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Communication Strategies to Improve Antibiotic Prescribing in Pediatric Urgent Care Centers

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Abstract

Objective: Urgent care (UC) clinicians frequently prescribe inappropriate antibiotics for upper respiratory illnesses. In a national survey, pediatric UC clinicians reported family expectations as a primary driver for prescribing inappropriate antibiotics. Communication strategies effectively reduce unnecessary antibiotics while increasing family satisfaction. We aimed to reduce inappropriate prescribing practices in otitis media with effusion (OME), acute otitis media (AOM), and pharyngitis in pediatric UC clinics by a relative 20% within 6 months using evidence-based communication strategies.

Methods: We recruited participants via e-mails, newsletters, and Webinars from pediatric and UC national societies. We defined antibiotic-prescribing appropriateness based on consensus guidelines. Family advisors and UC pediatricians developed script templates based on an evidence-based strategy. Participants submitted data electronically. We reported data using line graphs and shared deidentified data during monthly Webinars. We used χ^2 tests to evaluate change in appropriateness at the beginning and end of the study period.

Results: The 104 participants from 14 institutions submitted 1183 encounters for analysis in the intervention cycles. Using a strict definition of inappropriateness, overall inappropriate antibiotic prescriptions for all diagnoses trended downward from 26.4% to 16.6% ($P = 0.13$). Inappropriate

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prescriptions trended upward in OME from 30.8% to 46.7% ($P = 0.34$) with clinicians' increased use of "watch and wait" for this diagnosis. Inappropriate prescribing for AOM and pharyngitis improved from 38.6% to 26.5% ($P = 0.03$) and 14.5% to 8.8% ($P = 0.44$), respectively.

Conclusions: Using templates to standardize communication with caregivers, a national collaborative decreased inappropriate antibiotic prescriptions for AOM and had downward trend in inappropriate antibiotic prescriptions for pharyngitis. Clinicians increased the inappropriate use of "watch and wait" antibiotics for OME. Future studies should evaluate barriers to the appropriate use of delayed antibiotic prescriptions.

Keywords

antibiotic stewardship; quality improvement; acute otitis media; pharyngitis; communication

Inappropriate antibiotic prescribing places patients at risk for adverse drug effects without added benefit.[1] This prescribing practice also increases rates of antibiotic-resistant infections, leading to increased health care costs.[2] A study of pediatric urgent care (UC) providers reported that unnecessary antibiotic prescriptions for common upper respiratory tract diagnoses were as high as 60.3%.[3]

In a national survey of pediatric UC providers, 93% of clinicians reported family expectations as a barrier to following antibiotic stewardship guidelines.[4] However, Mangione-Smith et al[5] demonstrated that providers are not good predictors of family expectations. Furthermore, family satisfaction was found to be related to the quality of communication during the visit and not associated with receiving antibiotics.[5] Evidence-based communications strategies have decreased unnecessary antibiotics in primary care settings.[6] The aim of this quality improvement collaborative was to decrease inappropriate antibiotic prescriptions in patients diagnosed with otitis media with effusion (OME), acute otitis media (AOM), and pharyngitis by a relative 20% within 6 months.

METHODS

Project Design

This project was designed and led by a leadership team comprised of subject matter experts from the Society for Pediatric Urgent Care (SPUC), the Centers for Disease Control and Prevention (CDC), Children's Mercy Kansas City, Children's National Hospital, and the Antibiotic Resistance Action Center.

Setting & Participant Recruitment

The SPUC has a membership of approximately 500 physicians and advanced practice providers from approximately 200 UC centers in 33 states and the District of Columbia. Although the SPUC supported the project, clinicians did not have to be members to participate in the study. Participants were recruited via SPUC e-mails, newsletters, and Webinars. As a recruitment incentive, we offered the American Board of Pediatrics maintenance of certification Part 4 credit to eligible pediatricians participating in the study. Only freestanding pediatric UC centers were eligible to participate in this national quality improvement project. Each participating institution was asked to commit 3 providers who

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would each submit 10 patient encounters each month (or 30 charts per month minimum from each site) with diagnoses of OME, AOM, and/or pharyngitis. Data were collected via Research Electronic Data Capture (REDCap; Vanderbilt University, Nashville, TN) surveys.[7,8] Due to the added stressors of the ongoing COVID-19 pandemic, we limited the study period to 7 months of active participation (May–November 2020), with final project evaluation coinciding with submission for maintenance of certification credit.

