Antibiotic Prescribing
for Acute Respiratory Infections
in New York City:
A Model for Collaboration

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Title: Antibiotic Prescribing for Acute Respiratory Infections in New York City: A Model for Collaboration

Running Head: Ambulatory ASP Assessment in NYC

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Abstract

Objective

    To assess the status of antibiotic prescribing in the ambulatory setting for adult patients with acute respiratory infections (ARIs) and to identify opportunities and barriers for outpatient antibiotic stewardship programs (ASPs).

Design

    Mixed methods including point prevalence using chart reviews, surveys, and collaborative learning.

Setting

    Hospital-owned clinics in the New York City area.

Participants/Patients

    Thirty-one hospital-owned clinics from nine hospitals and health systems participated in the study to assess ARI prescribing practices for patients >18 years old.

Interventions

    Each clinic performed a survey of current stewardship practices, retrospective chart reviews of prescribing in 30 randomly selected ARI patients from October 2015 to March 2016, and surveys of provider characteristics and knowledge. Clinics participated in collaborative learning with peers and experts in antibiotic stewardship and collected data from June 2016 to August 2016. Sites received data reports by individual clinic, aggregated by hospital, and compared to participating clinics.

Results

    Few sites had outpatient stewardship activities. The retrospective review of 1,004 ARI patients revealed that 37.3% of ARI patients received antibiotics, with significant variation in prescribing practices among sites (17.4% to 71.0%, p<0.001). Macrolides were the most commonly prescribed antibiotics. The majority of the 302 respondents recognized the need for tools to assist in prescribing.

Conclusion

This collaborative establishes a baseline assessment of the status of outpatient ASPs in New York City and provided hospitals, health systems, and individual clinics with specific data to inform their development of stewardship interventions targeting ARIs.

Introduction

Antibiotic resistance is a major threat to patient safety, leading to an estimated 2 million infections and 23,000 deaths per year in the United States.[1] Antibiotic stewardship programs (ASPs) coordinate interventions directed toward curbing inappropriate antibiotic use and improving overall antibiotic prescribing practices.[2,3] Despite advances in antibiotic stewardship programs in the acute care setting, it is widely acknowledged that most organizations do not have formal outpatient ASPs[2]. This is true even in institutions with robust inpatient ASPs. Annually, 154 million ambulatory visits result in an antibiotic prescription, and approximately 30% of antibiotic use in outpatient settings is inappropriate.[4]

In terms of targeted stewardship efforts in the ambulatory arena, the need for improved prescribing for acute respiratory infections (ARIs) is a fruitful starting point.[5,6,7] It is estimated that 44% of all outpatient antibiotic prescriptions are written for ARIs (e.g., sinusitis, otitis media, pharyngitis, bronchitis),[4] many of which are caused by viruses and often resolve without antibiotics. Outpatient prescribing practices vary based on geography, patient population, insurance, and provider specialty.[8,9] Though New York City (NYC) is the most densely populated metropolitan area in the United States and one with substantial antibiotic resistance, to our knowledge a widespread assessment of ambulatory prescribing practices there has not been published.

In 2016, United Hospital Fund, an independent nonprofit in New York, issued a request for proposals to engage hospital-owned outpatient practices in a grant-funded initiative to better elucidate the current state of outpatient antibiotic stewardship and to describe factors influencing antibiotic prescribing practices, with a focus on adult patients with ARIs. Stage I of this initiative sought to assess the status of outpatient ASPs in NYC, focusing on ARI antibiotic prescribing patterns; Stage II is using the information from Stage I to assist and direct participating organizations implementing site-specific plans to improve outpatient prescribing practices. This report describes the findings of Stage I.

Methods

This is a mixed-methods study designed to assess current practices around outpatient prescribing of antibiotics. The study protocol was reviewed by an institutional review board committee at the Biomedical Research Alliance of New York and determined to be exempt from review. Individual health systems received local institutional review board approval if deemed appropriate. The collaborative activities occurred from May 2016 through January 2017.

Surveys and data collection tools were developed in consultation with an advisory group including members from UHF,[10] the New York State Department of Health, the Greater New York Hospital Association, the Centers for Disease Control and Prevention,[11] and inpatient and outpatient clinicians from most of the participating hospitals and health systems. The tools and a description of the tools are included as supplemental materials. These include an assessment of current outpatient stewardship practices, a chart abstraction tool, and a survey of providers.

The participating clinics piloted and tested the tools prior to data abstraction. In addition, throughout the initiative, a collaborative approach was used: subject matter advisors educated and provided guidance through a series of in-person meetings and webinars. UHF staff provided

technical assistance and individual feedback to clinics to improve consistency and accuracy of abstraction.

Data were collected at each of the participating clinics and entered into a web-based survey tool (SurveyMonkey®, San Mateo, California). Each clinic was asked to use International Classification of Diseases, 10th revision codes to select possible charts for review. If there were > 30 charts meeting these criteria, each site chose charts randomly. The method of randomization was chosen by each site's principal investigator. One site elected to use the ordering of diagnostic testing (e.g., respiratory viral panel and/or sputum culture) to select potential charts rather than primary or secondary diagnosis codes. Patient level data from chart abstraction were de-identified prior to submission. Data from the assessment of the current practices, survey of prescribers, and chart review were aggregated across the clinics and by hospital or health system. Sites received results comparing clinic-specific data to the aggregate for all sites.

