





Concise Communication

Impact of an enterprise-wide ambulatory antibiotic stewardship bundle on patient satisfaction surveys

Kelsey L. Jensen PharmD¹ , Ryan W. Stevens PharmD² , Paschalis Vergidis MD³ , Abinash Virk MD³  and Dan Ilges PharmD⁴ 

¹Department of Pharmacy, Mayo Clinic Health System, Austin, MN, USA, ²Department of Pharmacy, Mayo Clinic, Rochester, MN, USA, ³Division of Public Health, Infectious Diseases, and Occupational Medicine, Mayo Clinic, Rochester, MN, USA and ⁴Department of Pharmacy, Mayo Clinic Arizona, Phoenix, AZ, USA

Abstract

An association between antibiotic prescribing in upper respiratory infection and improved patient satisfaction has been documented, though data are mixed. Following implementation of a multifaceted antimicrobial stewardship bundle, no difference in patient satisfaction was observed between groups, despite a reduction in antibiotic prescribing from 28.3% to 14.1%.

(Received 8 March 2024; accepted 24 May 2024; electronically published 16 September 2024)

Introduction

Approximately 80–90% of antimicrobial prescribing occurs in ambulatory care settings, with up to 50% of antimicrobials prescribed being inappropriate and 30% entirely unnecessary.^{1,2} Upper respiratory infections (URIs) remain the most common indication for ambulatory antibiotic prescribing, though treatment is often not indicated.³ Patient expectations and physician assumptions regarding those expectations influence the decision to prescribe antibiotics.⁴ Moreover, multiple studies have demonstrated an association between antibiotic prescribing and higher patient satisfaction, though data are mixed.⁵

Ambulatory antimicrobial stewardship program (ASP) initiatives can reduce unnecessary antibiotic prescribing for tier 3 URI diagnoses where antibiotics are never appropriate.⁶ However, a better understanding of the impact of these initiatives on patient satisfaction is needed. We sought to compare patient satisfaction scores pre- and post-implementation of a multifaceted ambulatory ASP bundle aimed at reducing unnecessary antibiotics for URI.

Methods

We conducted a quasi-experimental pre/post retrospective cohort study from 1/1/2019 to 12/31/22, with a 12-month washout during implementation from 7/1/2020 to 6/30/21. All enterprise adult and pediatric primary care ambulatory encounters with *International Classification of Diseases, 10th Revision (ICD-10)* diagnosis code(s) for tier 3 URIs were included.^{6,7} The Mayo Enterprise includes three major centers in Minnesota, Florida, and Arizona, and the Mayo Clinic Health System, a network of hospitals and clinics in Minnesota and Wisconsin. COVID-19 encounters were excluded

to prevent denominator inflation given high encounter volumes and low antibiotic prescription rates.⁸

The multifaceted ASP bundle was implemented in a stepwise fashion beginning 7/1/2020, consisting of standardized provider education, dissemination of symptomatic management strategies (ie, viral prescription pad), development of a syndrome-based, prepopulated ambulatory order panel (clinical decision support tool), a patient-facing antimicrobial commitment poster, peer comparison reporting, and a provider-facing data dashboard.^{6,7} Regional ASP teams were responsible for rollout of Enterprise-developed tools, with time lines varying by region during the implementation phase.

Following bundle implementation, pre- (1/1/2019–12/31/22) and post-implementation (7/1/2021–12/31/22) data for survey respondents were retrieved and compared retrospectively. Surveys were administered using a standard version of the Press Ganey[®] outpatient medical practice survey⁹ as part of our standard patient experience surveying process and directly correlated with individual encounters. Patients were randomly solicited within one week of encounters for all primary care department specialties across the enterprise, excluding urgent care. Telemedicine surveys were administered electronically and solicited via e-mail. Surveys for in-person visits were either solicited via e-mail or mailed based on volume-based algorithms.⁶

Patients were included if they answered all six survey questions (Table 2). Patients rated satisfaction with their provider on a 5-point response scale. Responses were converted to an ordinal scale to allow for comparison of means (ie, very poor = 1, poor = 2, fair = 3, good = 4, and very good = 5). The primary comparison groups were pre- and post-intervention cohorts. A sensitivity analysis evaluating the impact of an antibiotic prescription in the overall cohort, as well as within the pre- and post-implementation groups, was performed for question 1 (likelihood of you recommending our practice to others), which was determined a priori as the most impactful representation of satisfaction with care. Data were compared using χ^2 for categorical data and Wilcoxon rank sum to compare means of ordinal scale survey data.