Interventions

As an intervention kickoff, all participating sites provided a signed commitment letter to antibiotic stewardship during the first Plan-Do-Study-Act (PDSA) cycle.[9] Because clinicians identified family expectations as a driver of unnecessary antibiotics, subsequent PDSA cycles involved introducing participants to a diagnosis-specific standardized script. We codesigned these scripts with subject matter experts and patient-and-family advisors using an evidence-based communications strategy.[6] Study participants attended monthly Webinars that introduced each standardized script at staggered increments throughout the study period.

The first standardized script was for OME. This standardized script introduced the concept of providing positive and negative treatment recommendations and emphasized the importance of a contingency plan for what to do if symptoms did not improve (https://players.brightcove.net/70829860001/S1MDI8LJZ_default/index.html?videoId=6160065427001). The script for AOM built on the concepts introduced in the first script and included standardized scripting for discussing delayed antibiotic prescribing for eligible patients. The AOM module also provided a framework for providers to discuss avoiding broad-spectrum antibiotics as a first-line therapy (https://players.brightcove.net/70829860001/default_default/index.html?videoId=6173810063001). Finally, the script for pharyngitis reiterated the concepts introduced in previous modules and discussed deferring strep testing in patients aged younger than 3 years (https://players.brightcove.net/70829860001/default_default/index.html?videoId=6193178571001). Participants were also provided with discharge instruction templates that mirrored the communication strategy for each diagnosis.

During monthly Webinars, the leadership team reviewed deidentified, aggregated results and discussed barriers and successes to the project with the participants. Attending the Webinars was a requirement for participation; however, Webinars were recorded and participants were able to self-report that they had reviewed the recorded version if they were unable to attend the live session.

Measures

For our primary outcome measure, we evaluated the rate of overall inappropriate antibiotic prescriptions for all target diagnoses. To determine antibiotic appropriateness for each encounter, the leadership team used previously developed algorithms based on the 2004 American Academy of Otolaryngology - Head and Neck Surgery and American Academy of Pediatrics joint guidelines for OME, the 2013 American Academy of Pediatrics guidelines for AOM, and the 2012 Infectious Diseases Society of America (IDSA) guidelines for group A streptococcal (GAS) pharyngitis.[3,10–12] We used a 3-tiered classification

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system from previously published literature to determine if antibiotics were appropriate for encounters taking into consideration any associated codiagnoses.[3,13–15] Encounters prescribed antibiotics with codiagnoses for which antibiotics might be indicated were considered appropriate. We also measured the individual rate of inappropriate antibiotics for OME, AOM, and pharyngitis. Secondary analyses evaluated which category in prescribing practices (indication, agent, or duration) contributed to inappropriate use.

In addition, we evaluated the frequency participants engaged in best practices for testing and treatment for antibiotic prescriptions for AOM and pharyngitis, respectively. For AOM encounters, we evaluated the frequency of delayed antibiotic prescriptions given for eligible encounters. Eligible encounters were defined as patients aged 2 years or older with mild symptoms (no fever, unilateral) that had been present for less than 2 days. For pharyngitis, we evaluated how often patients aged younger than 3 years or encounters with a codiagnosis of upper respiratory symptoms received streptococcal testing.

To evaluate if the decrease in unnecessary antibiotics resulted in increased resource use, we used the percentage of overall encounters that included laboratory (excluding rapid strep testing) or radiology orders as a balancing measure.

Analysis

We exported data from REDCap to Microsoft Excel and SAS 9.4 (SAS Institute, Inc, Cary, NC) for analysis. Patient demographic characteristics for each diagnosis were compared using χ^2 tests. Because of the short duration of the study and limited data points, we trended the rates of inappropriate antibiotic prescriptions for all encounters and for individual diagnoses using a line graph. We tracked process measures and balancing measures using line graphs as well. We used χ^2 tests to detect change of inappropriate prescribing rates from the beginning of the study period to the end. We did not report results at the individual prescriber level to decrease reporting bias by participants and preserve anonymity.[16,17] The study team provided participants feedback using the global deidentified site data during monthly Webinars.

The institutional review board at Children’s Mercy Kansas City determined that this project does not involve research as defined by Department of Health and Human Services regulations.