Chart abstraction data were analyzed in aggregate and are shown in Table 1. Descriptive statistical analysis was performed using SAS, version 9.4 (SAS Institute, Cary, North Carolina). Univariate associations were compared using chi-square or Mantel-Haenszel chi-square when applicable. Those factors achieving a p-value of <0.1 were included in a stepwise multivariable logistic regression model to identify potential independent predictors of antibiotic prescribing.

Results

Participant demographics and current state of outpatient stewardship

Thirty-one clinics representing nine hospitals or health systems participated. They were located throughout the NYC region—Manhattan (7), Queens (9), Bronx (4), Brooklyn (8), Long Island (2), and Westchester (1)—and represented diverse patient and provider populations (Tables 1 and 2). The payer mix varied by site; the median percentage covered by Medicare was 22%, by Medicaid 29%, by commercial payers 24%, and by other/unknown 0.5%; 5% were uninsured.

Sixty-eight percent of practices responded that there were ASPs in their health system. Although 25% of practices reported having institutional guidelines for antibiotic use and selection for ARIs as part of their program, only 11% had any ambulatory-specific guidance. A high proportion of providers, close to 40%, stated that there was an identified leader for outpatient ASP. Although all the practices stated they had an electronic health record system, only 7% reported embedded computer decision support for antibiotic use in that system.

Antibiotic prescribing practices

Across the clinics, 1,004 charts were reviewed; all clinics provided chart reviews. Thirty-seven percent of patients diagnosed with an ARI received a prescription for antibiotics. There was statistically significant variation in the rate of prescribing based on the hospital or health system in which the patient sought treatment, with prescribing rates ranging from 17.4% to 71.0% (p <0.001) (Figure 1).

Among patients with a diagnosis of ARI, the diagnoses associated with the highest antibiotic prescribing rates were sinusitis (83.3%) and bronchitis (62.9% bronchitis-unspecified, 66.7%

acute bronchitis). The rate of antibiotic prescribing varied based on patient-level characteristics including primary spoken language, insurance type, and number of comorbid conditions. Patients who reported their preferred language as English were more likely to be prescribed an antibiotic than non-English speaking patients (p<0.001). In addition, patients with commercial insurance were more likely to receive a prescription than patients with Medicare, Medicaid, or no insurance (p=0.016). The presence of three or more comorbidities also increased the likelihood that a patient would be prescribed an antibiotic (p=0.003). There was no difference in prescribing rates based on patient age or sex. In multivariable analysis, having commercial insurance and speaking English were both independent predictors of receiving a prescription.

In this sample, attending physicians prescribed antibiotics more often than other prescribing providers. While attending physicians comprised over a third (35.6%) of providers across all sites, the charts reviewed in the sample indicated that nearly three-quarters (74.1%) of the antibiotics were prescribed by attending physicians when they were not overseeing a resident. The remaining prescriptions were written by nurse practitioners, physician assistants, and resident physicians in training.

Fifty-eight percent of patients receiving an antibiotic prescription were prescribed a macrolide. Seventeen percent were prescribed amoxicillin/clavulanic acid. Fewer patients were prescribed fluoroquinolones (10.4%) or other antibiotics. Of those patients receiving an antibiotic prescription, 56.7% were prescribed the antibiotic for < 5 days, 27.0% for 6-9 days, and 12.3% for ≥ 10 days.

Forty-five percent of patients received education on their diagnosis and/or treatment, and follow-up was recommended in close to 62% of cases. However, < 44% had documentation of any follow-up.

Survey of provider knowledge, attitude, and perceptions

The findings from the provider survey (Table 2) are based on 302 surveys received, representing all 31 clinics. The total number of providers (e.g., attendings, residents, nurse practitioners, and physician assistants) at all sites was 1,029; the response rate was 29.3%. Providers responding to the survey consisted largely of attending physicians (42.1%) and residents (50.7%).

In terms of provider knowledge, most respondents acknowledged the difference between broad- and narrow-spectrum antibiotics, and most considered spectrum of activity in prescribing. In response to a clinical vignette in which current guidelines would not support antibiotic prescribing, 24% of respondents indicated they would prescribe an antibiotic.

When asked to select the top three factors in the decision to prescribe antibiotics, severity of illness, clinical practice guidelines, and patient comorbidities were the most frequently selected. Thirty-five percent of providers identified "concern for antibiotic resistance" as one of the top three considerations. Seven percent of providers cited patient request or satisfaction as a concern.

When asked to choose methods or tools that would likely improve decision-making and antibiotic prescribing for ARIs in their practice, providers were most interested in reference

guides and clinical guidelines, educational materials for patients and families, and decision support tools.

Discussion

We sought to better define the current outpatient antibiotic prescribing landscape in the greater NYC area by assessing provider perceptions and prescribing patterns for adult ARIs among diverse clinics associated with nine hospitals and health care systems. We found very little activity was directed specifically toward improving outpatient antibiotic use, and none of the clinics had outpatient specific strategies in place to improve antibiotic prescribing.

Antibiotic prescribing for the treatment of bronchitis and sinusitis was high with close to two-thirds of patients with bronchitis and over four-fifths of patients with acute sinusitis prescribed an antibiotic, despite guidelines and endorsed metrics against routine use for these indications.[9,12,13]

Interestingly, as in previous studies,[14] provider knowledge or experience did not appear to influence prescribing; most antibiotic prescriptions were authored by attending physicians. One motivation for antibiotic prescribing may be these clinicians' long-standing relationships with patients and perception of patient pressure or satisfaction.[11,15] However, the provider survey did not identify this as a major contributor to antibiotic prescribing.

