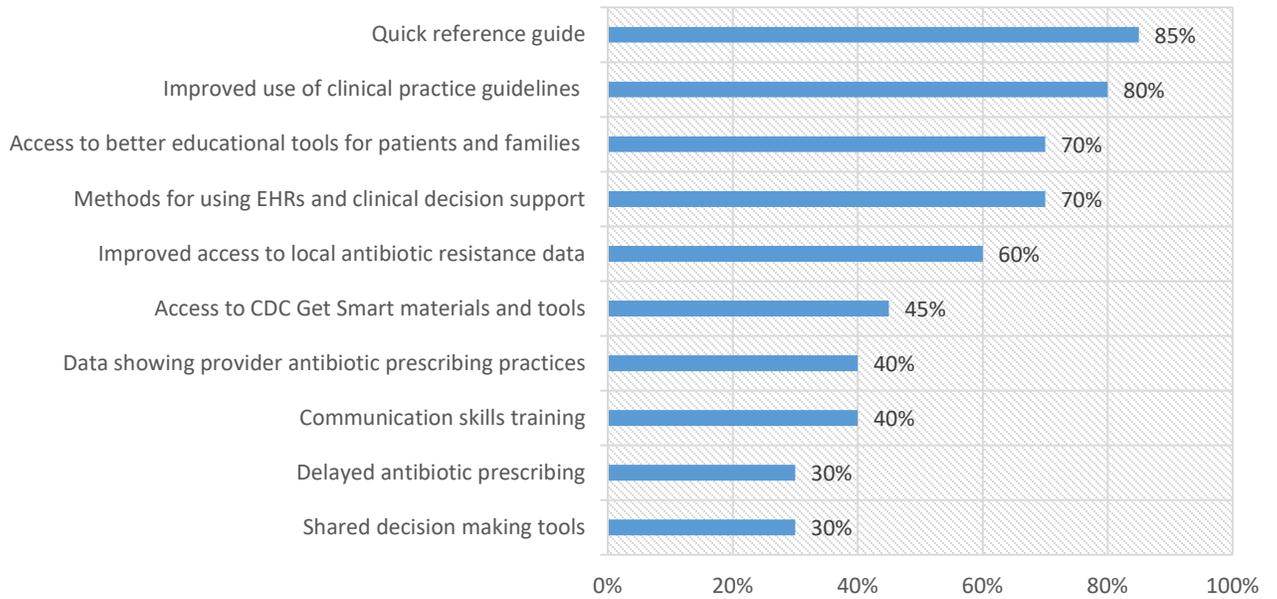
Types of antibiotic prescriptions (n = xxx)



Factors that impact decision to prescribe antibiotics



Preferred methods to improve appropriate antibiotic prescribing



Appendix H. Sample Action Plan Template

CDC Core Elements of Outpatient ASP	Hospital or Health System/ Outpatient Clinics	Steps to Take	Person(s) Responsible	Timeframe	Measurement Strategy to Evaluate Impact
Commitment	Health System Health Center 1, 2, and 3	1) Use quality and leadership to develop Ambulatory ASP Committee 2) Identify site champions at Health Centers 1,2, and 3	ASP Director Nurse Manager	February – May 2017	Establish local champions at 3 sites and an overall working group
Actions	Health System Health Center 1, 2, and 3	1) Develop peer comparative data across clinics 2) Establish commitments to prescribing	Medical Director 1 Site Directors Charge Nurse 1 Charge Nurse 2	March – December 2017	Review of peer comparative ICD-10 codes and prescribing for ARI; Assess prescribing patterns
Tracking and Reporting	Health System/ Health Center 1, 2, and 3)	1) IT support for data ongoing basis by ICD-10, by provider and larger scale from EPIC	Data analyst A Data analyst B	April – December 2017	Develop EMR algorithms and compare data for specific ICD-10 codes
Education	Health System Health Center 1, 2, and 3	1) Grand rounds 2) Provider-educational sessions, 3) Patient education sheets, screen savers and video (in waiting areas)	ASP Director Medical Director 1 Site Directors	January – December 2017	Develop materials; Number of sessions and participants; Assess provider knowledge via pre- and post- quiz

Appendix I. Sample Interventions

Best Practice Alerts

Below is an example of a BPA alert which prompts the provider to fill out the Centor Score Criteria for Strep Pharyngitis, and a pop-up is then displayed with prompts on next steps, such as ordering diagnostic tests.