Corresponding author: Kelsey Jensen; Email: Jensen.kelsey@mayo.edu

Cite this article: Jensen KL, Stevens RW, Vergidis P, Virk A, Ilges D. Impact of an enterprise-wide ambulatory antibiotic stewardship bundle on patient satisfaction surveys. *Infect Control Hosp Epidemiol* 2024. 45: 1243–1246, doi: [10.1017/ice.2024.116](https://doi.org/10.1017/ice.2024.116)



Table 1. Baseline characteristics

| Baseline characteristic | Pre-implementation (n = 1715) | Post-implementation (n = 1241) | P-value |
|--|-------------------------------|--------------------------------|---------|
| Age, mean (SD) | 51.3 (24.9) | 51.0 (26.3) | 0.754 |
| Age group | | | 0.017 |
| 0–2 | 113 (6.6) | 100 (8.1) | |
| 3–18 | 164 (9.6) | 136 (11.0) | |
| 19–65 | 837 (48.8) | 535 (43.1) | |
| >65 | 601 (35.0) | 470 (37.9) | |
| Female sex | 1060 (61.8) | 780 (62.9) | 0.563 |
| Provider type | | | <0.001 |
| Advanced practice provider | 669 (39.0) | 542 (43.7) | |
| Physician | 1021 (59.5) | 629 (50.9) | |
| Trainee | 25 (1.5) | 70 (5.6) | |
| Region | | | 0.136 |
| Arizona | 237 (13.8) | 155 (12.5) | |
| Florida | 267 (15.6) | 224 (18.0) | |
| MCHS NWWI | 249 (14.5) | 148 (11.9) | |
| MCHS SEMN | 194 (11.3) | 153 (12.3) | |
| MCHS SWMN | 164 (9.6) | 106 (8.5) | |
| MCHS SWWI | 188 (11.0) | 152 (12.2) | |
| Rochester | 416 (24.3) | 303 (24.4) | |
| Department specialty | | | 0.129 |
| Community internal medicine | 357 (20.8) | 251 (20.2) | |
| Community pediatric and adolescent medicine | 147 (8.6) | 112 (9.0) | |
| Family medicine | 1176 (68.6) | 866 (69.8) | |
| Women's health | 35 (2.0) | 12 (1.0) | |
| Telehealth visit | 65 (3.8) | 280 (22.6) | <0.001 |
| Primary diagnosis | | | <0.001 |
| Bronchitis/bronchiolitis | 358 (20.9) | 171 (13.8) | |
| Influenza | 91 (5.3) | 26 (2.1) | |
| Laryngitis/pharyngitis | 46 (2.7) | 19 (1.5) | |
| Other | 2 (0.1) | 2 (0.2) | |
| Rhinitis | 282 (16.4) | 255 (20.5) | |
| Serous OM/ear disorders | 121 (7.1) | 100 (8.1) | |
| URI unspecified | 815 (47.5) | 668 (53.8) | |
| Antibiotic prescribed | 486 (28.3) | 175 (14.1) | <0.001 |
| Repeat respiratory-related 14-day healthcare contact | 90 (5.2) | 73 (5.9) | 0.456 |

Note. SD, standard deviation; MCHS, Mayo Clinic Health System; NWWI, Northwest Wisconsin; SEMN, Southeast Minnesota; SWMN, Southwest Minnesota; SWWI, Southwest Wisconsin; OM, otitis media; URI, upper respiratory infection. Data are shown as number (%) unless otherwise specified.

All analyses were performed in IBM SPSS Statistics (version 28.0.0.0). All tests were two-sided with *P*-values of <0.05 considered statistically significant.

Results

A total of 75,874 tier 3 primary care encounters occurred during the pre- and post-implementation periods. Of these, 2956 patients seen by 972 unique providers completed surveys, with 1715 from

the pre- and 1241 from the post-implementation cohorts, respectively (Table 1). Baseline characteristics were similar between groups except for age, provider type, telemedicine utilization, primary diagnosis, and if an antibiotic was prescribed. Patients were predominantly aged 19–65 years, female, seen in Family Medicine department specialty, and received care by either a physician or advanced practice provider (APP). Tier 3 antibiotic prescribing decreased from 28.3% pre- to 14.1% post-implementation (*P* < 0.001).