Previous studies have suggested that patients of certain ethnicities are more likely to desire antibiotics for ARIs.[16,17] In our sample, patients who were English-speaking or commercially insured were more likely to be prescribed an antibiotic; further investigation into potential confounding by clinic or provider is needed.

Even more disconcerting was the use of broad-spectrum agents to treat ARIs and the variability in duration of antibiotic prescribed. Macrolides are not the first-line agent for any of the diagnoses included in our sample, but they were the most commonly prescribed antibiotic. Despite public health concerns, provider concern for antibiotic resistance was not reported as major factor impacting prescribing. It is unclear if the pervasive reliance on macrolides results from gaps in knowledge of antibiotic spectrum and the common causes ARIs or the convenience of macrolides.

The New York State Department of Health and the Centers for Disease Control and Prevention have identified a need for targeted interventions that can improve public knowledge of appropriate antibiotic use.[18,19] Our review showed that only 45.3% of patients who were diagnosed with an ARI received directed patient education. Of the 61.8% where follow-up was recommended, only 43.5% received follow-up. While our assessment did not address the reasons for this lack of education and follow-up, the discrepancy raises concerns about patient education and continuity of care that may warrant further attention.

Despite a low response rate, results from the provider survey do provide some direction for participating institutions to consider next steps. In general, providers recognize the need to improve antibiotic prescribing practices and are open to utilizing tools that will improve their practice. They expressed interest in a quick reference guide for each major diagnosis including

antibiotic indication; improved use of established clinical practice guidelines for selection, dose, and duration; and clinical decision support.

Limitations of Study

Despite the overall sample size, the individual clinics reviewed a median of 30 charts, range [28 - 124]. There were site-specific variations in methodologies employed to randomly select charts for abstraction, which may have led to sampling bias. In addition, we hypothesize that coding bias may also have affected the findings; it is possible that physicians prescribing antibiotics may have utilized diagnosis codes for which antibiotic prescribing is not clearly contraindicated (e.g., sinusitis). In addition, there were some limitations in identifying specific ARI codes where the ARI may not have been recorded as the primary diagnosis. The overall provider survey response rate was low. The discrepancy between the findings of the sampled charts and the provider survey may reflect social biases (i.e., the perceived desirability of particular answers). The provider surveys may have been skewed by particular health systems with higher response rates and may limit generalizability to the broader population. Our study was observational and largely descriptive; while we have described the variations in prescribing practices observed in our data, we were not able to fully explore many of the underlying factors that may contribute to these differences.

Conclusion

Despite evidence-based recommendations, outpatient antibiotic prescribing for ARIs continues to be high even in hospitals and health systems with established inpatient ASPs. By using local data on antibiotic prescribing, we have been able to increase provider and leadership awareness of the importance of outpatient antibiotic stewardship for improving local ambulatory prescribing practices We remain far from resolving the problem of inappropriate antibiotic use for ARIs; however, this initiative has provided a useful assessment of current outpatient antibiotic prescribing in NYC outpatient clinics, a framework for site-specific and responsive actions, and tools to assess the impact of improvement efforts after implementation of those actions.

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UHF Outpatient ASP Collaborative Team
Lynne Antonio, MS RPh, Interfaith Medical Center; Olga Badem MD, Wyckoff Heights Medical Center; Abigail Chen, MD, Mount Sinai Health System; Mary Heffernan, RN, DNP, Northwell Health; Anna Stachel, MPH, NYU Langone Medical Center; George Rodriguez, Pharm.D., NewYork- Presbyterian/Queens; Susan Seo, MD, Memorial Sloan Kettering Cancer Center; Luigi Tullo, MD, MediSys Health Network; Jaimie Mittal, MD, Montefiore Medical Center

Table 1. Demographic and clinical characteristics for antibiotic prescribing for acute respiratory infections in all participating outpatient practices (n = 1,004 patient encounters from 31 clinics)

Characteristic	Antibiotic Prescription (n = 1,004)		Univariable *P*-value	Multivariable *Odds Ratio (95% CI) [P-value]*
	Yes No. (%)	**No No. (%)**		
Total ARI Patients	374 (37.3)	618 (61.6)		
Patient Age			0.11	
18-39 years	106 (33.0)	213 (66.4)		
40-59 years	164 (40.6)	238 (58.9)		
60 or older	104 (37.3)	167 (59.9)		
Patient Language			<0.0001	
English	300 (41.9)	408 (57.0)		1.58 (1.07, 2.36) [<0.0001]
Spanish	31 (26.5)	84 (71.8)		
Other	22 (32.6)	45 (66.2)		
Unknown	21 (20.4)	81 (78.6)		0.38 (0.19, 0.78) [0.007]
Patient Sex			0.5	
Female	232 (36.6)	395 (62.3)		
Male	141 (38.2)	223 (60.4)		
Payor Mix			0.016	
Medicare	54 (37.2)	91 (61.8)		
Medicaid	85 (35.7)	153 (64.3)		
Commercial	203 (41.3)	289 (58.7)		1.53 (1.12, 2.07) [0.007]
Uninsured	6 (19.4)	25 (80.7)		
Unknown/Other	26 (31.3)	57 (68.7)		
Primary or secondary ARI Diagnosis				
J06.9 Acute URI	153 (27.9)	389 (71.0)	<0.0001	0.51 (0.32, 0.81) [0.006]
J02 Acute Pharyngitis	41 (37.3)	67 (60.9)	0.95	
J01 Acute Sinusitis	70 (83.3)	14 (16.7)	<0.0001	7.64 (3.70, 15.78) [<0.0001]
J40 Bronchitis, unspecified	44 (62.9)	26 (37.1)	<0.0001	2.12 (1.09, 4.13) [<0.0001]
J00 Acute Nasopharyngitis	2 (4.4)	43 (95.6)	<0.0001	0.07 (0.02, 0.31) [0.001]
J03 Acute Tonsillitis	10 (76.9)	2 (23.2)	0.003	5.06 (1.28, 20.10) [0.0001]
J20 Acute Bronchitis	40 (66.7)	20 (33.3)	<0.0001	3.05 (1.51, 6.15) [<0.0001]
Other[a]	14 (20.0%)	56.0 (80.0)	0.002	0.22 (0.10, 0.46) [0.022]

