Delayed antibiotic prescribing to reduce antibiotic use: an urgent care practice change

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ABSTRACT

Background Antibiotic overuse threatens global health, food security and human development through the development of antibiotic resistance. Antibiotic resistance is associated with worse clinical outcomes and increased healthcare costs. Studies suggest urgent cares exceed the national average for inappropriate antibiotic use associated with maintaining patient satisfaction.

Local problem Chart audits from an urgent care clinic in the southwest region of the USA revealed that antibiotics were prescribed for upper respiratory infections (URIs) routinely and without patient instruction on methods to reduce their antibiotic use. Further review, exposed that most urgent care sites do not have an Antibiotic Stewardship Plan (ASP) and little-to-no ASP training for medical staff.

Methods A quantitative quality improvement project was implemented to determine the impact of delayed antibiotic prescribing on antibiotic usage rates for adult patients with URI symptoms at an urgent care clinic in central Arizona over 4 weeks.

Interventions Implementing the Centers for Disease Control and Prevention's URI adult treatment guidelines for antibiotic use with follow-up phone calls 10 days post-discharge to evaluate the patient's decision-making.

Results Antibiotic usage rates decreased by 12% in 30 days, N=927, n=598 in the comparative and n=330 in the implementation group. A Mann-Whitney U test demonstrated a statistically and clinically significant reduction in antibiotic usage rates between groups (U=247, p=0.023).

Conclusion Success in meeting the goal was a result of team and patient engagement strategies that reduced outpatient antibiotic use while maintaining high levels of patient satisfaction.

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A study published by JAMA, in 2018, determined that antibiotics were inappropriately prescribed in outpatient clinics about 45.7% of the time.[1] Weiss, Deave, Peters and Salisbury established patient expectations for treatment as an influencer on provider antibiotic prescribing.[2] Acute upper respiratory infections (URIs) are the main reason for inappropriate antibiotic prescribing.[3] Doctors and providers are concerned about patient satisfaction and patient demand for antibiotics and often know when to prescribe or withhold but they comply with patient demands.[4] Patients lack understanding of the antibiotic resistance issue which contributes to poor prescribing practices when providers attempt to appease patient expectations.[5] In 2019, the Centers for Disease Control and Prevention (CDC) acknowledged more than 2.8 million annual antibiotic-resistant infections in the USA and more than 35 000 deaths.[3]

The CDC's 2017 report highlighted the outpatient prescribing deficiency in retail clinics and encouraged a shift in their practice to implement the CDC's adult treatment recommendations for URI.[6] Delayed antibiotic prescribing is an effective way to alleviate patient concerns about worsening symptoms while lowering antibiotic consumption rates through patient education and shared decision-making.[7] Urgent care clinics need to incorporate antibiotic stewardship to improve patient outcomes and protect community health.

LITERATURE REVIEW

There are established goals for reducing outpatient antibiotic consumption focused on urgent care centres, due to their prominence in episodic patient care. With the declining trend of Americans having a primary care provider over the past 20 years, urgent care is often viewed as the frontline for patients due to easy access, convenience and cost savings.[8] The National Action Plan for Combating Antibiotic-Resistant Bacteria set a goal to reduce inappropriate outpatient antibiotic use by 50% by 2020.[9] Fleming-Dutra *et al* concluded that there is a need for establishing goals for reduction in outpatient antibiotic consumption as well as implementing and evaluating methods of reducing outpatient prescribing.[10] Two out of five urgent care visits result in antibiotics while the majority of antibiotic prescribing in these settings was due to an acute URI diagnosis for which antibiotics are not clinically indicated.[1] In the *Journal of Urgent Care Medicine*,

Sweeney encouraged urgent care centres to have available resources and educational material related to antibiotic use for patients and all staff and to monitor these implementations for effect.[11] Patient-led delayed antibiotic prescribing can reduce antibiotic consumption for URI symptoms by 40%.[12]

RATIONALE AND OBJECTIVE

An initial root cause analysis was performed to help identify gaps in antibiotic stewardship at an urgent care clinic in the southwest region of the USA. When compared with the CDC's adult treatment prescribing guidelines, the process revealed that the providers were overprescribing antibiotics for patient appeasement, patient satisfaction and lack of patient education on antibiotic resistance. A randomised chart review of adult patients concluded there were various reasons for the overprescribing and the main lack of an antibiotic stewardship programme prevented a cohesive way to address the issue among providers and staff.

