

Antibiotic Duration for Skin and Soft Tissue Infections in Pediatric Urgent Care

Urgent message: Approximately one quarter of pediatric ambulatory visits result in antibiotic prescriptions, with over one third of those exceeding guideline-recommended durations. Factors that influence urgent care providers toward longer durations have not been studied previously.

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Abstract

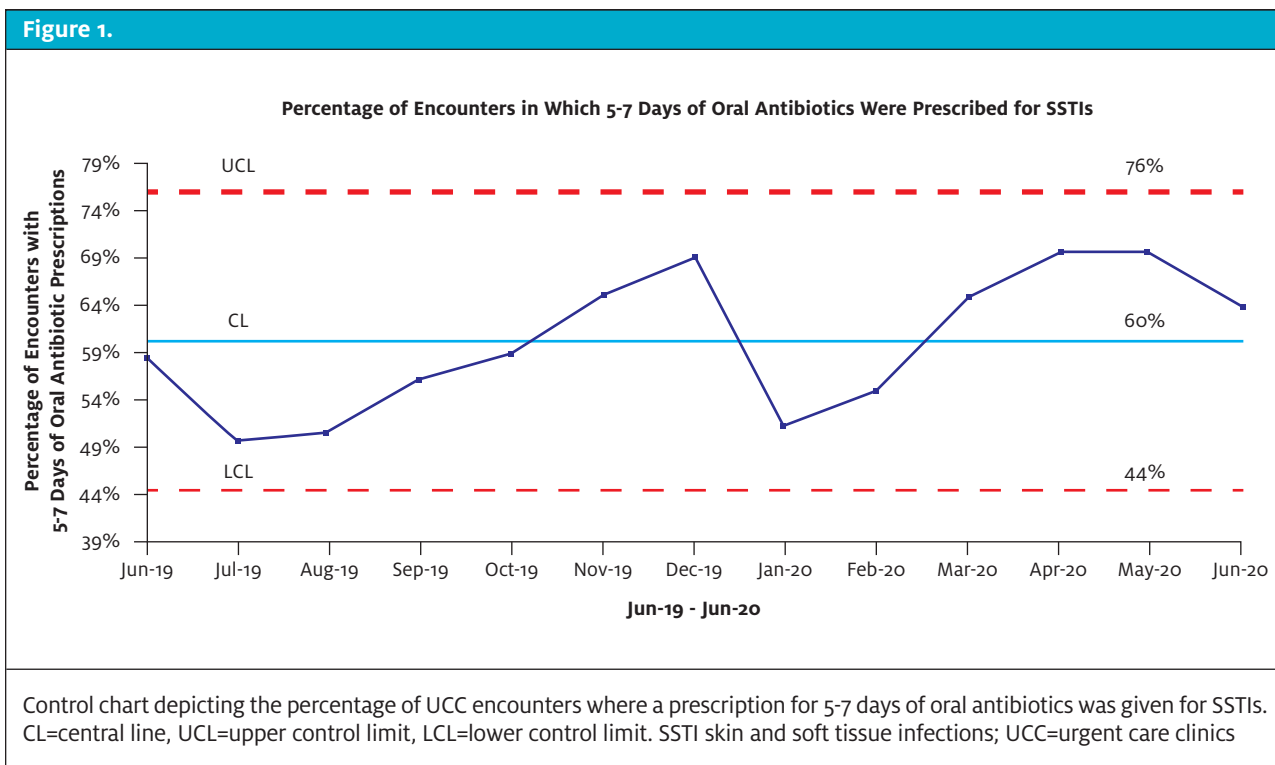
Objective: National guidelines recommend a 5–7-day course of antibiotics for most skin and soft tissue infections (SSTIs). Our goal was to evaluate the baseline rate of oral antibiotic duration for SSTIs in our pediatric urgent care clinics (UCCs) and interrogate factors that influence providers towards longer durations.

Methods: We evaluated all patient encounters with a diagnosis of SSTIs from three pediatric UCCs between June 2019 and June 2020. Data included patient age, concomitant diagnoses, antibiotics prescribed, and their duration. We excluded encounters if the patient was younger than 3 months of age, transferred to the emergency department or admitted, no oral antibiotics were prescribed, or if there was a concurrent diagnosis requiring antibiotics. We also sent out a 22-question survey to urgent care providers to gain an understanding of prescribing habits, focusing on factors prompting longer antibiotic courses.