Centor Score for Strep Pharyngitis

Time Taken Date

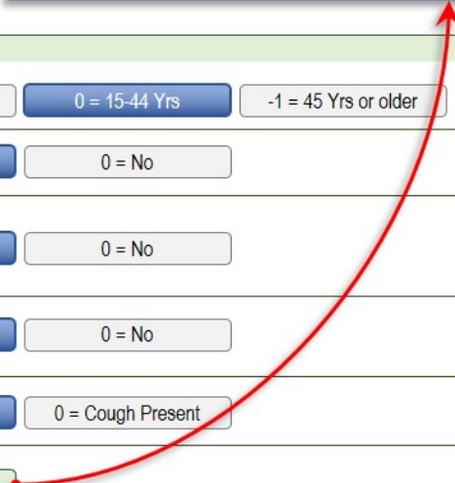
▼ Centor Score for Strep Pharyngitis

Patient age	<input type="button" value="1 = 3-14 Yrs"/>	<input checked="" type="button" value="0 = 15-44 Yrs"/>	<input type="button" value="-1 = 45 Yrs or older"/>
Exudate or swelling on tonsils	<input checked="" type="button" value="1 = Yes"/>	<input type="button" value="0 = No"/>	
Tender/ swollen anterior cervical lymph nodes	<input checked="" type="button" value="1 = Yes"/>	<input type="button" value="0 = No"/>	
Fever greater than 100.4 F	<input checked="" type="button" value="1 = Yes"/>	<input type="button" value="0 = No"/>	
Cough	<input checked="" type="button" value="1 = Cough Absent"/>	<input type="button" value="0 = Cough Present"/>	
Centor Score	<input type="text" value="4"/>		

Best Practice Advisory – Pharyngitis, One

 Consider rapid strep testing and/or culture. Note: IDSA and ASIM no longer recommend empiric treatment for strep based on symptomology alone.

<input type="button" value="Order"/>	<input type="button" value="Do Not Order"/>	POCT rapid strep A
<input type="button" value="Order"/>	<input type="button" value="Do Not Order"/>	Culture Throat



Hard Stops

Below is an example of a hard stop alert which prompts the provider to consider not prescribing an antibiotic because clinical guidelines do not indicate an antibiotic for bronchitis and links to supporting literature. If an antibiotic is still prescribed, then the provider can enter in a reason.

Best Practice Advisory – Bronchitis

**URI or Bronchitis and Antibiotics**

Existing clinical guidelines do not support the use of antibiotics for the common cold / upper respiratory infection or bronchitis. Please indicate the reason why the patient is on this therapy.

[Click for supporting literature](#)

**Acknowledge reason**

	ICD-9-CM	ICD-10-CM	
Bronchitis	J40	490	<input type="button" value="Dismiss"/>
			<input type="button" value="Change"/>

Hard Stop Override Report

Below is an example of a hard stop override report that can be sent to the provider to indicate where there were deficiencies in antibiotic prescribing and provides an explanation of why those deficiencies were found and when antibiotic is indicated.

MEMORANDUM

TO: Provider XYZ

FROM: Provider ABC

SUBJECT: Antibiotic Hard Stop Overrides

DATE: Month/Date/Year

A comprehensive review was conducted of your Hard Stop Overrides. The following deficiencies were found:

Medical Record #	Diagnosis	Date of Service
MR #01234567	Bronchitis	1/1/17
MR #12345678	Negative Strep Pharyngitis	1/2/17
MR# 23456789	Bronchitis	2/1/17

Bronchitis is a viral illness and antibiotics are not indicated. [Hospital can insert summary of clinical guidelines for bronchitis or link to appropriate guidelines online].

Pharyngitis should be assessed using the Centor Score criteria and should not be treated empirically. [Hospital can insert reference to appropriate clinical guidelines]. Treatment should only be started after either a confirmed positive rapid strep test or a positive throat culture.

Please remember to review the hard stop when it appears to appropriately prescribe antibiotics.

Provider Feedback Reports

Below are three examples of provider feedback reports on antibiotic prescribing presented in different formats which can be used to display the provider’s prescribing rate and indicate when prescribing was unnecessary or inappropriate. A run chart can be used by the outpatient antibiotic stewardship team to understand trends in antibiotic prescribing over time. Additionally, a patient-level report can be produced for the team lead to drill down on specific encounters for further discussion.

There is research on the effectiveness of providing peer comparisons⁹ to providers to show their prescribing rates relative to their peers and other research showing that a letter to a provider stating that he/she is a “top performer”¹⁰ i.e. prescribing appropriately in comparison to a peer group can be used to influence provider behavior on prescribing antibiotics appropriately.

Example 1

Provider Name	# Encounters for ARIs for which antibiotics are not recommended	# Encounters in which antibiotics were not prescribed	Rate (%)
Dr. A	10	8	80%
Dr. B	2	2	100%
Dr. C	3	2	67%
Total	15	12	80%

Example 2

In an effort to support the CDC’s ‘Be Antibiotics Aware’ Campaign, the Antibiotic Stewardship team has begun to monitor compliance for ARI antibiotics. Below is a summary of your visits and your compliance report for your site. The data provided here is collected based on encounter using ICD-10 codes for Primary or Secondary ARI [Insert codes e.g. J40 Bronchitis, J01 Acute Sinusitis].

