RESEARCH LETTER

Durability of Benefits of an Outpatient Antimicrobial Stewardship Intervention After Discontinuation of Audit and Feedback

Antibiotics are the most frequently prescribed medications for children; most are prescribed for outpatient acute respiratory tract infections. Because antibiotic prescribing is often inappropriate, we recently conducted a cluster randomized trial of an outpatient antimicrobial stewardship intervention that found a nearly 50% relative reduction in prescribing rates for broad-spectrum antibiotics. To assess the durability of this intervention, we followed antibiotic prescribing across intervention and control sites for 18 months after termination of audit and feedback.

Methods | The cluster randomized trial was conducted within 18 community-based pediatric primary care practices using a common electronic health record. These practices served children of diverse racial and socioeconomic backgrounds within urban, suburban, and rural settings. Data acquisition began in October 2008; the intervention started in June 2010 and ended in June 2011. The intervention included (1) clinician education, comprising a 1-hour review of current prescribing guidelines for the targeted conditions, which included sinusitis, streptococcal pharyngitis, and pneumonia, and (2) audit and feedback of antibiotic prescribing. Nine practices received the combined intervention (education plus prescribing audit and feedback) and 9 practices received no intervention. A representative from each practice consented verbally to the study on behalf of the group before treatment allocation.

The primary outcome was broad-spectrum antibiotic prescribing. Twelve months after initiating the study, we stopped providing antibiotic prescribing audit and feedback to clinicians in the intervention group. As planned prior to the end of the intervention, we extended our observation period by an additional 18 months (to December 2012), bringing the total observation time to 50 months. All 18 practices completed the extended observation. Using a piecewise generalized linear model with knots at month 0 (intervention start) and 12 (end of audit and feedback), we modeled the trajectory of the log odds of prescribing between treatment and control practices standardized for patient age, sex, race, and insurance type and excluding preventive encounters and encounters by children with an additional bacterial infection, comorbid conditions, recent prior antibiotic use, and/or antibiotic allergies. Results were transformed to the probability scale. Analyses were performed using Stata version 12.1 (Stata Corp). The Children's Hospital of Philadelphia Committee for the Protection of Human Subjects approved this study.

The estimate of interest is the treatment × time interaction term, representing the relative changes in trajectories before and during the intervention. Error bars indicate 95% CIs.
Results | There were 1,259,938 office visits by 185,868 unique patients to 180 clinicians at 18 practices during the 50-month study period. Nine clinicians left and 16 joined the practices after the intervention began. As previously reported, following the 12-month intervention of prescribing audit and feedback, broad-spectrum antibiotic prescribing decreased from 26.8% to 14.3% among intervention practices vs 28.4% to 22.6% in controls (difference of differences, 6.7%; P = .01 for differences in trajectories).4 Following termination of audit and feedback, however, prescribing of broad-spectrum antibiotics increased over time (Figure), reverting to above-baseline levels. After restandardization of the data set for the additional 18 months of data, antibiotic prescribing increased from 16.7% at the end of intervention to 27.9% at the end of observation in the intervention group and from 25.4% to 30.2% in controls (difference of differences, −6.4%; P = .02 for differences in trajectories).

Discussion | Antimicrobial stewardship programs, which have been shown to reduce antimicrobial use, improve patient outcomes, and reduce health care costs,5 are recommended for hospitals but rarely extend to the outpatient setting. We previously showed that a combination of clinician-specific education and audit and feedback significantly reduced prescribing of broad-spectrum antibiotics to children at acute primary care encounters.4 Following the removal of audit and feedback, however, the initial benefits of this outpatient antimicrobial stewardship intervention were lost, which is consistent with prior reports.6 Limitations of this study include our inability to assess the specific reasons for the reversion to baseline prescribing rates and the lack of corresponding clinical outcome data. These data suggest that audit and feedback was a vital element of this intervention and that antimicrobial stewardship requires continued, active efforts to sustain initial improvements in prescribing. Our findings suggest that extending antimicrobial stewardship to the ambulatory setting can be effective but should include continued feedback to clinicians.

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Conflict of Interest Disclosures: All authors have completed and submitted the ICME Form for Disclosure of Potential Conflicts of Interest. Drs Gerber and Fiks reported receiving grant funding from Pfizer for projects unrelated to this study. Dr Keren reported serving as a member of a CVS advisory board regarding subject matters outside of this study. No other authors reported disclosures.

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Trial Registration: clinicaltrials.gov Identifier: NCT01806103.


COMMENT & RESPONSE

Assessment of Outcomes of Hepatitis C Treatment
To the Editor The review by Dr Kohli and colleagues1 illustrated how hepatitis C virus (HCV) treatment has moved from the low efficacy and high complication rates observed with ribavirin plus interferon to the high sustained viral response (SVR) and rare complication rates observed with