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Education-Based Intervention to Decrease Unnecessary Antibiotic Prescribing for Uncomplicated Acute Bronchitis

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Abstract

Background and Purpose: Antibiotic resistance is a serious health problem in Oregon and across the United States. The increased incidence is partly due to inappropriate outpatient antibiotic use, especially for uncomplicated acute bronchitis.

Methods: In an effort to decrease unnecessary antibiotic prescribing, a 30-minute education seminar for providers was implemented. The content focused on antibiotic stewardship and management of bronchitis using a printed decision support (PDS) guideline algorithm, Wait and See Prescription (WASP) method, and motivational interviewing (MI). The intervention was monitored through eight weeks of data collection, using ICD-10 codes from the electronic health record and a paper-based survey.

Conclusions: In the first month, there were no antibiotics prescribed for acute bronchitis, while one was prescribed in the second month. The WASP method was used the most by providers, but the PDS algorithm was perceived to be more helpful. MI was used the least and perceived to be the least helpful. Following the education seminar, 77% of providers felt like they prescribed fewer antibiotics for acute bronchitis.

Implications for Practice: When compared to baseline data, there were no significant differences in antibiotic prescribing, suggesting that providers were prescribing antibiotics judiciously at baseline. Variations in provider coding may have impacted the results. Recommendations for the future include extending the data collection period and obtaining information about narrow and broad-spectrum antibiotic use to identify trends and provider education needs.

Introduction

Problem Description

In the United States, "at least 2 million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die each year as a direct result of these infections" (Centers for Disease Control and Prevention [CDC], 2016a). Antibiotic resistance is a serious public health problem that results from microbial adaptation, which enables bacteria to resist the effects of antibiotics and cause severe illness (CDC, 2016a). According to the CDC (2016b), antibiotic resistant infections lead to poor health outcomes and increased care costs.

Available Knowledge

The increased incidence of antibiotic resistance over recent decades is partly due to inappropriate outpatient antibiotic use, especially for uncomplicated acute respiratory tract infections, such as acute bronchitis (McDonagh et al., 2016). The majority of cases have a non-bacterial cause, resulting in a lack of efficacy of antibiotic treatment (Oregon Health Authority [OHA], 2016c). As a result, current guidelines do not recommend the use of antibiotics for acute bronchitis (McDonagh et al., 2016). However, adults in Oregon are more likely to receive antibiotic treatment for bronchitis and sinusitis, compared to other conditions (OHA, 2016a). In addition, the OHA found that "antibiotics were prescribed in more than 75% of patients diagnosed with bronchitis, approximately 60% of which were broad-spectrum" (Thomas, Richards, Van Winkle, Ward, & Leggett, 2013, p. 10).

Literature Review

The Cumulative Index to Nursing and Allied Health Literature (CINAHL) database was searched, using key phrases such as, "interventions for antibiotic stewardship," "interventions to reduce unnecessary antibiotic prescribing," and "interventions to improve antibiotic prescribing

in ambulatory care." Articles located on the websites for the CDC and Oregon Alliance Working for Antibiotic Resistance Education (AWARE) were also reviewed. According to a quasi-experimental study by Vinnard et al. (2013), providers who received educational training demonstrated a reduction in antibiotic prescribing, from 43% pre-intervention to 33% post-intervention (Vinnard et al., 2013). In a cluster-randomized trial of decision support strategies for reducing antibiotic use in the treatment of acute bronchitis, researchers found that printed decision support strategies were less costly and more effective than usual care and computer decision support (Michaelidis, Kern, & Smith, 2015). Lastly, a recent systematic review found that communication skills training for providers, which is similar to motivational interviewing, was one of the most effective interventions to decrease unnecessary use (Drekonja et al., 2015).

The literature also demonstrated that multi-faceted interventions were more effective than single tools (Gonzales et al., 2013). There were no time recommendations for education seminars or reported differences between single and multiple education sessions on antibiotic prescribing rates. However, the quality of the education was important to impact change. According to Ranji et al. (2008), interactive provider education was more effective than passive education. The findings from the literature review were incorporated into the intervention.

Selection of Intervention

The practice need was identified in collaboration with the medical director and providers at the health center where the intervention took place. The medical director expressed interest in participating in a project that increased provider knowledge about antibiotic resistance and stewardship through appropriate prescribing practices, especially since the health center did not have policies related to antibiotic prescribing, provide continuing education on the subject, or track antibiotic use.

In an effort to evaluate the level of interest among providers, AWARE, a statewide coalition funded by the CDC, presented introductory information about the incidence of antibiotic resistance in Oregon and evidence-based strategies from the literature to address the problem (OHA, 2016b). These strategies, which have been proven to enhance antibiotic stewardship, included provider education, motivational interviewing (MI), "Wait and See Prescription" (WASP) approach, and the implementation of a clinical decision support (CDS) tool within the electronic health record (EHR). Other strategies included audit and feedback and patient education materials. After the presentation, providers were encouraged to complete an online survey, which consisted of four questions, to determine their needs.