In addition, please keeping the following in mind when viewing this email:

- The data is for informational purposes only and is not meant to be punitive
- Please provide your feedback so we may improve.

Sincerely,

Hospital X Outpatient Antibiotic Stewardship Program

NPI	Total ARIs	# Cases Prescribed Antibiotics	Your Compliance	Your Compliance Quartile
012345	50	30	40%	3 rd quartile
123456	55	20	64%	2 nd quartile
234567	40	5	88%	1 st quartile

⁹ Gerber, J et al. (2013). Effect of an outpatient antimicrobial stewardship intervention on broad-spectrum antibiotic prescribing by primary care pediatricians: a randomized trial. (<https://jamanetwork.com/journals/jama/fullarticle/1696098>)

¹⁰ Meeker, D. et al. (2016). Effect of behavioral interventions on inappropriate antibiotic prescribing among primary care practices: a randomized clinical trial. (<https://jamanetwork.com/journals/jama/fullarticle/2488307>)

Example 3

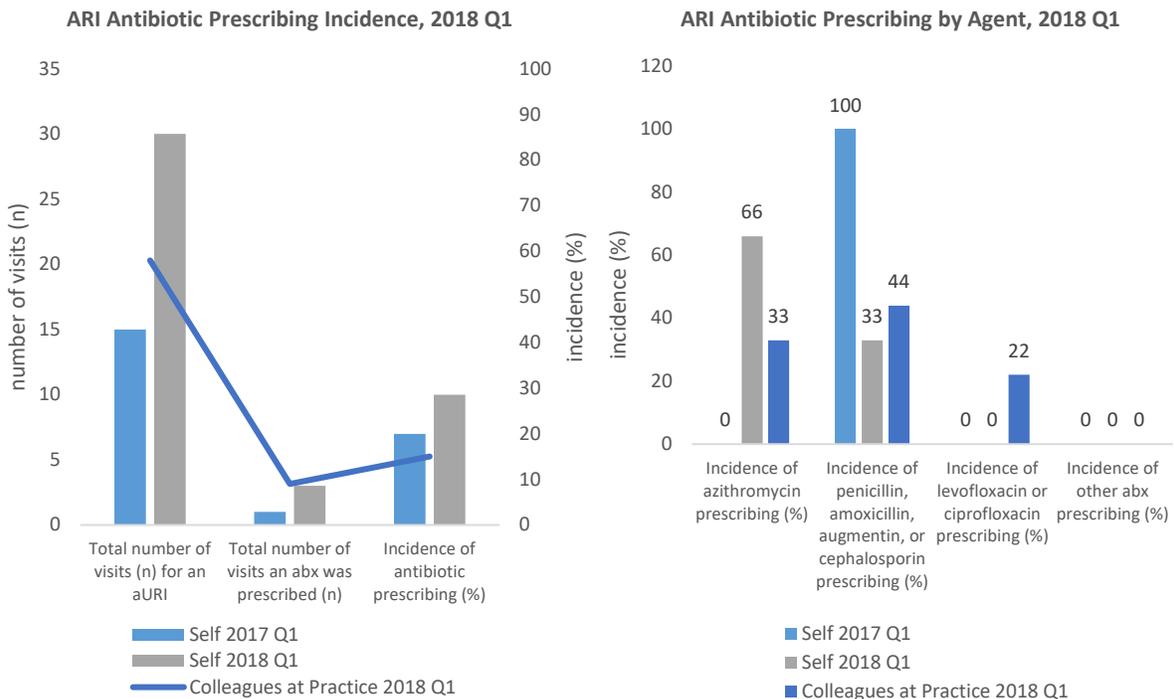
To: Dr. ABC
 From: Director of ID/ASP
 CC: Chairman, Department of Medicine
 Subject: Antibiotic Prescribing Incidence for [Insert time period—e.g., Q1 2018]
 Date: Month/Date/Year

Dear Dr. XX,

The [Insert Hospital Name] Outpatient Antibiotic Stewardship Program has collected and analyzed the data in the table and chart below.

It displays your antibiotic prescribing rates as compared to your colleagues at your outpatient site and others, for patients whom you diagnosed with an acute respiratory infection [Insert codes e.g. J00, acute nasopharyngitis; J01, acute sinusitis; J02, acute pharyngitis; J03, acute tonsillitis; J20, acute bronchitis; and J40, bronchitis, not specified as acute or chronic]. The data was collected from your clinical EMR documentation, therefore prescribing rates may differ if you did not use the above ICD-10 codes.

Thank you for all you do in promoting the optimal use of antibiotics! If you have any questions at all, please do not hesitate to contact the OASP at xxx-xxx-xxxx or abc@xyz.com.



Sincerely,

_____, x, Director of ID/ASP
 _____, x, Chairman, Department of Medicine