Results: We reviewed 2,575 encounters in our study period, out of which 2,039 (79.2%) met our inclusion criteria. Of those, 822 (40.3%) included an oral antibiotic prescription for greater than 7 days while 1,181 (57.9%) included an oral antibiotic prescription for 5-7 days. The survey was sent to 50 providers, with 27 responding (a 54% response rate). Barriers for shorter treatment courses included concern for acute rheumatic fever development, parental pressure, fear of complica-

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tions, and accustomed antibiotic duration.

Conclusion: Forty percent of children with SSTIs seen in our UCCs received unnecessary long courses of antibiotics. Antibiotic duration would be a good target for future quality improvement interventions.

Introduction

Antimicrobial stewardship programs (ASPs) in the inpatient setting have successfully refined antibiotic prescribing habits leading to advances in patient safety and improved outcomes.¹ Approximately one quarter of pediatric ambulatory visits result in antibiotic prescriptions²; over a third of these exceed guideline-recommended durations.³

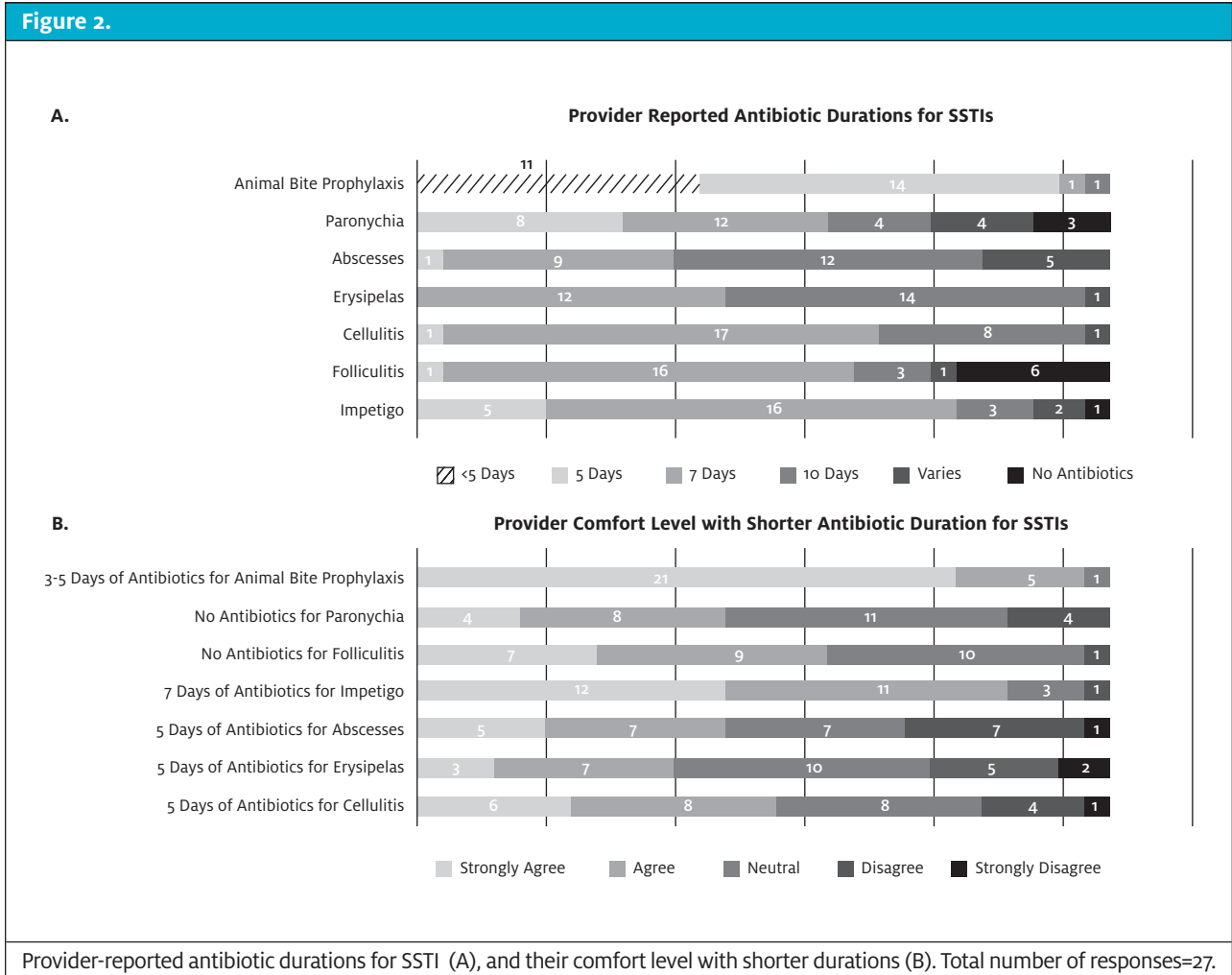
In their joint statement, the American Academy of Pediatrics and the Pediatric Infectious Diseases Society identified outpatient pediatrics, including urgent care clinics, as an important target of ASP initiatives.⁴ Skin and soft tissue infections (SSTIs) are the second most common diagnosis leading to pediatric antibiotic prescriptions in the outpatient setting, after respiratory diagnoses.² Multiple studies have shown that a short (5–7-day) course of antibiotics is sufficient for children with SSTI,⁵⁻⁸ and current guidelines recommend 5–7 days for most diagnoses^{9, 10}; however over 75% of chil-