Number of Patient Comorbidities			0.003	1.26 (1.10, 1.45) [0.011]
0	90 (35.6)	162 (64.0)		
1	96 (33.0)	192 (66.0)		
2	84 (35.4)	153 (64.6)		
≥ 3	104 (48.4)	111 (51.6)		
Antibiotic Prescribed[b]				
Macrolide	219 (58.2)			
Amoxicillin/Clavulanic Acid	64 (17.0)			
Fluoroquinolones	39 (10.4)			
Other[c]	54 (14.4)			
Duration of Antibiotic Prescribed				
≤ 5 days	212 (56.7)			
6-9 days	101 (27.0)			
≥ 10 days	46 (12.3)			

Note. ARI, Acute Respiratory Infection; URI, Upper Respiratory Infection

[a] Other – case selection based on ordering of diagnostic testing (e.g., respiratory viral panel and/or sputum culture) and not by a primary diagnosis code.
[b] In several cases an individual patient was prescribed more than one type of antibiotic. The types of antibiotic prescribed should not be considered mutually exclusive categories.
[c] Other antibiotics prescribed included penicillin, cephalosporins, clindamycin and other.

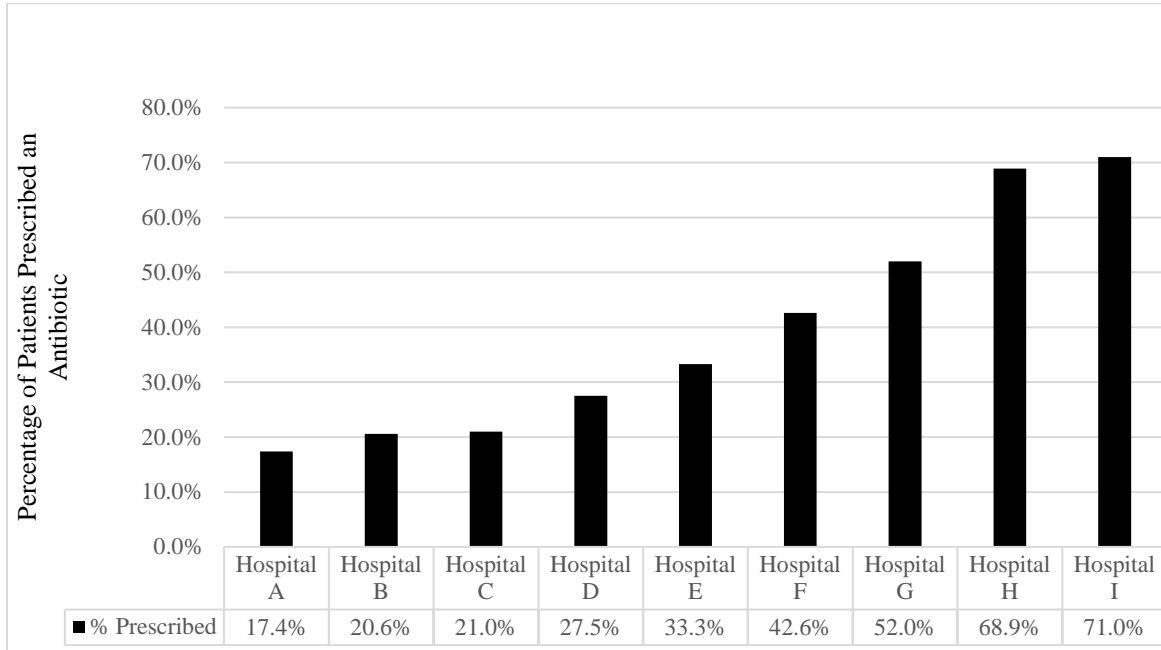*Table 2.* Provider characteristics and antibiotic and prescribing knowledge

Provider Characteristic	All Outpatient Practices
Number of Surveys	n = 302 (of 1,029, 29.3%)
Provider Mix	
Attending Physician	42.1%
Resident Physician	50.7%
Nurse Practitioner	2.3%
Physician Assistant	3.0%
Other	2.0%
Direct Patient Care	
< 50% of time	32.5%
≥ 50% of time	67.5%
Years Practicing	
< 5 years	55.6%
5-10 years	13.3%
11-20 years	12.6%
21-30 years	11.6%
≥ 31 years	6.0%
Clinical Vignette – Prescribed Antibiotic[a]	23.8%
Factors that Influence Prescribing[b]	
Illness severity	91.4%
Clinical practice guidelines	83.4%
Patient medical history and/or comorbidities	74.5%
Concern for antibiotic resistance	35.4%
Patient request/satisfaction	6.6%
Patient compliance	5.6%
Time pressure	2.0%
Sample access	1.3%
Methods to Improve Prescribing	
Access to a quick reference guide for each diagnosis, including indications	69.2%
Improved use of clinical practice guidelines for selection, dose and duration	68.2%
Access to better educational materials for patients and families	65.9%
Improved methods for using EHRs and clinical decision support	60.9%
Improved access to antibiotic resistance data for local areas	53.6%
Access to CDC "Get Smart" materials	44.7%
Data showing antibiotic prescribing practices among providers	42.4%
Communication skills training to address benefits and harm of antibiotics	42.1%
Delayed antibiotic prescribing, i.e., "wait and watch prescribing"	33.1%
Use of shared decision-making tool in your practice	30.5%

Note. EHR, Electronic Health Record; CDC, U.S. Centers for Disease Control and Prevention.