In total, there were 17 survey responses that yielded important information. The first question stated, "Would you be interested in participating in an intervention based project that evaluates antibiotic prescribing practices, with the goal of reducing unnecessary antibiotic use?" There were 14 people that responded, "yes," while three responded "no." The second question asked those who responded "no" to provide a brief explanation for their response or to list another area of interest. These providers expressed concerns about time constraints and their desire to focus on newly implemented protocols.

The third question identified a focus for the practice improvement project. The question stated, "What condition would you like the project to focus on?" There were 10 respondents who selected bronchitis, which represented the majority. Finally, the fourth question stated, "What intervention(s) would you like to be included in the project?" The most preferred intervention for the project was a CDS tool in the EHR. Despite interest, this option was not feasible due to compatibility issues with the EHR. Provider responses also indicated interest in patient education materials, WASP, audit and feedback, MI training, and a 30-minute provider education seminar.

These responses helped to further narrow the intervention, which ultimately consisted of a 30 minute provider education seminar with information about a printed decision support (PDS) tool, WASP, and MI training. Overall, the online survey identified and validated the practice need, while also increasing support for the project by incorporating provider preferences.

Specific Aims

The intervention aimed to increase provider acceptability, implementation, and perceived usefulness of current guidelines and evidence-based methods, as well as decrease antibiotic prescribing rates and use of broad-spectrum antibiotics for acute bronchitis. The overall goal of the practice improvement project was for 60% of providers to integrate guidelines and evidence-based methods from the intervention into practice, as well as for the perceived and actual prescribing rates to be less than those before the intervention.

Methods

Ethical Considerations

Prior to implementation, approval was obtained from the University of Portland Institutional Review Board (IRB). The providers at the health center were also provided an information consent form that explained the practice improvement project. The form clearly communicated that participation was voluntary and would not affect their employment.

Intervention

The intervention consisted of a one-time, 30-minute provider education seminar, which was held, three months after the introductory meeting. During the seminar, the medical director of AWARE, who is a physician, provided an informational lecture about antibiotic stewardship and management of bronchitis using the PDS guideline algorithm and WASP method. At the end of the session, providers were given a WASP informational tool that contained a summary of the

information presented during the seminar. The tool was also posted on the "improvement board" and in staff bathrooms. In addition, a qualified and experienced AWARE representative provided introductory information about MI. Providers were offered informational brochures to facilitate use with patients. The involvement of AWARE increased provider engagement and enhanced the overall experiences, as they were provided with a variety of educational materials. The medical director of AWARE was able to relate to the challenges expressed by the providers during the seminar, which facilitated the process.

Effectiveness of Intervention

The effect of the intervention was monitored through eight weeks of data collection, using two different methods. One method consisted of a paper-based provider survey at two months post-intervention to evaluate the acceptability and implementation of practice guidelines into practice, as well as the perceived usefulness of the evidence-based methods.

The second method used ICD-10 codes from the electronic health record to extract monthly pre-intervention and post-intervention antibiotic prescribing data. After identifying 12 different codes for acute bronchitis, inclusion criteria were established, consisting of patients who were 18 years and older. If patients met the criteria, then the data analyst performed a chart review to identify whether an antibiotic was prescribed. The implementation intervention strategy included monthly check-ins with the medical director and data analyst.

Measures

There were four outcomes identified for the intervention. The first outcome was the acceptability and use of the WASP method, PDS algorithm, and MI techniques. The associated outcome measure was the proportion of providers who used these strategies. The second outcome was the perceived antibiotic prescribing rate for patients diagnosed with acute

bronchitis. The associated outcome measure was the proportion of providers who perceived to prescribe fewer antibiotics for acute bronchitis since the intervention. The third outcome related to the perceived type of antibiotic prescribed, which examined the use of narrow-spectrum and broad-spectrum antibiotics. The associated outcome measure was the proportion of providers who perceived to prescribe fewer broad-spectrum antibiotics for acute bronchitis following the intervention. The fourth outcome measure was the actual antibiotic prescribing rate from the EHR. The associated outcome measure was the number of antibiotics prescribed for acute bronchitis, which was derived from selected ICD-10 codes. The actual type of antibiotic prescribed was another intended outcome from the intervention, which was supposed to be obtained through chart review. However, no information was reported on this outcome.

The process data for the intervention was based on the perceived usefulness of methods in reducing antibiotic use. The associated measure was the proportion of providers who perceived the methods to be helpful in reducing unnecessary antibiotic prescribing for acute bronchitis. There was additional space provided for providers to comment on how the methods worked or did not work.

Results

There were 11 providers at the health center, comprised of six physicians, four nurse practitioners, and one physician assistant. However, not every provider attended the education seminar. In total, there were nine completed surveys, which revealed that 77% (n=7) of providers accepted and used the WASP method, 66% (n=6) of providers accepted and used the PDS algorithm, and 44% (n=4) of providers accepted and used MI. The goal for 60% of providers to accept and use the evidence-based methods from the education seminar was achieved for the WASP method and PDS algorithm, but not for MI.