dren diagnosed with SSTI received a prolonged >7 days of oral antibiotics.^{3, 9}

In this study, we aimed to evaluate the antibiotic duration appropriateness for children seen in our pediatric urgent care clinics (UCCs) with SSTIs, and to explore factors that influence providers toward longer durations. In our effort to improve outpatient antimicrobial use in our institution, these data were used to determine whether SSTI antibiotic durations would be a good target for future quality improvement (QI) interventions.

Methods

Our organization has three pediatric UCCs located throughout a midwestern metropolitan area with over 90,000 encounters a year. The UCCs are staffed by board-certified general pediatricians and advanced-practice registered nurses. We conducted a retrospective chart review of all UCC visits with a final diagnosis of SSTI (**Appendix 1**) between June 2019 and June 2020. We collected patient and clinical demographics, including age, weight, concomitant diagnoses, antibiotics prescribed, dose, duration, and any return visits with a diagnosis of SSTIs within 14 days. These data were obtained from the electronic health record via International Classification of Diseases (ICD) 10 codes for common SSTIs and were then validated through chart



review. We excluded encounters when patients were admitted or transferred to the emergency department, patients were <90 days of age or >21 years of age, no antibiotics or only topical antibiotics were prescribed, or patients had concomitant diagnoses that may require antibiotics.¹¹

We reviewed return visits to determine the outcome of the visit. If a patient returned for an SSTI such as cellulitis or abscess and was prescribed a new antibiotic, both their original encounter and the return encounter were counted. If patients did not receive a new antibiotic prescription or were only prescribed a topical antibiotic, the return encounter was excluded.

In addition, we developed an anonymous 22-question provider survey using REDCap to better understand prescribing habits, particularly focusing on factors prompting administration of longer antibiotic courses (Appendix 2).

This survey included a mix of questions including evaluation of provider comfort level with diagnosing and treating SSTIs and with prescribing short courses of antibiotics for SSTIs, and evaluation of their current practice with antibiotic duration for SSTIs. We also provided free text boxes for providers to expand on factors that may prompt longer antibiotic durations. The survey was evaluated by four urgent care providers for clarifications and feedback before it was deployed by email to all UCC providers in mid-July 2020. We used descriptive statistics to share our results, and control charts to display month-to-month data.

This study received exempt status by our institutional review board.

Results

During our study period, we reviewed 2,575 individual encounters. We excluded 536 (20.8%) patients; 66 were

admitted or transferred to the emergency department, 15 were younger than 90 days of age, 68 received no antibiotic prescription, 328 only received topical antibiotic prescriptions, and 59 had concomitant diagnoses that may require antibiotics. Our final analysis included 2,039 encounters.

Most common antibiotics prescribed included cephalexin, clindamycin, and trimethoprim-sulfamethoxazole. Of those, 1,181 (57.9%) included an oral antibiotic prescription for 5-7 days with a monthly mean of 60% (control limits: 44%-76%) on the control chart (**Figure 1**), while 822 (40.3%) included an oral antibiotic prescription for greater than 7 days with a mean of 38% (control limits 21%-55%). We observed some variation in our duration data, but no special cause variation was identified.

There were 27 (1.3%) total return visits to the UCCs for SSTIs over our study period. Of these, only 13 (0.6%) visits resulted in a change in antibiotics, most commonly with the addition of methicillin-resistant *S aureus* coverage (eg, switch from cephalexin to clindamycin for cellulitis).