RESULTS

Participants

Our recruitment goal was to have 30 participants. We exceeded this goal with 104 participants from 14 freestanding pediatric UC centers. Data were collected from 1183 encounters during the study period (May–November 2020). Of those encounters, 9.5% (n = 113) had OME diagnoses, 34.1% (n = 403) had AOM, and 56.4% (n = 667) had pharyngitis diagnoses (Appendix 1, http://links.lww.com/PEC/B98). Clinicians prescribed antibiotics in 36 (31.9%) encounters for OME, 402 (99.8%) encounters for AOM, and 142 (21.3%) encounters for pharyngitis.

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Outcome Measures

At the beginning of the study period, 26.4% of submitted patient encounters resulted in an inappropriate antibiotic prescription. This trended downward to 16.6% ($P = 0.13$) by the end of the study period (Fig. 1). Prescribing practices for AOM improved from 38.6% to 26.5% ($P = 0.03$). Inappropriate prescribing practices for pharyngitis encounters trended downward from 14.5% to 8.8% ($P = 0.44$). However, inappropriate antibiotic prescribing practices in OME encounters trended upward from 30.8% to 46.7% ($P = 0.34$) (Fig. 1).

Measures for Otitis

Clinicians prescribed an inappropriate duration of antibiotics as the most common error for AOM diagnoses. This decreased from 34.3% at the beginning of the study to 8.8% ($P = 0.02$) by the end of the study (Fig. 2A). Other errors in prescribing practices for AOM diagnoses included inappropriate prescription type (delayed vs immediate) (7.4%) and inappropriate antibiotic agent (4.5%) (Fig. 2B). During the study period, only 9.9% of encounters with an AOM diagnosis met the criteria for delayed antibiotic prescriptions. Of those eligible, 14.3% received delayed antibiotics beginning of the study period. This trended upward to 50.0% by the end of the study period ($P = 0.5$) (Fig. 2C). Although not considered an appropriate prescribing practice, delayed prescriptions for OME also had an upward trend during the study period from 0% to 40.0% ($P = 0.34$) (Fig. 3).

Measures for Pharyngitis

Inappropriate use of rapid GAS testing in diagnoses of pharyngitis (9.3%) accounted for the highest percentage of errors by pediatric UC clinicians during the study period. The rate of inappropriate GAS testing did not change significantly over time (6.6%–8.8%; $P = 0.80$). Although inappropriate GAS testing did not improve, by the end of the study, both inappropriate antibiotic agent and prescribing antibiotics with a negative test trended downward from 3.9% and 5.3% to 0% and 0%, respectively ($P = 0.17$ and 0.21) (Fig. 4).

Balancing Measures

The proportion of encounters resulting in laboratory testing (excluding GAS testing) was 3.2% at the beginning of the study period and trended upward to 30% ($P = 0.05$). The proportion of encounters with radiology orders did not change during the study period (1.3% to 2.0%, $P = 0.41$).

DISCUSSION

Using evidence-based communication strategies to develop standardized scripts, we saw a downward trend in inappropriate antibiotic prescribing practices during this multisite pediatric UC quality improvement study. Due to decreased patient volumes in UC centers across the United States during the Sars-CoV-2 pandemic,[16] our ability to power the study to show significant improvement was limited. However, the communication strategies developed during this study provided a framework for participants to discuss best practices for the evaluation and management of common pediatric infections. The scripts used an evidence-based template,[6] and also included strategies to discuss delayed antibiotic prescribing for AOM, avoid broad-spectrum antibiotics for first-line treatment of

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uncomplicated AOM or strep pharyngitis, and strep testing in patients aged younger than 3 years with families during their visit.

Although there was a downward trend in immediate antibiotic prescriptions for OME diagnoses after the initiation of the first script specific to OME, the frequency of inappropriate antibiotic prescriptions for OME trended upward during the study period. This trend was driven by an uptick in delayed antibiotic prescriptions for OME. Although this practice was not recommended, the option for offering delayed prescribing provided participants a contingency plan for families when the provider was unable to monitor the progression of illness or ensure timely follow-up. Participants may have adopted the use of delayed prescribing for OME during the study because of concerns for reliable access to care during the concurrent COVID-19 pandemic overlaid on the already transient relationship a patient has with a UC clinician. Regardless, further studies should explore the UC providers' inappropriate use of delayed prescribing and barriers to decreasing antibiotic use in OME.