The perceived usefulness of the methods was determined by a survey question that asked providers to rate the helpfulness of each method. The possible responses were "Very Helpful," "Somewhat Helpful," or "Not Helpful." According to the results, four providers reported the WASP method to be "Very Helpful," while five providers reported the WASP method to be "Somewhat Helpful." There was one provider comment about the perceived usefulness of the method, which stated, *"Depends on how likely I think [patients] are to follow up if not improving."* For the PDS Algorithm, six providers reported the method to be "Very Helpful," while two providers reported the method to be "Somewhat Helpful." There was one "NA" response. Lastly, three providers reported MI to be "Very Helpful," while three providers reported the method to be "Somewhat Helpful." There were three blank responses and one provider comment, which indicated their passion for MI, especially with patients who have drug and alcohol problems.

The perceived antibiotic prescribing rates, including the use of broad-spectrum antibiotics were also evaluated. Since the education seminar, 77% (n=7) of providers felt like they prescribed fewer antibiotics for acute bronchitis, achieving the goal for perceived prescribing rates to be less than those before the intervention. Five providers reported that they had not prescribed antibiotics for acute bronchitis since the education seminar, while four providers reported only "occasionally" prescribing antibiotics for acute bronchitis. When providers did prescribe antibiotics for acute bronchitis, eight providers reported not prescribing a broad-spectrum antibiotic, representing a decrease in the perceived prescribing of broad-spectrum antibiotics.

In the first month of data collection, there were no codes recovered from the EHR. In an effort to capture additional data, the code for "Acute Respiratory Infection, Unspecified" (J06.9)

was added, which resulted in 33 codes, including one associated with antibiotic use. However, chart review indicated that the antibiotic was prescribed for a urinary tract infection. As a result, there were no antibiotics prescribed in the first month. In the second month of data collection, 27 codes were identified with one antibiotic prescribed. When these results were compared to baseline data, there were no significant differences in antibiotic prescribing for acute bronchitis, suggesting that providers were prescribing antibiotics judiciously at baseline. Appendix A describes the pre-intervention and post-intervention antibiotic prescribing rate data in relation to the number of codes identified for acute bronchitis. The actual type of antibiotics prescribed (narrow versus broad-spectrum) was not reported or measured.

Discussion

Interpretation

The WASP method was used the most by providers, but the PDS algorithm was perceived to be more helpful. In contrast, MI was used the least and perceived to be the least helpful at decreasing unnecessary antibiotic use. However, one provider indicated that MI was used more frequently and perceived to be more helpful with chronic alcohol and drug use. Additional training may be needed to help providers understand the applicability of MI to unnecessary antibiotic use.

Initially, there were no codes identified for October, which potentially indicates variations in provider coding from the ICD-10 codes selected. As a result, the codes used for data collection may have been limited, decreasing the actual number of codes identified. Another possibility for this discrepancy is the timing of the data collection period, which extended from October to November. Due to the fact that data collection occurred at the beginning of the "season," the timing of the intervention may have resulted in a low number of patients who

presented with acute bronchitis and therefore, a low number of prescribed antibiotics. However, the timing of the intervention has the potential to positively impact provider prescribing practices as more patients seek care during the winter months for symptoms of acute bronchitis.

Cost Information

The intervention was cost-effective for the health center. The seminar training services and provider/patient resources were provided at no cost by AWARE, which receives funding from the state of Oregon and CDC. Additionally, the seminar was held during a scheduled monthly provider meeting and did not require overtime or affect productivity. The use of a PDS tool instead of a computerized version further decreased expenses for the health center.

Limitations

There were several imitations of the practice improvement project, including a data discrepancy between the EHR and survey responses, which decreased the validity of the results. Provider bias and the use of a non-validated questionnaire may have contributed to this discrepancy. There seemed to be some confusion among providers about the questionnaire that caused some to comment on the education seminar experience, rather than the helpfulness of the evidence-based methods in reducing unnecessary antibiotic prescribing for acute bronchitis. The use of a validated questionnaire may have helped to yield appropriate provider responses. Lastly, the use of limited inclusion criteria due to reduced EHR capability failed to acknowledge disease complexities that warrant antibiotic use based on clinical judgement.

Conclusion

Due to the fact that acute bronchitis is more prevalent between October and March, the data collection period needs to be extended through an entire “season” to identify trends and education needs. After identifying needs, AWARE could provide a focused follow-up education

session to help sustain the use of guidelines and evidence-based methods. In order to accurately measure unnecessary antibiotic prescribing for acute bronchitis in the future, the most commonly used ICD-10 codes need to be identified. A recommendation for future research is to obtain information about narrow and broad-spectrum antibiotic use to further identify needs, as well as reduce inappropriate prescribing practices that contribute to antibiotic resistance.

Funding Information

No funding was received for this practice improvement project.

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Appendix A

Pre-Intervention and Post-Intervention Antibiotic Prescribing Rate Data from EHR