The survey was sent to 50 UCC providers, with 27 responding (54% response rate). Providers' reported duration of antibiotic therapy for common SSTI and their comfort level with short durations are included in **Figure 2**. Only five (19%), seven (26%), and eight (29%) providers expressed being uncomfortable with a 5-day treatment course for cellulitis, erysipelas, and abscesses, respectively. Free text responses for barriers for shorter treatment courses included the following: four (15%) providers expressed most comfort with their accustomed antibiotic duration, two (7%) were concerned about treatment failures, two (7%) were concerned about parental pressure, and two (7%) were concerned about the development of acute rheumatic fever with shorter antibiotic courses.

Discussion

At our pediatric UCCs, 40% of patients received inappropriately prolonged courses of oral antibiotics for SSTIs, placing them at risk for adverse drug events, development of multi-drug-resistant organisms, and increased healthcare costs.¹

This is not unique to our institution; in fact, a broad evaluation of provider prescribing practices across the United States revealed that approximately 93% of pediatric patients receive >5 days of antibiotics for cellulitis.² Other pediatric institutions have reported rates of more than 75% of antibiotic prescriptions with prolonged duration for SSTIs.¹²

Antimicrobial stewardship (AS) interventions have been shown to improve clinician antibiotic choice, dosing, and duration for respiratory diagnoses such as acute otitis media, upper respiratory tract infections, and pharyngitis¹³; however, studies evaluating the effect of AS interventions on the treatment of SSTIs in pediatrics are not widely available. Schuler, et al were able to use QI methodology to improve the percentages of patients with SSTIs discharged from the inpatient setting with short courses of antibiotics from 23% to 74%,¹² however there are no studies evaluating QI improvements in the ambulatory setting.

Our provider survey revealed interesting influences on selected antibiotic duration, such as parental pressure and fear of complications including perceived risk of rheumatic fever development.

Parental pressure is a frequently reported factor influencing clinician prescription decisions as seen in a 2015 systematic review.¹⁴ Specific provider concerns regarding parental pressure included fear of the potential for litigation, repeated visits, late night calls, desire for increased patient satisfaction, and avoidance of anxious and angry parents.¹⁴

The specific concern regarding the development of acute rheumatic fever in relation to Group A *Streptococcus* skin infections is largely unfounded, as in developed countries this is a very rare phenomenon with only two cases reported in the literature.¹⁵ In addition, initial studies regarding prevention of acute rheumatic fever occurred in epidemic settings where the incidence of the disease was higher than it currently is in the United States.¹⁶ This suggests that provider education can be an important aspect of AS interventions.

Limitations

Our study has limitations. First, encounters were restricted to UCCs of a single pediatric institution so results may not be generalizable to other locations. Second, we did not include virtual encounters, which have risen in utilization since the COVID-19 pandemic. Third, given its retrospective nature, accuracy of data relies on correct chart documentation. Additionally, our survey included a small number of providers and may not be reflective of all providers' prescribing behaviors or influences.

Conclusion

Overall, our study illustrates the need for AS interventions aimed at improving antibiotic durations for pediatric SSTIs in the urgent care setting. While we did see some variation in our numbers over the year of analysis,

there is still opportunity for improvement in decreasing the duration of antibiotics. Based on these findings, we are embarking on a QI project to increase the percentage of patients receiving 5-7 days of oral antibiotics for SSTIs in our pediatric UCCs by addressing the specific barriers we identified via our provider survey. ■