METHODS

Study settings and inclusion criteria

This quality improvement project was implemented at an urgent care in south-central Arizona. The patient population is drawn from a large metropolitan area of Caucasians (82%), Hispanics (31%) and African Americans (6%).[13] The clinic averages 35–40 patient visits per day, with the project site operating each clinic shift with one physician, one back office medical assistant and one front office representative. Inclusion criteria included all adult patients ≥18 years old who presented to the urgent care clinic for upper respiratory problems, which included cough, runny nose, nasal congestion, sore throat and post nasal drip, during a 4-week period between August and September 2020. The Institutional Review Board approved this initiative as exempt, meeting federal requirements for a quality improvement project. No outside funding was received.

Design

In line with the CDC's Adult Treatment Guidelines for URI, this initiative implemented the guidelines over 4 weeks to all adult patients with URI problems. Data on antibiotic consumption, for adult patients with upper respiratory problems from the 4 weeks before the implementation was collected by the staff. Follow-up phone calls to the participants in the intervention group, 10 days post discharge, allowed for examination of the effect of reiteration of Evidence Based Practice (EBP) guidelines and implementation of the CDC's treatment recommendations for URIs on antibiotic consumption rates before and after the implementation. Using a quantitative methodology quasi-experimental design, a retrospective chart review and a delayed antibiotic prescribing tool focused this quality improvement project on determining the effectiveness of the delayed antibiotic prescribing initiative.

Interventions

First, the staff and providers were trained on the CDC's treatment guidelines which served as the initial antibiotic stewardship initiative in this urgent care. This met the CDC's call to action for all urgent cares to implement an antibiotic stewardship programme.[3] Second, the following preworded discharge instructions were given to patients with URIs along with an antibiotic prescription: 'You were seen for symptoms consistent with an upper respiratory infection. This is usually caused by a virus and does not require an antibiotic intervention. However, you were given an antibiotic prescription. Please only begin these medications for temperature that develops over 100.4°F, worsening sore throat, cough, shortness of breath, facial or sinus pain, earache and runny or blocked nose, or if your symptoms persist past 10 days from the initial onset'.[14] Finally, a follow-up phone call was initiated by staff 10 days after the patient was seen and the patient was asked if they consumed the antibiotics and if so what was their conversion factor from the above-listed symptoms.

Data analysis

To study the impact of the CDC's delayed antibiotic prescribing tool, the quantitative data from the follow-up phone questionnaire was codified into a Mann-Whitney U test using International Business Machines Statistical Package for Social Sciences (SPSS), V.26, for analysis.[12] The Mann-Whitney U test compared the outcomes from the comparative rates of antibiotic consumption pre-implementation and post-implementation. During the pre-implementation period, 598 people were seen in the urgent care with 19 people diagnosed with URIs and prescribed antibiotics. These patients were prescribed the antibiotics with the assumption that 100% would take them since they were not given instructions to 'delay' their prescription. During the implementation period, 330 patients were seen in the urgent care with 34 of the patients seen for URIs and given the intervention of patient-led delayed antibiotic prescribing. Follow-up with the patients showed that 30 of the patients delayed taking the antibiotics and 4 patients were unable to be contacted. These four patients were assumed to have taken the antibiotics since delay could not be ensured through contact. Four more participants, who were prescribed a delayed antibiotic, did not begin the prescribed antibiotics because their symptoms improved spontaneously.