Table 2. Survey results pre- and post-implementation

| Survey question | Pre-implementation (n=1715) | Post-implementation (n=1241) | P-value |
|--|-----------------------------|------------------------------|---------|
| Question 1: Likelihood of you recommending our practice to others | | | |
| Very good | 1343 (78.3) | 975 (78.6) | 0.195 |
| Good | 261 (15.2) | 172 (13.9) | |
| Fair | 55 (3.2) | 50 (4.0) | |
| Poor | 31 (1.8) | 16 (1.3) | |
| Very poor | 25 (1.5) | 28 (2.3) | |
| Ordinal, Mean [SD] | 4.67 [0.75] | 4.65 [0.81] | |
| Question 2: Concern the care provider showed for your questions or worries | | | |
| Very good | 1380 (80.5) | 998 (80.4) | 0.948 |
| Good | 220 (12.8) | 155 (12.5) | |
| Fair | 67 (3.9) | 50 (4.0) | |
| Poor | 25 (1.5) | 17 (1.4) | |
| Very poor | 23 (1.3) | 21 (1.7) | |
| Ordinal, Mean [SD] | 4.7 [0.73] | 4.69 [0.76] | |
| Question 3: Explanations the care provider gave you about your problem or condition | | | |
| Very good | 1367 (79.7) | 967 (77.9) | 0.313 |
| Good | 239 (13.9) | 174 (14.0) | |
| Fair | 55 (3.2) | 56 (4.5) | |
| Poor | 32 (1.9) | 22 (1.8) | |
| Very poor | 22 (1.3) | 22 (1.8) | |
| Ordinal, Mean [SD] | 4.69 [0.74] | 4.65 [0.80] | |
| Question 4: Care provider's efforts to include you in decisions about your care | | | |
| Very good | 1344 (78.4) | 959 (77.3) | 0.323 |
| Good | 261 (15.2) | 188 (15.1) | |
| Fair | 49 (2.9) | 52 (4.2) | |
| Poor | 30 (1.7) | 17 (1.4) | |
| Very poor | 31 (1.8) | 25 (2.0) | |
| Ordinal, Mean [SD] | 4.67 [0.78] | 4.64 [0.80] | |
| Question 5: How well the staff worked together to care for you | | | |
| Very good | 1310 (76.4) | 948 (76.4) | 0.083 |
| Good | 321 (18.7) | 205 (16.5) | |
| Fair | 56 (3.3) | 60 (4.8) | |
| Poor | 12 (0.7) | 14 (1.1) | |
| Very poor | 16 (0.9) | 14 (1.1) | |
| Ordinal, Mean [SD] | 4.69 [0.66] | 4.66 [0.72] | |
| Question 6: Likelihood of your recommending this care provider to others | | | |
| Very good | 1358 (79.2) | 986 (79.5) | 0.767 |
| Good | 210 (12.2) | 138 (11.1) | |
| Fair | 67 (3.9) | 58 (4.7) | |
| Poor | 27 (1.6) | 19 (1.5) | |
| Very poor | 53 (3.1) | 40 (3.2) | |
| Ordinal, Mean [SD] | 4.63 [0.88] | 4.62 [0.90] | |

Note. SD, standard deviation.

Data are shown as number (%) unless otherwise specified.

Overall, no statistically significant changes in satisfaction were observed for any of the six survey questions or their associated means, when comparing pre- versus post-implementation (Table 2). For the sensitivity analysis of impact of antibiotic prescribing on patient responses to survey question number 1, mean satisfaction was higher in antibiotic (n = 661) compared to non-antibiotic encounters (n = 2295) in the overall cohort (4.74 vs 4.64; $P = 0.012$). This trend was consistent in both the pre- and post-implementation cohorts, with higher mean satisfaction in antibiotic (n = 486) compared to non-antibiotic (n = 1129) encounters in the pre-implementation cohort (4.73 vs 4.64; $P = 0.027$), as well as in antibiotic (n = 175) compared to non-antibiotic (n = 1066) encounters in the post-implementation cohort (4.75 vs 4.64; $P = 0.199$).

Discussion

We compared patient satisfaction scores before and after implementation of a multifaceted ASP bundle across the Mayo Clinic Enterprise. In this subset of primary care survey respondents, the tier 3 URI prescribing rate decreased from 28.3% to 14.1%, consistent with the decrease from 21.7% to 11.2% observed in the overall cohort as previously published.⁶ Despite a 50% relative reduction in antibiotic prescribing, no differences were observed in patient satisfaction score responses when comparing the pre- and post-implementation cohorts; however, antibiotic prescribing was associated with statistically significantly higher mean satisfaction scores for question 1 in the overall and pre-implementation cohorts, although the difference in mean score was small (ie, ~0.1 points) and may not be meaningfully different.