[a] The vignette in the 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.

[b] Results from the "often impacts decision to prescribe" category was included in the aggregate response for all outpatient practices. Providers were allowed to select more than one response.

Figure 1 title: Percent of patient visits prescribed an antibiotic for an acute respiratory infection

	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E	Hospital F	Hospital G	Hospital H	Hospital I
■ % Prescribed	17.4%	20.6%	21.0%	27.5%	33.3%	42.6%	52.0%	68.9%	71.0%

Reflects the percentage of patient with adult acute respiratory infection that received an antibiotic by participating hospital or health system which significantly varied (17.4% to 71.0%, $p < 0.001$)

References

1.   Antibiotic resistance threats in the United States, 2013. US Centers for Disease Control and Prevention website. 2013. https://www.cdc.gov/drugresistance/threat-report-2013/index.html. Accessed January 15, 2018.

2.   Policy statement on antimicrobial stewardship by the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America (IDSA), and the Pediatric Infectious Diseases Society (PIDS). *Infect Control Hosp Epidemiol* 2012;33:322-327.

3.   Sanchez GV, Fleming-Dutra KE, Roberts RM, Hicks LA. Core elements of outpatient antibiotic stewardship. *MMWR Recomm Rep* 2016;65:1-12.

4.   Antibiotic use in outpatient settings: health experts create national targets to reduce unnecessary antibiotic prescriptions. 2016. http://www.pewtrusts.org/~/media/assets/2016/05/antibioticuseinoutpatientsettings.pdf. Accessed January 16, 2018.

5.   Fleming-Dutra KE, Hersh AL, Shapiro DJ, et al. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010-2011. *JAMA* 2016;315:1864-1873.

6.   Shapiro DJ, Hicks LA, Pavia AT, Hersh AL. Antibiotic prescribing for adults in ambulatory care in the USA, 2007-09. *J Antimicrob Chemother* 2014;69:234-240.

7.   Meeker D, Linder JA, Fox CR, et al. Effect of behavioral interventions on inappropriate antibiotic prescribing among primary care practices: a randomized clinical trial. *Jama* 2016;315:562-570.

8.   Hicks LA, Bartoces MG, Roberts RM, et al. US outpatient antibiotic prescribing variation according to geography, patient population, and provider specialty in 2011. *Clin Infect Dis* 2015;60:1308-1316.

9.   Roberts RM, Hicks LA, Bartoces M. Variation in US outpatient antibiotic prescribing quality measures according to health plan and geography. *Am J Manag Care* 2016;22:519-523.

10.   Greater New York Hospital Association / United Hospital Fund Antimicrobial stewardship toolkit. United Hospital Fund website. 2011. https://uhfnyc.org/assets/1042. Accessed January 15, 2018.

11.   Sanchez GV, Roberts RM, Albert AP, Johnson DD, Hicks LA. Effects of knowledge, attitudes, and practices of primary care providers on antibiotic selection, United States. *Emerg Infect Dis* 2014;20:2041-2047.

12.   Harris AM, Hicks LA, Qaseem A. Appropriate antibiotic use for acute respiratory tract infection in adults. *Ann Intern Med* 2016;165:674.

13.   Rosenfeld RM, Piccirillo JF, Chandrasekhar SS, et al. Clinical practice guideline (update): adult sinusitis. *Otolaryngol Head Neck Surg* 2015;152:S1-s39.

14.   Jones BE, Sauer B, Jones MM, et al. Variation in outpatient antibiotic prescribing for acute respiratory infections in the veteran population: a cross-sectional study. *Ann Intern Med* 2015;163:73-80.

15.   McKay R, Mah A, Law MR, McGrail K, Patrick DM. Systematic review of factors associated with antibiotic prescribing for respiratory tract infections. *Antimicrob Agents Chemother* 2016;60:4106-4118.

16.   Francois Watkins LK, Sanchez GV, Albert AP, Roberts RM, Hicks LA. Knowledge and attitudes regarding antibiotic use among adult consumers, adult Hispanic consumers, and health care providers--United States, 2012-2013. *MMWR Morb Mortal Wkly Rep* 2015;64:767-770.

17.   Mangione-Smith R, Elliott MN, Stivers T, McDonald L, Heritage J, McGlynn EA. Racial/ethnic variation in parent expectations for antibiotics: implications for public health campaigns. *Pediatrics* 2004;113:e385-394.

18.   O'Sullivan JW, Harvey RT, Glasziou PP, McCullough A. Written information for patients (or parents of child patients) to reduce the use of antibiotics for acute upper respiratory tract infections in primary care. *Cochrane Database Syst Rev* 2016;11:Cd011360.