Delayed prescribing for AOM has been shown to reduce antibiotic use by as much as 56%[18]; however, increasing delayed prescribing for AOM has not been successful in similar cohorts of pediatric UC providers.[3] In contrast, delayed prescribing for eligible encounters with a diagnosis of AOM trended upward after our third PDSA 3, where participants engaged in communication strategies specific to discussing delayed prescribing with families. Our intervention specifically addressed the barrier reported by clinicians. This adds to the existing literature that providing communication strategies to medical providers improves antibiotic-prescribing practices.[6]

Clinicians improved their rates of choosing the recommended first-line agent and refraining from starting antibiotics without a positive GAS test. However, we did not see improvement in the judicious use of GAS testing in patients with upper respiratory infection symptoms or those aged younger than 3 years. Unnecessary testing may have been influenced by the COVID-19 pandemic. Further studies are needed to identify drivers that will improve diagnostic stewardship for patients presenting with pharyngitis.

Many participants may have participated in previous antibiotic stewardship initiatives and self-selected to participate in our study. Because of this, the generalizability of the findings here may be limited. The concurrent COVID-19 pandemic also affected laboratory testing, access to care, and presentation patterns to pediatric UC.[19] This study also relied on the integrity of the providers to report their individual prescribing data. Providers were aware their prescribing patterns were being monitored, which may have affected their prescribing behavior.

This national multisite quality improvement study provided standard scripting for 3 common pediatric acute illnesses. The interventions addressed not only the skill of delivering the diagnosis, treatment, and contingency plans, but also addressed the clinician-reported barriers of family expectations with evidence-based interventions backed by data. The cocreation of the scripting ensured a patient-and family-centered treatment plan to decrease inappropriate antibiotic use. The rate of inappropriate antibiotics at the beginning of our

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study period was lower than previously reported and trended downward over the course of the study period. Future PDSA cycles will focus on diagnostic stewardship and reducing inappropriate use of delayed prescribing for diagnoses that should never receive antibiotics, including OME.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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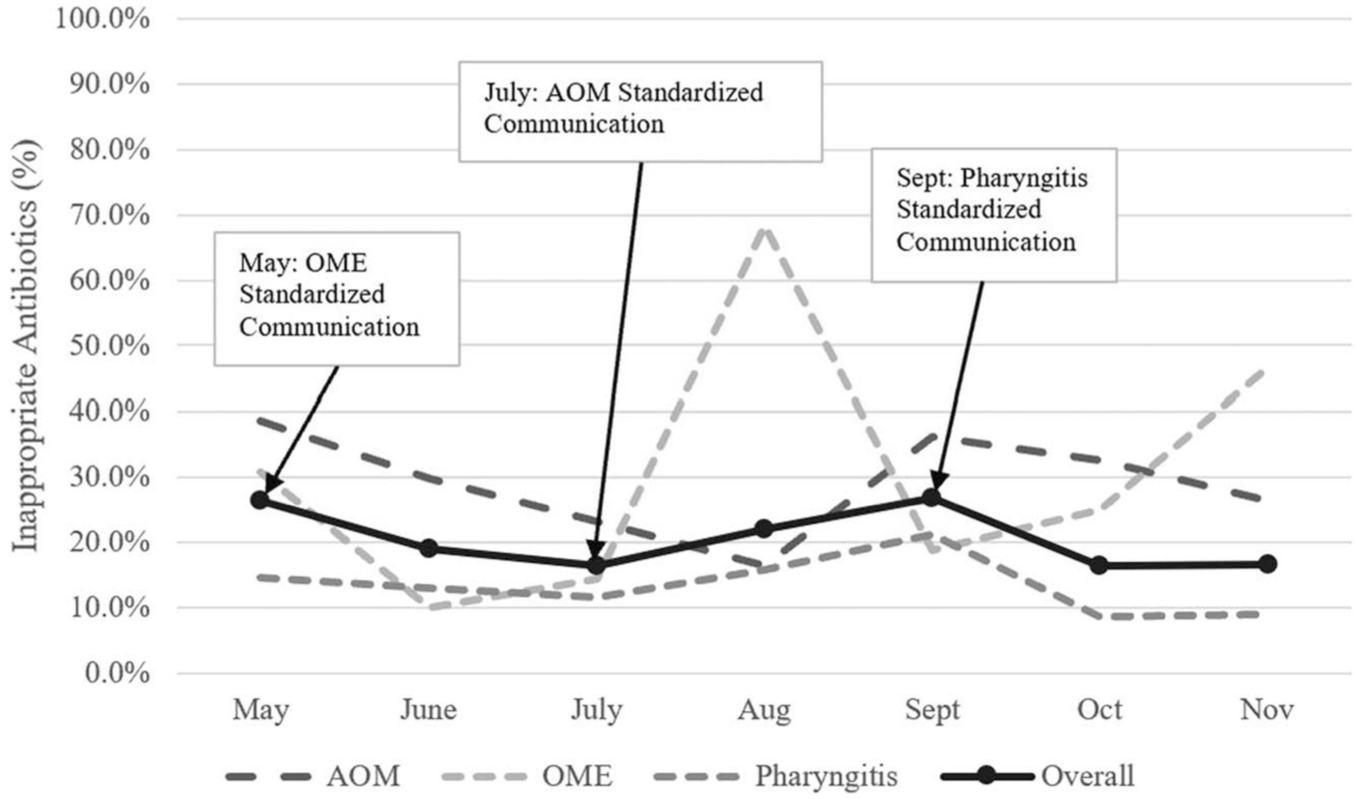