Our study has several noteworthy limitations. First, we noted significantly more telehealth visits in our post-implementation cohort (22.5% vs. 3.8%; $P < 0.001$), consistent with changes in care following the COVID-19 pandemic (Table 1). Previous studies have demonstrated higher patient satisfaction with telehealth visits,¹⁰ which may have confounded patient satisfaction post-implementation. Second, given the known association between patient satisfaction and the patient-provider relationship,⁵ as well as the nearly infinite additional variables that can impact patient satisfaction scores, it was impossible to control for all possible confounders. Therefore, the results of this unadjusted analysis may have been subject to additional unmeasured confounding. Third, inherent to the fact that there was no obligation to respond to surveys, responses may skew toward patients with stronger opinions introducing voluntary response bias and limiting generalizability. Additionally, this cohort represents only a small subset (~4%) of the overall 75,874 tier 3 primary care URI encounters during the study period; however, as a general practice, not all patient encounters are solicited for survey response. We are unable to determine exactly what proportion of the cohort was surveyed; however, at large, typical response is 25% of those receiving the survey for outpatient encounters within our enterprise. Lastly, given our intervention was multifaceted including provider education, provision of a patient-directed viral prescription pad with over-the-counter symptomatic management

recommendations, and routine peer comparison reporting, results may not be generalizable to ASP efforts that utilize different interventions and/or interventions that focus less on providing tools for providers to provide patients with tangible value outside of antibiotic prescriptions.

Conclusions

Patient satisfaction was not diminished following implementation of a comprehensive, multimodal ambulatory ASP bundle that resulted in a 50% relative reduction in unnecessary antibiotic prescribing for tier 3 URIs. Programmatic efforts to reduce inappropriate antibiotic prescribing should not be dissuaded by concerns over reduced patient satisfaction, although empowering providers with tools to educate patients and provide non-antibiotic value are paramount.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/ice.2024.116>.

Acknowledgments. We sincerely thank Laurie Wilshusen for her assistance with obtainment of survey data detailed in this study.

Financial support. No financial support was provided relevant to this study.

Competing interests. All authors report no conflicts of interest relevant to this study.

References

1. Fleming-Dutra KE, Hersh AL, Shapiro DJ, *et al.* Prevalence of inappropriate antibiotic prescriptions among us ambulatory care visits, 2010–2011. *JAMA* 2016;315:1864–73.
2. Hersh AL, King LM, Shapiro DJ, *et al.* Unnecessary antibiotic prescribing in US ambulatory care settings, 2010–2015. *Clin Infect Dis* 2021;72:133–137.
3. Stenehjem E, Wallin A, Fleming-Dutra KE, *et al.* Antibiotic prescribing variability in a large urgent care network: a new target for outpatient stewardship. *Clin Infect Dis* 2020;70:1781–1787.
4. Cals JW, Boumans D, Lardinois RJM, *et al.* Public beliefs on antibiotics and respiratory tract infections: an internet-based questionnaire study. *Br J Gen Pract* 2007;57:942–7.
5. Baummer-Carr A, Nicolau DP. The challenges of patient satisfaction: influencing factors and the patient - provider relationship in the United States. *Expert Rev Anti Infect Ther* 2017;15:955–962.
6. Ilges D, Jensen K, Draper E, *et al.* Evaluation of multisite programmatic bundle to reduce unnecessary antibiotic prescribing for respiratory infections: a retrospective cohort study. *Open Forum Infect Dis* 2023;10: ofad585.
7. Jensen KL, Rivera CG, Draper EW, *et al.* From concept to reality: Building an ambulatory antimicrobial stewardship program. *J Am Coll Clin Pharm* 2021;4:1583–1593.
8. Lepak AJ, Taylor LN, Stone CA, *et al.* Association of changes in seasonal respiratory virus activity and ambulatory antibiotic prescriptions with the COVID-19 pandemic. *JAMA Internal Med* 2021;181:1399–1402.
9. Presson AP, Zhang C, Abtahi AM, *et al.* Psychometric properties of the Press Ganey® Outpatient Medical Practice Survey. *Health Qual Life Outcomes* 2017;15:32.
10. Chen K, Lodaria K, Jackson HB. Patient satisfaction with telehealth versus in-person visits during COVID-19 at a large, public healthcare system. *J Eval Clin Pract* 2022;28:986–990.