19.   Fleming-Dutra KE, Mangione-Smith R, Hicks LA. How to prescribe fewer unnecessary antibiotics: talking points that work with patients and their families. *Am Fam Physician* 2016;94:200-202.

Attachment 1 – Description of Data Collection Tools Used

Type of Tool	Purpose	Sources used to Develop Tool	Dates	Participants (n)
Assessment Survey of Current Outpatient Stewardship Practices	Identify practice characteristics, existence of antibiotic management policies and stewardship activities	GNYHA/UHF Antibiotic Stewardship Survey of Hospital Current Practices[10] and NHSN Patient Safety Component Annual Hospital Survey	Collected June 2016	31 practice assessments from 9 hospitals and/or health systems
Chart Abstraction Tool	Retrospective data collection on prescribing for ARIs	ICD-10 codes: J100 acute nasopharyngitis/ common cold; J01 (acute sinusitis), J02 (acute pharyngitis), J03 (acute tonsillitis +/- pharyngitis), J06.9 (acute URI, unspecified), J20 (acute bronchitis), and J40 (bronchitis not specified as acute or chronic)	Reflects patients seen between October 2015- March 2016 Collected June -July 2016	Median of 30 charts; range [28, 124]; 1,004 charts reviewed total
Survey of Antibiotic Prescribers	Assess provider characteristics, knowledge, perceptions and factors influencing prescribing; Included patient clinical vignette.	CDC Interview Tool: Knowledge, Attitudes and Practices Used by Primary Care Providers in Antibiotic Selection[11]	Collected June - August 2016	302 provider surveys of 1,029 total providers (29.3% response)

Note. GNYHA, Greater New York Hospital Association; UHF, United Hospital Fund; ARI, Acute Respiratory Infection, ICD, International Statistical Classification of Diseases and Related Health Problems; URI, Upper Respiratory Infection; CDC, U.S. Centers for Disease Control and Prevention; NHSN, National Healthcare Safety Network

Attachment 2 - United Hospital Fund Assessment of Current Antibiotic Stewardship Practices in Outpatient Sites

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. Our suggested timeframe to complete the surveys is from Monday, June 13, 2016 through Friday, June 24, 2016.** Please ensure you enter this information into SurveyMonkey by **Monday, September 19, 2016**.

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):

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.

Revision Date: 5/24/16

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):

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.

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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?
    a. Yes
    b. No
    c. Not Sure
    d. 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 Marit Boiler at mboiler@uhfnyc.org.*

Electronic Systems

16. Does your practice site have an electronic health record?
    a. Yes
    b. No
    c. Not yet, in the process of being implemented.

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

17. Is your practice site's electronic health record connected to the hospital's inpatient electronic health record?
    a. Yes
    b. No
    c. Not yet, in the process of being connected.

18. Is your practice site currently using computer decision support to monitor antibiotic use?
    a. Yes
    b. No
    c. Not sure
    d. 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?
    a. Yes
    b. No
    c. Not yet, but we plan to.
    d. Not applicable (N/A)

Antibiotic Stewardship Practices for Outpatient Settings

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.

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20. Does your hospital or health system have an antibiotic stewardship program in place?
    a. Yes
    b. No

21. If yes, does your antibiotic stewardship program include **outpatient-specific activities**?
    a. Yes
    b. No
    c. Not yet, but we plan to.
    d. Not applicable (N/A)

22. How long has your hospital or health system had **outpatient** antibiotic stewardship practices in place?
    a. Less than 1 year
    b. 1 year to less than 2 years
    c. 2 years to less than 5 years
    d. 5 years or more
    e. 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)?
    a. Yes
    b. No

24. If yes, what position is the clinical leader (before the United Hospital Fund initiative began) (please check all that apply)?
    a. Physician (Infectious Disease trained)
    b. Physician (Primary Care Provider)
    c. Clinical Pharmacist
    d. Co-led by Clinical Pharmacist and Physician (either Infectious Disease trained or Primary Care Provider)
    e. Not applicable (N/A)
    f. Other (please specify):

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.

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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 *Get Smart: Know When Antibiotics Work* tools and resources, including:	
l1. **Public commitment posters** in exam rooms, describing appropriate antibiotic use	
l2. **Fact Sheets** about the evaluation and diagnosis of antibiotic allergies and describing the impact of overusing antibiotics	
l3. **Prescription adherence tools** to promote adherence to antibiotic therapy and raise awareness of the importance of appropriate use	
l4. **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):	

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.

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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: _____
    _____
    _____
    _____

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Attachment 3. United Hospital Fund Outpatient Antibiotic Stewardship 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. Please conduct a random sample of 30 patients between the period of **October 1, 2015 and March 31, 2016**. Five patients from each month during that period should be randomly sampled (e.g., five from October 2015, five from November 2015, etc.), for a total of 30 patients. The abstraction tool should be used once per chart review. **Our suggested timeframe to complete these chart reviews is from Monday, June 20, 2016 through Friday, July 29, 2016.** Once you have completed the chart abstraction, make sure you enter the information for each patient into SurveyMonkey by **Monday, September 19, 2016**. **Do** not send protected health information or patient identifying information to UHF.

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).

Section 1 - Patient Characteristics/History:

Q1 Practice site name:

Q2 Hospital or health system affiliation:

Q3 Patient age (in years) at time of the ARI:
O 18-29
O 30-39
O 40-49
O 50-59
O 60-69
O 70 or older

Q4 Does the patient have a documented history of allergies to antibiotics?
O Yes
O No
O Unknown

If yes, please specify which antibiotics:

Q5 Patient Sex:
O Female
O Male
O Other (Please specify: _____)

1

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.