RESULTS

The implementation of an antibiotic stewardship programme, using the CDC's adult treatment guidelines for URIs, produced a 12% reduction in antibiotic consumption rates within the patient population during the 4-week nurse practitioner-led delayed antibiotic prescribing initiative. Effective implementation of the

Table 1 Descriptive data

Characteristic	Comparative (n=598) M (SD)	Post implementation (n=330) M (SD)	Total sample (n=927) M (SD)
Age	39.59	39.65	39.61
Gender frequency	n (%)	n (%)	n (%)
Male	310 (51.8)	149 (45.2)	459 (49.5)
Female	288 (48.2)	181 (54.8)	468 (50.5)

CDC's delayed antibiotic prescribing tool, coupled with patient education on how and when to use antibiotics, led to this process improvement and an overall reduction in antibiotic consumption. Before performing the Mann-Whitney U test the four associated assumptions for the test were confirmed to have been met. The comparative groups compliance with consuming antibiotics was assumed to be higher than the implementation groups. This difference was most likely because the implementation group was given specific directions on how and when to begin the antibiotics to reduce their unnecessary consumption. The Mann-Whitney U test of the data, comparing the comparative group and implementation group's rate of antibiotic consumption demonstrated that there is a difference between the ranks of the comparative and implementation groups (U (n1=19, n2=30)=247, $z=-2.73$, p=0.023) which concludes that implementing the CDC's adult treatment recommendations demonstrated a statistically significant reduction (p=0.023) in antibiotic usage rates in the implementation group compared with the comparative group. Proportions of patient-led delayed antibiotic prescribing decreased from 100% (n=19) in the comparative group to 88% (n=30) in the implementation group, demonstrating 12% more patients who delayed antibiotics, the desired outcome.

The comparative group included 598 participants (n=598): 310 men, or 51.8% of the total population, and 288 women, or 48.2% of the total population, with a mean age of 39.39 years as shown in table 1. The implementation group included 330 (n=330) participants: 149 men, or 45.2% of the population, and 181 women, or 54.8% of the population with an average age of 39.65.

Implementation of the CDC's Adult Treatment Guidelines for URI

This quality improvement project aimed to assist patients with understanding the consequences of antimicrobial resistance through an explanation of the CDC's treatment recommendations and how to implement the intervention. Gaarslev et al determined that explaining antimicrobial resistance and the health consequences associated with it produced more effective health campaigns against antimicrobial resistance.[15] Dumkow et al found that delayed antibiotic prescribing was effective at minimising antibiotic exposure without negative patient outcomes.[7] Implementing patient-led delayed antibiotic prescribing for patients with URIs encouraged antibiotic stewardship,

nurtured patient education, improved patient satisfaction and reduced community antibiotic overconsumption. Since the initial implementation, this intervention has been continuously implemented month-over-month for the past 8 months. While patient flow and acuity has affected the results, the clinical reduction in antibiotic use has remained above 12%.

DISCUSSION

The implementation of a conversion factor checklist, composed of evidence-based guidelines, demonstrated to be an effective approach to ensure patient satisfaction, antibiotic use reduction and quality improvement. The quality improvement project analysis closely followed the findings from Dumkow et al which determined patient compliance with delayed antibiotic prescribing was high with the implementation of clear discharge instructions outlining conversion factors.[7]

Most importantly, the direct involvement of patients with the use of the CDC's adult treatment guidelines for URIs helped initiate patient discussion and involvement around the topic of antibiotic resistance and overuse despite the fast-paced environment of urgent care. This improved patient understanding of how and when they should consume antibiotics to preserve their effectiveness. Engaging patients in their care can lead to measurable improvements in safety and quality.[16] The CDC's adult URI treatment guidelines offer a delayed antibiotic prescribing tool that positively impacted the urgent care population and would be feasibly incorporated into the electronic health record system for company-wide distribution. Similarly, the development of the team's communication skills with educating and implementing the tool improved patient and clinician outcomes. Engaged employees are vital to the success of implementations and using workforce engagement enhanced employee productivity.[17] The high level of commitment from the staff ensured the effective implementation of this quality improvement project and the positive patient outcomes.