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Appendix 1. ICD-10 Codes Utilized to Capture Patients with a Final Diagnosis of SSTIs		
Lo8.9- Local infection of the skin and subcutaneous tissue, unspecified	Lo2.31- Cutaneous abscess of buttock	S91.059A- Open bite, unspecified ankle, initial encounter
Lo3.90- Cellulitis, unspecified	Lo1.00- Impetigo, unspecified	S01.95XA- Open bite of unspecified part of head, initial encounter
Lo3.319- Cellulitis of trunk	Lo1.03- Bullous impetigo	S61.451A- Open bite of right hand, initial encounter
Lo3.113- Cellulitis of right upper limb	Lo1.01- Non-bullous impetigo	S61.452A- Open bite of left hand, initial encounter
Lo3.114- Cellulitis of left upper limb	L73.9- Follicular disorder, unspecified	S51.851A- Open bite of right forearm, initial encounter
Lo3.115- Cellulitis of right lower limb	Lo2.12- Folliculitis/Furuncle of neck	S51.852A- Open bite of left forearm, initial encounter
Lo3.116- Cellulitis of left lower limb	Lo2.22- Folliculitis/Furuncle of trunk	S81.859A- Open bite, unspecified lower leg, initial encounter
Lo3.317- Cellulitis of buttock	Lo2.42- Folliculitis/Furuncle of limb	S91.051A- Open bite, right ankle, initial encounter
Lo2.91- Cutaneous abscess, unspecified	Lo2.32- Folliculitis/Furuncle of buttock	S91.052A- Open bite, left ankle, initial encounter
Lo2.419- Cutaneous abscess of limb, unspecified	Lo3.0- Cellulitis and acute lymphangitis of finger and toe/paronychia	S81.851A- Open bite, right lower leg, initial encounter
Lo2.415- Cutaneous abscess of right lower limb	Lo3.031- Cellulitis of right toe	S81.852A- Open bite, left lower leg, initial encounter
Lo2.416- Cutaneous abscess of left lower limb	Lo3.032- Cellulitis of left toe	W50.3XXA- Accidental bite by another person, initial encounter
Lo2.413- Cutaneous abscess of right upper limb	Lo3.011- Cellulitis of right finger	S60.479A- Other superficial bite of unspecified finger, initial encounter
Lo2.414- Cutaneous abscess of left upper limb	Lo3.012- Cellulitis of left finger	
Lo2.214- Cutaneous abscess of groin	Lo3.019- Cellulitis of unspecified finger	
Lo2.215- Cutaneous abscess of perineum	Lo3.039- Cellulitis of unspecified toe	
Lo2.219- Cutaneous abscess of trunk, unspecified	A46- Erysipelas	
	So61.459A- Open bite of unspecified hand, initial encounter	
	S71.159A- Open bite, unspecified thigh, initial encounter	
	S51.859A- Open bite of unspecified forearm, initial encounter	

Appendix 2. Pre-Intervention UC Provider Survey

Confidential. Please complete the survey below. Thank you!

1. What is your degree designation?
 MD/DO
 APRN
 Other
2. How many years have you been in practice? < 5
 5-10
 10-15
 >15
3. At what UCC location(s) do you primarily work
 Blue Valley Urgent Care
 East Urgent Care
 North Urgent Care
 (Please check all locations you work at)
4. Have you practiced in a private setting?
 Yes, currently
 Yes, in the past
 No
5. How often do you work in the urgent care?
 Multiple shifts per week
 Once a week
 2-3 times per month
 Once a month
 Once every few months
 Very comfortable
 Comfortable
 Neutral
 Uncomfortable
 Very uncomfortable
6. How comfortable are you with diagnosing skin and soft tissue infections?
 If you selected uncomfortable or very uncomfortable, please explain why

 Very comfortable
 Comfortable
 Neutral
 Uncomfortable
 Very uncomfortable
7. How comfortable are you with treating skin and soft tissue infections?
 If you selected uncomfortable or very uncomfortable, please explain why

8. What is the oral antibiotic duration you most commonly prescribe for impetigo?
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

9. What is the oral antibiotic duration you most commonly prescribe for folliculitis?
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

10. What is the oral antibiotic duration you most commonly prescribe for cellulitis?
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

11. What is the oral antibiotic duration you most commonly prescribe for erysipelas?
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

12. What is the oral antibiotic duration you most commonly prescribe for abscesses? 5 days
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

13. What is the oral antibiotic duration you most commonly prescribe for paronychia?
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

14. What is the oral antibiotic duration you most commonly prescribe for animal bite prophylaxis?
 Less than 5 days
 5 days
 7 days
 10 days
 Varies
 No antibiotics
 If varies, please explain why

15. Are there any factors that would prompt you to prescribe a longer duration for a patient? If yes, please explain

 Please consider the following statements and select your answer based on how strongly you agree or disagree with the statement
 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
16. I would feel comfortable with prescribing only 5 days of antibiotics for cellulitis
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
17. I would feel comfortable with prescribing only 5 days of antibiotics for erysipelas
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
18. I would feel comfortable with prescribing only 5 days of antibiotics for abscesses
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
19. I would feel comfortable with disagree prescribing only 7 days of antibiotics for impetigo
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
20. I would feel comfortable with not prescribing antibiotics for folliculitis
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
21. I would feel comfortable with not prescribing antibiotics for paronychia
 If you selected disagree or strongly disagree, please explain why

 Strongly agree
 Agree Neutral
 Disagree
 Strongly disagree
22. I would feel comfortable with prescribing only 3-5 days of antibiotics for animal bite prophylaxis
 If you selected disagree or strongly disagree, please explain why