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Q6 What is the patient's race? (*if this information is available in this patient's chart*)
O White
O Black or African American
O American Indian or Alaskan Native
O Asian
O Native Hawaiian or Other Pacific Islander
O Mixed
O Other (Please specify: _____)
O Unknown

Q7 Is the patient of Hispanic, Latino, or Spanish origin? (*if this information is available in this patient's chart*)
O Yes
O No
O Unknown

Q8 What is the primary language spoken by this patient? (*if this information is available in this patient's chart*)
O English
O Spanish
O Unknown
O Other (Please specify: _____)

Q9 Was an interpreter used during the visit? (*if this information is available in this patient's chart*)
O Yes
O No
O Unknown

Q10 What type of insurance does this patient have? (*if this information is available in this patient's chart*)
O Medicare
O Medicaid
O Commercial
O Uninsured
O Unknown
O Other (Please specify: _____)

Section 2 - Diagnosis Information:

Q11 During which month was this patient diagnosed with an ARI?
O October 2015
O November 2015
O December 2015
O January 2016
O February 2016
O March 2016
O Other (please specify:) _____

2

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.

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Q12 What is this patient's ICD-10 ARI diagnosis code?
O J00 (acute nasopharyngitis/common cold)
O J01 (acute sinusitis)
O J02 (acute pharyngitis)
O J03 (acute tonsillitis +/- pharyngitis)
O J06.9 (acute URI, unspecified)
O J20 (acute bronchitis)
O J40 (bronchitis not specified as acute or chronic)

Q13 Is the diagnosis code from Q12 the patient's primary or secondary diagnosis?
O Primary
O Secondary
O Unknown

Q14 What type of provider made the clinical assessment for this patient (If more than one provider performed the assessment, 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**.
O Physician Attending
O Resident
O Nurse Practitioner
O Physician Assistant
O Student
O Other_____

Q15 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**.
O Physician Attending
O Resident
O Nurse Practitioner
O Physician Assistant
O Student
O Not applicable (N/A) – no antibiotic prescribed
O Other_____

Q16 Was this patient a scheduled patient or a walk-in?
O Scheduled
O Walk-in
O Unknown

Q17 What symptoms were present when the patient was diagnosed (please check all that apply)?

☐ Nasal congestion or discharge	☐ Cough
☐ Ear aches	☐ Shortness of breath
☐ Muscle aches or body aches	☐ Cervical lymphadenopathy
☐ Headache, facial, or sinus pain	☐ Sore throat
☐ Fever	☐ Other (please specify): _____
☐ Unknown	_____ _____

Q18 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?
O Less than 3 days (< 3 days)
O Between 3 and 7 days (3 days -- ≤ 7 days)
O Between 8 and 14 days (8 days -- ≤ 14 days)
O Greater than 14 days (> 14 days)
O Unknown

Q19 What comorbidities were present when the patient was diagnosed (please check all that apply)?

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

Q20 *If malignancy is selected as a comorbidity for this patient,* please indicate whether solid or hematologic (if known).
O Solid
O Hematologic
O Unknown
O Not applicable (N/A)

Q21 *If transplant is selected as a comorbidity,* please indicate type and date of transplant below (if known).
Type of transplant:
Date of transplant:

Q22 *If this patient also has cancer,* is this patient on chemotherapy?
O Yes (Please specify the last day patient received chemotherapy: _____)
O No
O Not applicable (N/A)

Q23 *If this patient also has cancer,* is this patient neutropenic?
O Yes
O No
O Not applicable (N/A)

Section 3 - ARI Course and Treatment Information:

Q24 Did this patient get testing for Acute Respiratory Illness in the clinic?
O Yes (check all that apply)
O No
O Unknown

Q25 If yes, please indicate which type(s) of testing the patient received (please check all that apply):
O Strep screen
O Rapid flu testing
O Rapid RSV testing
O Sputum cultures
O Nasopharyngeal cultures
O Nasopharyngeal PCR testing for viruses
O Nasal cultures
O Oropharyngeal cultures
O Not applicable (N/A)
O Other _____

Q26 Was this patient prescribed an antibiotic for the diagnosis specified in Q12?
O Yes
O No
O Deferred, pending culture results

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Q27 Was there a 14-day "look forward" to see if there was a documented telephone encounter or a revisit for the same reason/complaint?
O Yes
O No
O Unknown

Q28 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)

Antibiotic	**Duration**				
	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)**
☐ Penicillin or Amoxicillin	☐	☐	☐	☐	☐
☐ Amoxicillin/ Clavulanic acid (e.g., Augmentin)	☐	☐	☐	☐	☐
☐ 1st generation Cephalosporins (e.g., Cephalexin, Cefadroxil)	☐	☐	☐	☐	☐
☐ 2nd generation Cephalosporins (e.g., Cefaclor, Cefprozil)	☐	☐	☐	☐	☐
☐ 3rd generation Cephalosporins (e.g., Cefpodoxime, Cefdinir, Cefditoren)	☐	☐	☐	☐	☐
☐ Fluoroquinolones (e.g., Levofloxacin, Moxifloxacin)	☐	☐	☐	☐	☐
☐ Macrolides (e.g., Azithromycin, Clarithromycin)	☐	☐	☐	☐	☐
☐ Clindamycin	☐	☐	☐	☐	☐
☐ Other (please specify): _____	☐	☐	☐	☐	☐
☐ Unknown/unavailable					

