

Effect of Antimicrobial Stewardship Program Guidance on the Management of Uncomplicated Skin and Soft Tissue Infections in Hospitalized Adults

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Abstract

Objective: To assess the effect of an antimicrobial stewardship program (ASP)—bundled initiative on the appropriate use of antibiotics for uncomplicated skin and soft tissue infections (uSSTIs) at 2 academic medical centers in Pittsburgh, Pennsylvania.

Patients and Methods: A retrospective preintervention and postintervention study was conducted to compare management of patients admitted with uSSTIs before and after the implementation of the bundled initiative. The preintervention period was from August 1, 2014, through March 31, 2015, and the postintervention period was from August 1, 2015, through March 31, 2016.

Results: A total of 160 patients were included in the preintervention cohort, and 163 were included in the postintervention cohort. Compared with the preintervention group, the mean duration of therapy decreased (12.5 days vs 8.8 days; $P < .001$) and an appropriate duration of less than 10 days increased in more patients (20.6% [33 of 160] vs 68.7% [112 of 163]; $P < .001$) in the postintervention period. Fewer patients were exposed to antimicrobials with extended gram-negative (44.4% [71 of 160] vs 9.2% [15 of 163]; $P < .001$), anaerobic (39.4% [63 of 160] vs 9.8% [16 of 163]; $P < .001$), and antipseudomonal (16.3% [26 of 160] vs 1.8% [3 of 163]; $P < .001$) coverage. The mean length of stay decreased from 3.6 to 2.2 days ($P < .001$) without an increase in 30-day readmissions (6.3% [10 of 160] vs 4.9% [8 of 163]; $P = .64$). The ASP made recommendations for 125 patients, and 96% were accepted.

Conclusion: Implementation of an ASP-bundled approach aimed at optimizing antibiotic therapy in the management of uSSTIs led to shorter durations of narrow-spectrum therapy as well as shorter hospital length of stay without adversely affecting hospital readmissions.

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Skin and soft tissue infections (SSTIs) are the second most common type of infections leading to hospitalization in the United States and are becoming more prevalent.¹⁻⁵ Given the substantial effect these infections have on health care consumption, it is imperative that evidence-based strategies are implemented to optimize patient outcomes and use of health care resources while limiting

the unintended consequences of unnecessary antibiotic use.

In patients with uncomplicated SSTIs (uSSTIs), 5 to 7 days of antibiotic therapy has been shown to be effective for clinical cure.⁶⁻⁹ However, treatment duration at our institutions and other centers is often inappropriately long, with courses commonly prescribed up to or beyond 2 weeks.¹⁰⁻¹² In addition, aerobic



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gram-positive organisms, namely, *Staphylococcus aureus* and β -hemolytic streptococcal species, are the predominant etiologic pathogens in uSSTIs.^{10,13-20} Regardless, patients are frequently treated with broad-spectrum antibiotic therapy with activity against aerobic gram-negative and anaerobic bacteria.¹⁰⁻¹² The appropriate use of antimicrobials is critical, as unnecessary use is associated with patient harm due to increased drug resistance, adverse drug events and toxicity, and collateral damage including *Clostridium difficile* infection.²¹⁻²⁹ Therefore, reducing the duration of antibiotic therapy and minimizing the use of broad-spectrum therapy represent ideal opportunities to reduce unnecessary antibiotic exposure in hospitalized patients with uSSTIs.

To improve antibiotic use in cases of uSSTIs, our antimicrobial stewardship program (ASP) developed a syndrome-specific bundled intervention as described in the Methods section. The aims of this intervention were to (1) reduce the duration of therapy, (2) reduce the use of antibiotic agents with extended gram-negative and anaerobic coverage, and (3) shorten the hospital length of stay for patients admitted with uSSTIs. In this study, we assessed the effect of this ASP intervention at 2 large teaching facilities.

PATIENTS AND METHODS

Study Setting

Allegheny General Hospital (AGH) is a 631-bed quaternary care teaching facility with approximately 22,000 inpatient admissions yearly. The Western Pennsylvania Hospital (WPH) is a 317-bed community-based teaching hospital with nearly 6800 inpatient admissions annually. Both facilities are located in Pittsburgh, Pennsylvania, and are members of the Allegheny Health Network. The evaluation was approved and granted exempt status from the institutional review board of the Allegheny Health Network, as it was deemed quality assessment and quality improvement.

Study Design

We conducted a retrospective preintervention and postintervention study comparing the management of patients admitted with uSSTIs before and after the implementation of an ASP-bundled initiative. The preintervention period was from August 1, 2014, through March 31, 2015, and

the postintervention period was from August 1, 2015, through March 31, 2016. The findings from the preintervention period have been previously published.¹²

Intervention

After review of the preintervention management of patients admitted with uSSTIs at AGH and WPH, considerable opportunities were exposed to improve antibiotic use. Our ASP assembled a multidisciplinary task force to create a clinical decision-making algorithm for the evaluation and management of SSTIs, which focused primarily on uSSTIs (Supplemental Figure, available online at <http://www.mcpiqjournal.org>). For uSSTIs, we recommended against the use of routine plain films, advanced imaging modalities, blood cultures, serum erythrocyte sedimentation rate, and serum C-reactive protein level. The use of agents with extended gram-negative or anaerobic coverage was specifically discouraged. For patients with nonpurulent uSSTIs, intravenous cefazolin was recommended for empirical therapy. For patients with uSSTIs associated with purulence, we recommended empirical intravenous vancomycin, performing incision and drainage, and obtaining wound gram stain and culture. The recommended total duration of therapy was 7 days for those patients with uSSTIs who experienced improvement within 48 to 72 hours. Adjunct therapy with a nonsteroidal anti-inflammatory agent for 5 days was recommended, unless contraindicated. Elevation of the affected limb for all cases and evaluation for and treatment of tinea pedis for cases involving the lower extremities was also recommended. To ensure adherence to the clinical decision-making algorithm, we used a 3-pronged bundled approach:

1. *Dissemination of the clinical decision-making algorithm* to all medical and house staff via e-mail and as part of our yearly antimicrobial guide (available in print and on our network's intranet). Laminated copies were posted at nursing units, physician work areas, and the internal medicine residency department.
2. *Educational lectures* were presented to internal medicine residency house staff, Internal Medicine medical staff, the Department of Hospitalist Medicine, and the Division of Infectious Diseases.

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