FIGURE 1.

Rates of inappropriate antibiotic prescriptions in pediatric UC centers overall and by target diagnoses: AOM, OME, and pharyngitis from May to November 2020.

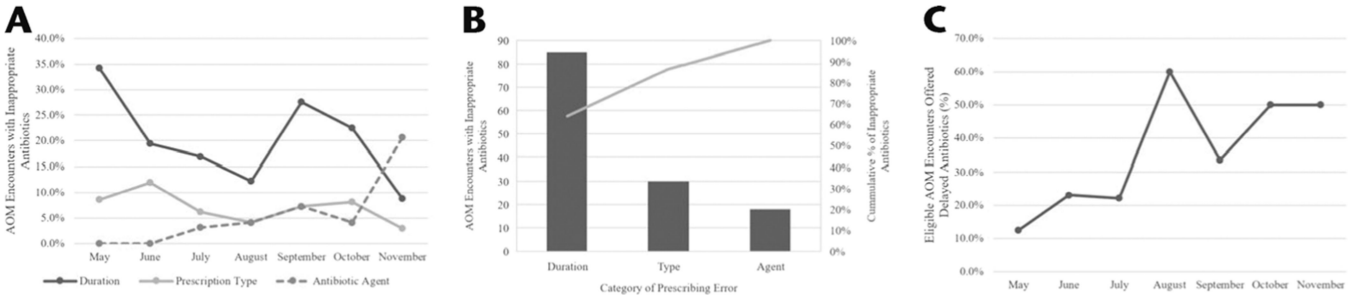

FIGURE 2.

A, Pareto chart of category of inappropriate antibiotic prescriptions for AOM encounters, (B) rates of inappropriate prescribing behaviors over time, and (C) rates of delayed antibiotic prescription for encounters that met criteria based on national guidelines.