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Q29 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)?
O Nasal irrigation
O A decongestant (e.g., Sudafed)
O An antiviral (e.g., Tamiflu)
O An antitussive agent
O An analgesic/anti-inflammatory medication
O NSAIDS/acetaminophen (antipyretic)
O A steroid
O An antihistamine
O Other (please specify): _____
O None

Section 4 – Follow Up and Outcomes Information:

Q30 What type of follow up was scheduled or recommended, as documented in the patient's chart (please check all that apply)?
O Phone call
O In-person visit
O No follow up provided
O Unable to tell
O Other (please specify): _____

Q31 What type of follow up actually took place (please check all that apply)?
O Phone call
O In-person visit
O No follow up provided
O Unable to tell
O Other (please specify): _____

Q32 Was any patient education provided to this patient regarding the diagnosis or treatment?
O Yes (please specify): _____
O No
O Unknown

Q33 *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)?
O Yes (please specify): _____
O No
O Unknown
O Not applicable – patient was not prescribed an antibiotic

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Attachment 4. United Hospital Fund Survey of Antibiotic Prescribers

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. **Our suggested timeframe for administering this survey is from Monday, July 18, 2016 through Friday, August 19, 2016.** Prescribers can complete this survey either on paper or via SurveyMonkey. For surveys completed via paper, please ensure responses are entered into SurveyMonkey by **Monday, September 19, 2016**. This survey will take approximately 30 minutes to complete.

Once all survey data is entered into SurveyMonkey, UHF will aggregate results and provide a data summary back to practices. Once practices receive survey results, each hospital/health system will convene prescribers to have a discussion about the results and inform action planning as well as the final report for this initiative.

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?
O Greater than or equal to 50% of your time
O Less than 50% of your time

4. Which of the following describe your role in the practice?
O Physician Attending
O Resident
O Nurse Practitioner
O Physician Assistant
O Other (Please specify:_____)

1

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.

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5. How many years have you been practicing medicine?
O <5 years
O 5-10 years
O >10-20 years
O 21-30 years
O 31 or more years

Antibiotic Selection

6. How influential are the following factors in impacting you to prescribe antibiotics?

a. Concern about patient satisfaction/expectation of the visit

1	2	3	4	5
(least influential)				(most influential)

b. Desire to prevent litigation as a result of complications of infections

1	2	3	4	5
(least influential)				(most influential)

c. Perceived decreases in visit length of time

1	2	3	4	5
(least influential)				(most influential)

d. Other (please describe):

1	2	3	4	5
(least influential)				(most influential)

7. Out of the factors below, please check off the **top *three* most important factors that impact** your decision to prescribe antibiotics AND the **top *three* factors that rarely impact** your decision to prescribe antibiotics.

Factors for Antibiotic Selection	Check off the **top *three* most important factors** that impact your decision to prescribe antibiotics:	Check off the **top *three* factors that rarely impact** your decision to prescribe antibiotics:
Illness severity		
Clinical Practice Guidelines		
Patient request /Patient satisfaction		
Sample access		
Patient medical history/comorbidities		
Patient compliance		
Concern for antibiotic resistance		
Time pressure		
Other (please describe):		

2

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.

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8. Does your practice have a policy or practice guideline in place for the **dose** of antibiotics used for clinical conditions?
O Yes
O No
O Sometimes
O Unknown
O Other (please explain):

9. Does your practice have a policy or practice guideline in place for the **selection** of antibiotics used for clinical conditions?
O Yes
O No
O Sometimes
O Unknown
O Other (please explain):

10. Does your practice have a policy or practice guideline in place for the **duration** of antibiotics used for clinical conditions?
O Yes
O No
O Sometimes
O Unknown
O Other (please explain):

11. What makes antibiotic selection most challenging for you?
O Patient Allergies
O Complicated medical histories
O Recurrent infections
O Other (please describe):

12. Do you know the difference between broad spectrum and narrow spectrum antibiotics?
O Yes
O No
Please explain:

13. Is antibiotic spectrum (broad versus narrow) a consideration when you prescribe an antibiotic?
O Yes
O No
O Sometimes
Please explain:

3

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

☐ Testing for Acute Respiratory Illness (e.g., PCR)	☐ Sinus radiographs or CT imaging
☐ Blood culture	☐ Completing a thorough history
☐ Urinalysis	☐ Other, please specify:
☐ Complete Blood Count (CBC) test	_____ _____

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.

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19. Would you prescribe an antibiotic to this patient?
O Yes
O 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?
O Very challenging
O Challenging
O Somewhat Challenging
O 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   2   3   4
     (small factor)   (large factor)

   b. Prescribers are used to the way they have been prescribing medications for years:

     1   2   3   4
     (small factor)   (large factor)

   c. Prescribers can't change their practices because of pressure from patients:

     1   2   3   4
     (small factor)   (large factor)

   d. Prescribers are challenged by a mix of patients with multiple comorbidities, making it difficult to change prescribing habits:

     1   2   3   4
     (small factor)   (large factor)

   e. Prescribers don't need to change their prescribing practices because they are sufficient:

    1   2   3   4
    (small factor)   (large factor)

   f. Other (please describe):

     1   2   3   4
     (small factor)   (large factor)

5

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.

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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 health 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?
O Yes
O No
Please explain:

24. Do you think your patients understand what antibiotic resistance is?
O Yes
O No
Please explain:

25. Do you think antibiotic prescribing in outpatient settings is contributing to infections like *Clostridium difficile*?
O Yes
O No
Please explain:

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

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