Limitations

This quality improvement project was implemented at one site in an urban community during the summer months and the SARS-CoV-2 pandemic. This limits the generalisability to other urgent care clinics in different communities which have a fluctuating patient census.

The tool was modified from existing tools and not validated which limits the validity of the results. Patient expectations for their recovery time and desired treatment affected compliance with the treatment guidelines and was addressed through patient education to mitigate misunderstandings and encourage patient adherence to the evidence-based practice guidelines. This mitigated the risk of reduced patient satisfaction but also maintained a level of evidence-based practice in the treatment of adults diagnosed with URIs who lacked a clinical rationale for initial antibiotic use. A larger sample size with a more diverse population is recommended to mitigate these limitations. Future projects should include more demographic details on the population, differentiate between specific URIs and incorporate multivariate comparisons.

This project assumed that all patients had access to a phone which may not be true for some so the staff were instructed to verify there was a current and working phone number where the patient may be contacted during the follow-up. This created an unintentional sampling bias that may have systematically favoured those who had access to a phone to answer the follow-up phone call over others and may have resulted in some not being included in the post-implementation analysis. Selection bias was addressed by ensuring random sampling without assigning patients to certain groups. The patient-led delayed antibiotic prescribing was applied to all patients with URIs over 4 weeks to remove selection bias.

The SARS-CoV-2 pandemic most likely had a profound effect on the sample size, prescribing practices and patient compliance with the implementation. The patient volume in the urgent care clinic varied greatly from the usual volume from previous years. While the results from the implementation were statistically significant in reducing antibiotic consumption rates from the comparative rate, research that guided the implementation was from pre-COVID-19 times. Some initial but no longer relevant studies into the effects of azithromycin in SARS-CoV-2 demonstrated decreased viral entry into the cells and had been an included component to many COVID-19 treatment regimens.[18] This information impacted patient treatment expectations and influenced the treatment decision-making for the providers in the clinic. This changing medical practice will need to be understood better, and an evidence-based practice outpatient treatment guideline for this viral infection would be beneficial.

A more robust statistical analysis should be included in future projects and incorporate age, race and gender in a multivariable model. Including data on the conversion factor, or why patient's chose to begin their antibiotics would be valuable information. Targeting specific antibiotic drug classes for reduction in use may be beneficial for future projects to improve prescriber adherence to guidelines for first-line antibiotic therapies. Future statistical analysis should also include phone calls to the baseline group to determine if all the patients who were prescribed antibiotics had consumed their antibiotics. Assuming they consumed the antibiotics without confirming could skew the results. This intervention may not have reduced antibiotic consumption if a more robust data collection was performed and analysed.

Future implementations should include a more thorough analysis between the baseline and comparative group's antibiotic consumption rates and should include their conversion factors. Institutional Review Board constraints limited data collection from patients prior to the beginning of the intervention which limited data collection from the baseline group. However, this data are essential to understanding the effectiveness of delayed antibiotic prescribing on reducing antibiotic consumption.

CONCLUSIONS

Nurses today have an important role to conduct quality improvement projects that further nursing knowledge, promote better patient care and outcomes and demonstrate fiscal responsibility. This quality improvement project was consistent in reinforcing previous research that found that implementing patient-led delayed antibiotic prescribing will often result in a statistically significant reduction in antibiotic therapy in patients seeking medical care for URIs.[10] Over 30 days, this quality improvement project appears to have achieved an effective reduction in antibiotic use through the implementation of a nurse practitioner-led shared decision-making tool. More importantly, it investigated how a combination of the healthcare team and patient engagement strategies can reduce antibiotic consumption in an outpatient setting. This quality improvement project has significance for local and national healthcare systems at its tool provided a simple and inexpensive method to provide patient education on responsible antibiotic use which allows for easy replication into any healthcare facility that offers episodic care. Future project sustainability can be developed through the development of a company-wide protocol and transitioning the tool into the electronic health record. Further research is recommended to determine the long-term impact that delayed antibiotic prescribing has on antibiotic consumption.