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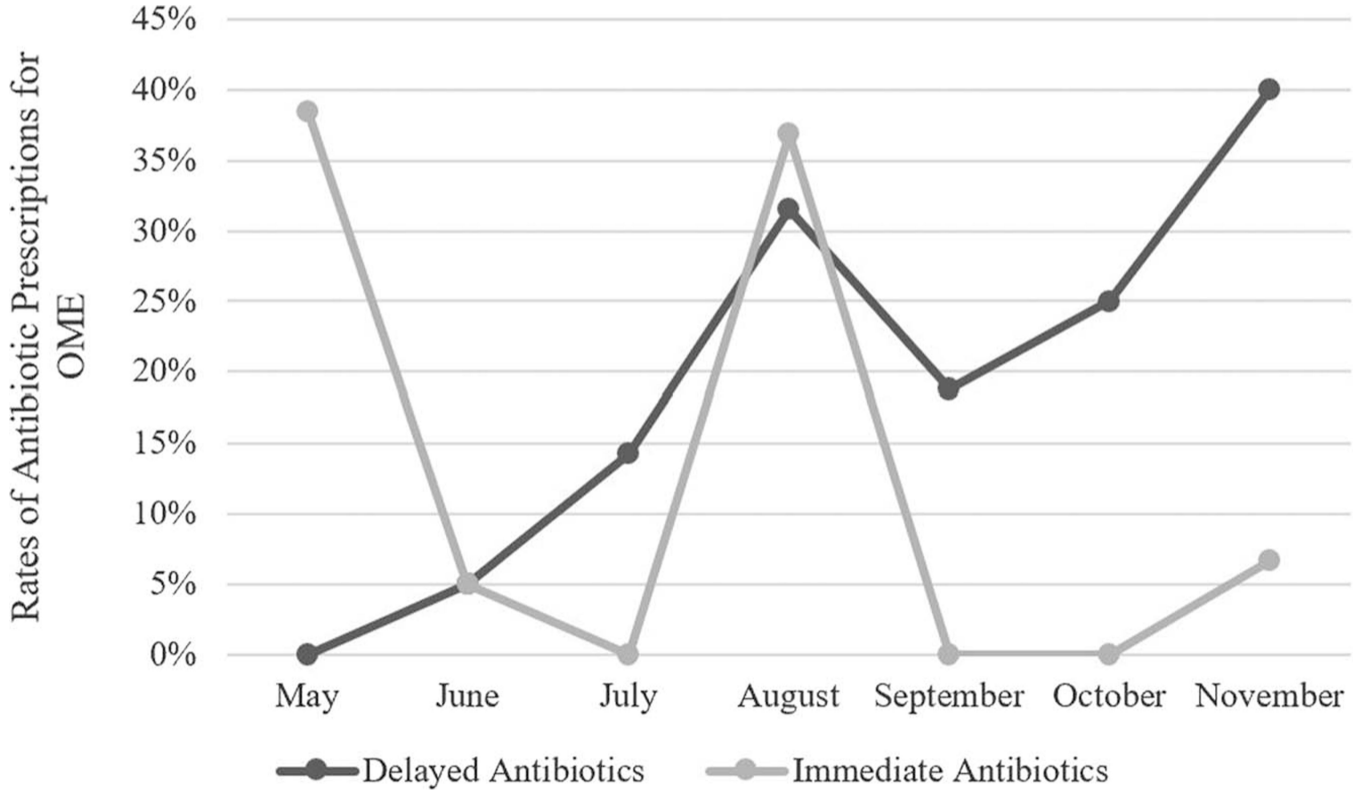

FIGURE 3.

Rates of immediate prescriptions versus delayed prescriptions for encounters with a diagnosis of OME in pediatric UC centers during the study period (May–November 2020).

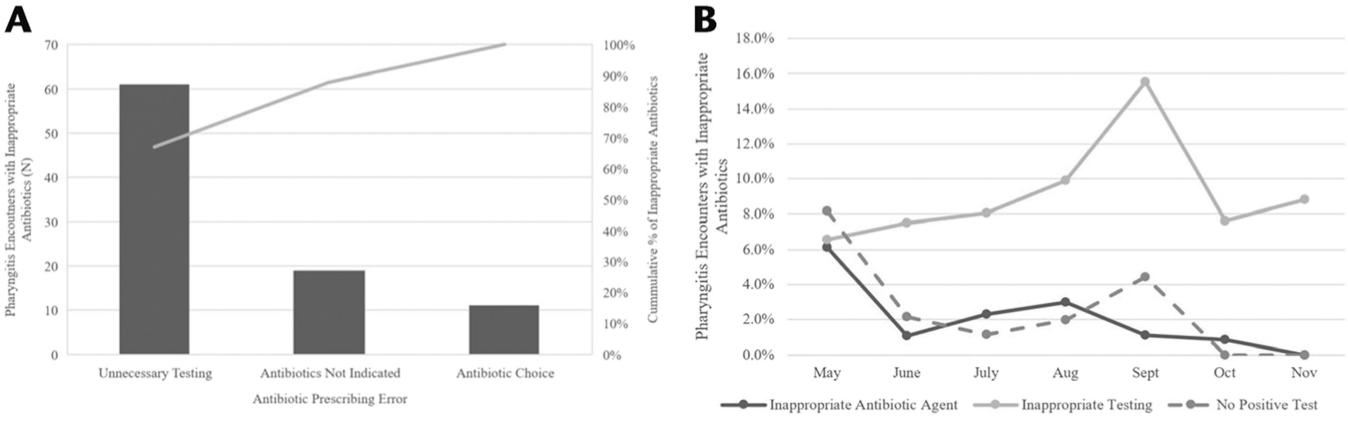

FIGURE 4.

A, Pareto chart of the different categories of inappropriate antibiotic prescriptions and (B) rates of inappropriate prescribing behaviors for encounters with a diagnosis of pharyngitis in pediatric UC centers during the study period (May–November 2020).

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