

Impact of an Educational Intervention to Improve Antibiotic Prescribing for Nurse Practitioners in a Pediatric Urgent Care Center

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ABSTRACT

Background: Up to 21% of pediatric visits result in an antibiotic prescription, and a large portion of these are unnecessary.

Objective: To determine if educational sessions would reduce inappropriate antibiotic use.

Methods: Intervention study evaluating antibiotic prescribing following educational sessions for urinary tract infection,

skin and soft tissue infection, pharyngitis, upper respiratory tract infection, acute otitis media, and acute bacterial sinusitis.

Results: A total of 26 out of 43 (60%) nurse practitioners in 4 urgent care centers were enrolled in the study. The rate of inappropriate antibiotic use among all conditions was 10% before and 8% after the intervention ($p = .02$). A decrease in inappropriate antibiotic prescribing was seen after the educational session ($p < .01$). The most common reasons for inappropriate antibiotic prescribing were *too broad* (41%), *wrong dosage* (22%), and *not indicated* (17%).

Conclusions: Educational sessions led to improvement in overall inappropriate antibiotic use. Additional stewardship interventions are needed to further reduce unnecessary antibiotic use. *J Pediatr Health Care.* (2016) ■, ■-■.

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Conflicts of interest: None to report.

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KEY WORDS

Antimicrobial Stewardship Program, nurse practitioner, pediatric, urgent care center

Inappropriate antibiotic use increases health care costs, exposes patients to potential unnecessary adverse reactions, and promotes antibiotic resistance. Studies have shown that since the early 1990s, a significant reduction in antibiotic prescribing in the outpatient setting has occurred (McCraig, Besser, & Hughes, 2003). Concurrent with this reduction, however, has been a significant increase in the prescribing of

broad-spectrum macrolides and quinolones (McCraig et al., 2003). Additionally, the decrease in outpatient antibiotic use has plateaued, and newer studies suggest continued inappropriate prescribing among children treated for respiratory conditions (Hersh, Shapiro, Pavia, & Shah, 2011; Vaz et al., 2014).

Antimicrobial stewardship interventions primarily targeting physicians have been successful. Educational programs, audit and feedback, and other behavior economic approaches have improved antimicrobial prescribing in the ambulatory setting (Andrews et al., 2012; Gerber et al., 2013a; Meeker et al., 2014). However, in pediatrics 8% of all ambulatory visits are evaluated by advanced practice providers, and this number is increasing (Hing & Uddin, 2011). Therefore, more data are needed on the impact of stewardship interventions with advanced practice providers.

Nurse practitioners (NPs) play a critical role in patient care and are frequent prescribers of antibiotics. In 2014, data from the American Association of Nurse Practitioners showed that there are over 189,000 NPs licensed in the United States who write an average of 19 prescriptions a day (Manning, 2012). Although this does not specify how many are for antibiotics, it has been shown that antibiotics are the most common prescription for children ages 0 to 11 years (Chai et al., 2012). Data suggest that most NPs are concerned about antibiotic resistance and agree that appropriate antibiotic use would decrease resistance. However, NPs have a paucity of knowledge regarding the treatment of more resistant bacterial infections (Abbo, Smith, Pereyra, Wyckoff, & Hooton, 2012). The objective of this study was to determine if educational sessions provided by pediatric infectious diseases specialists would reduce inappropriate antibiotic prescribing among NPs in pediatric urgent care centers (UCCs) and to identify predictors of antibiotic prescribing.

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METHODS

Study Design

A pre-/postinterventional study was conducted to evaluate the impact of antibiotic appropriateness education for NPs at four UCCs affiliated with a free-standing children's hospital. Appropriate antibiotics were evaluated for the following conditions: urinary tract infection (UTI), skin and soft tissue infection (SSTI), pharyngitis, and upper respiratory tract infection (URI), which included acute otitis media (AOM) and acute bacterial sinusitis (ABS). The goal of this study was to decrease the number of inappropriate antibiotic prescriptions. Institutional review board approval was obtained.

Participants

A convenience sample was obtained from NPs who work in the UCC. NPs gave consent to allow assessment of antibiotic prescribing for specific conditions before and after the intervention. Patients were included in the study if they had one of the following conditions: UTI, pharyngitis, SSTI, URI, AOM, or ABS. Exclusion criteria included any NP shifts that occurred in the emergency department, if the patient required hospital admission, or if the patient did not have one of the inclusion diagnoses.

Setting

The study was conducted at four UCCs affiliated with a free-standing children's hospital with a combined 80,000 UCC visits annually. The UCC sites include both urban and suburban locations.

Intervention

Members of the institution's Antimicrobial Stewardship Program team provided 30-minute educational sessions for each of the selected diagnoses. The educational sessions used evidence-based guidelines and a local antibiogram to provide specific recommendations for the best prescribing practices. These practices included high-dose amoxicillin for first-line therapy for AOM, standard-dose amoxicillin for confirmed group A β -hemolytic streptococcal infection, amoxicillin or amoxicillin-clavulanate acid for sinusitis, cefdinir for UTI, and no antibiotics for viral infection. For SSTI, antistaphylococcal therapy was based on clinical presentation and patient history of methicillin-resistant *Staphylococcus aureus*. Therefore, cefazolin, clindamycin, and trimethoprim/sulfamethoxazole were considered appropriate depending on patient history.

Measures and Data Collection

Patients were identified by using *International Classification of Diseases, Ninth Edition, Clinical Modification* (2011) codes for UTI, SSTI, pharyngitis, URI, AOM, and ABS (Centers for Disease Control and Prevention, 2011). Antibiotic appropriateness was determined based on the recommendations presented at the educational sessions taken from published guidelines. Chart review was performed at two preintervention time points (3 months and 1 month before educational sessions) and three postintervention time points (1 month, 3 months, and 9 months after educational sessions).

The primary outcome, inappropriate antibiotic prescribing rate, was determined as the number of patients in a given month who received inappropriate antibiotic therapy over total patients who received an antibiotic prescription for each condition. By collecting background incidence, we expected to have data that show whether prescribing during our postintervention year was dramatically lower than in the preceding year. NPs who attended the educational sessions were then compared with those who did not attend the sessions.

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