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REFERENCES

1. Palms DL, Hicks LA, Bartoces M, *et al*. Comparison of antibiotic prescribing in retail clinics, urgent care centers, emergency departments, and traditional ambulatory care settings in the United States. *JAMA Intern Med* 2018;178:1267.
2. Weiss MC, Deave T, Peters TJ, *et al*. Perceptions of patient expectation for an antibiotic: a comparison of walk-in centre nurses and GPs. *Fam Pract* 2004;21:492–9.
3. Centers for Disease Control and Prevention. Antibiotic use in the United States, 2018 update progress and opportunities, 2019. Available: https://www.cdc.gov/antibiotic-use/stewardship-report/pdf/stewardship-report-2018-508.pdf
4. Pifer R. Nearly half of antibiotics inappropriate in urgent care, CDC study says. healthcare dive, 2018, July 18. Available: https://www.healthcaredive.com/news/nearly-half-of-antibiotics-inappropriate-in-urgent-care-cdc-study-says/528061/
5. Little P, Moore M, Kelly J, *et al*. Delayed antibiotic prescribing strategies for respiratory tract infections in primary care: pragmatic, factorial, randomised controlled trial. *BMJ* 2014;348:g1606 https://doi.org/10.1136/bmj.g1606
6. Centers for Disease Control and Prevention. Antibiotic use in outpatient settings, 2017, 2019. Available: https://www.cdc.gov/antibiotic-use/stewardship-report/outpatient.html
7. Dumkow LE, Axford KL, Suda KJ, *et al*. Impact of a stewardship-focused culture follow-up initiative on the treatment of pharyngitis in the emergency department and urgent care settings. *Diagn Microbiol Infect Dis* 2018;92:136–42.
8. Levine DM, Linder JA, Landon BE. Characteristics of Americans with primary care and changes over time, 2002-2015. *JAMA Intern Med* 2020;180:463–6.
9. Centers for Disease Control and Prevention. The nation's plan to combat antibiotic resistance, 2020. Available: https://www.cdc.gov/drugresistance/us-activities/national-action-plan.html
10. 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.
11. Sweeney P. Improving appropriate antibiotic use for common clinical conditions in urgent care. *The Journal of Urgent Care Medicine*. 2017 https://www.jucm.com/improving-appropriate-antibiotic-use-common-clinical-conditions-urgent-care/
12. IBM Corp. *Ibm SPSS statistics for windows (version 26.0*. Armonk, NY: IBM Corp, 2019.
13. Census bureau QuickFacts. U.S. census bureau QuickFacts: Maricopa County, Arizona, 2019. Available: https://www.census.gov/quickfacts/maricopacountyarizona
14. Centers for Disease Control and Prevention. Adult treatment recommendations, 2019. Available: https://www.cdc.gov/antibiotic-use/community/for-hcp/outpatient-hcp/adult-treatment-rec.html
15. Gaarslev C, Yee M, Chan G, *et al*. A mixed methods study to understand patient expectations for antibiotics for an upper respiratory tract infection. *Antimicrob Resist Infect Control* 2016;5:39.
16. Agency for Healthcare Research and Quality. Guide to improving patient safety in primary care settings by engaging patients and families, 2020. Available: https://www.ahrq.gov/patient-safety/reports/engage.html
17. Revere Team. How employee engagement impacts continuous improvement culture, 2019. Available: https://reverscore.com/employee-engagement-impacts-continuous-improvement/
18. Bleyzac N, Goutelle S, Bourguignon L, *et al*. Azithromycin for COVID-19: more than just an antimicrobial? *Clin Drug Investig* 2020;40:683–6.