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BRIEF REPORT

Expanding Antimicrobial Stewardship to Urgent Care Centers Through a Pharmacist-Led Culture Follow-up Program

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ABSTRACT

Introduction: Urgent care centers represent a high-volume outpatient setting where antibiotics are prescribed frequently but resources for antimicrobial stewardship may be scarce. In 2015, our pharmacist-led Emergency Department (ED) culture follow-up program was expanded to include two urgent care (UC) sites within the same health system. The UC program is conducted by ED and infectious diseases clinical pharmacists as well as PGY1 pharmacy residents using a collaborative practice agreement (CPA). The purpose of this study was to describe the pharmacist-led UC culture follow-up program and its impact on pharmacist workload.

Methods: This retrospective, descriptive study included all patients discharged to home from UC with a positive culture from any site resulting between 1 January and 31 December 2016. Data collected included the culture type, presence of intervention, and proportion of interventions made under the CPA. Additionally, pharmacist workload was reported as the number of call attempts made, new prescriptions written, and median time to complete follow-up per patient. Data were reported using descriptive statistics.

Results: A total of 1461 positive cultures were reviewed for antibiotic appropriateness as part of the UC culture follow-up program, with 320 (22%) requiring follow-up intervention. Culture types most commonly requiring intervention were urine cultures (25%) and sexually transmitted diseases (25%). A median of 15 min was spent per intervention, with a median of one call (range 1–6 calls) needed to reach each patient. Less than half of patients required a new antimicrobial prescription at follow-up.

Conclusion: A pharmacist-led culture follow-up program conducted using a CPA was able to be expanded to UC sites within the same health system using existing clinical pharmacy staff along with PGY1 pharmacy residents. Service expansion resulted in minimal increase in pharmacist workload. Adding UC culture follow-up services to an existing ED program can allow health systems to expand antimicrobial stewardship initiatives to satellite locations.

Keywords: Antimicrobial stewardship; Collaborative practice agreement; Culture follow-up; Pharmacist; Urgent care

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INTRODUCTION

Antimicrobial resistance stemming from the overuse and inappropriate prescribing of antibiotics has been recognized as a global threat to public health [1]. It is estimated that 30% of antimicrobials prescribed in the outpatient setting are inappropriate [2]. Urgent care (UC) centers have emerged as a way for patients to achieve quick access to healthcare in the ambulatory setting. Nearly 160 million Americans receive care at UC centers each year with 12.6% of outpatient visits resulting in a prescription for antibiotics [2, 3].

Emergency department (ED) culture follow-up programs have been described within health systems as a way to expand antimicrobial stewardship program initiatives to the outpatient setting. When led by a clinical pharmacist ED culture follow-up programs have demonstrated improved time to culture review, improved guideline-concordant antibiotic prescribing, and decreased return visits within 96 h [4–7]. Similar to the ED, antibiotic prescribing in UC centers is primarily empiric, with culture results not usually available for several days following a visit. Prescribing of inappropriate antimicrobials puts patients at risk for clinical failure and subsequent revisit to UC, the primary care provider, or admission to the hospital [8, 9]. Therefore, UC centers represent an important target for antimicrobial stewardship programs to implement process improvements to optimize antimicrobial use.

Here we describe a pharmacist-led UC culture follow-up program conducted using a pharmacist-physician collaborative practice agreement (CPA). We additionally described the volume and type of cultures audited as well as the impact of the UC culture follow-up program on pharmacist workload. The aim of this descriptive report is to raise awareness of avenues for UC stewardship and expansion of ED services within health systems.

METHODS

Culture Follow-up Program Description

This study was conducted at Mercy Health Saint Mary's, a 350-bed community teaching hospital with two affiliated UC sites serving urban Grand Rapids, Michigan. The UC centers are staffed 12-h per day, 7-days per week, and treat more than 32,000 patients each year. The UC culture follow-up program is conducted off-site by 2.0 full-time equivalent (FTE) ED and 1.0 FTE Infectious Disease (ID) clinical pharmacists who staff at the main hospital campus.

The pharmacist-led UC culture follow-up program began in April 2015 following CPA protocol approval by the institution's Pharmacy and Therapeutics Committee, which specifies physician-pharmacist developed, evidence-based, antimicrobial treatment protocols (agent, dose, and duration); it is stratified by disease state and allows for pharmacists to independently conduct patient follow-up for the most common infectious diagnoses utilizing the outlined protocols. The CPA was developed utilizing local susceptibility data as well as national guidelines for common infectious diseases. The UC CPA was modeled off of an existing CPA for the hospital's pharmacist-led ED culture follow-up program, which had been in place since October 2013. The CPA was signed by the ED and ID clinical pharmacists as well as the UC physician director.

All culture types for adult and pediatric patients, with the exception of blood, synovial fluid, and cerebrospinal fluid, are managed under the collaborative practice agreement by a pharmacist. Routine culture results are reviewed Monday–Friday each week with only institution-defined critical results (sexually transmitted infections, strep throat, stool, and positive blood cultures) reviewed during weekend days. Culture results are reviewed via a daily printed report from the institution's Clinical Microbiology Laboratory as well as an electronic print-out of all patients tested for *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, syphilis, human immunodeficiency virus, and herpes simplex virus. Only positive test results are audited by the pharmacist. Positive cultures are reviewed for follow-up interventions based on susceptibility mismatch, positive culture with no antibiotics prescribed at UC visit, need for renal dose adjustment, and drug-drug interactions. Patients with susceptibility mismatch or who did not receive initial antibiotics and have

a subsequent positive urine, wound, or throat culture are assessed via phone by the pharmacist for symptoms prior to prescribing new antibiotic therapy. Under the CPA a new antibiotic prescription is only recommended if a patient has ongoing symptoms at the time of follow-up or if a specific disease state requires treatment regardless of the presence of symptoms (e.g., sexually transmitted infections, asymptomatic bacteriuria in pregnancy). Patients positive for sexually transmitted infections (STIs) are contacted by the pharmacist for notification of results and follow-up counseling as well as the need for treatment. Information regarding all health department-reportable infections were collected by the pharmacist completing culture follow-up and submitted to ED clerical staff for transmission to the health department using a standard form that includes patient information, diagnosis, treatment, and date of notification of results.

The auditing pharmacist is responsible for contacting patients needing follow-up and phoning in or e-scribing new prescriptions as necessary following the protocol outlined in the CPA. The auditing pharmacist additionally provides patient counseling regarding new prescriptions, answers any patient questions, and documents all follow-up activities in the electronic medical record including the amount of time necessary to make the intervention. Patients unable to be reached via telephone after three contact attempts are sent a letter of results notification via certified mail with instructions to call the pharmacist or UC center with any questions. For any culture types falling outside of the collaborative practice agreement (e.g., blood cultures, synovial fluid cultures), the pharmacist will call in the results to the staffing UC provider and work with the provider to develop a follow-up plan.

The expansion of the culture follow-up program to include UC cultures was made possible by including the responsibility as part of the post-graduate year-one (PGY1) pharmacy resident program requirements. The hospital's two PGY1 residents are involved daily in conducting culture audits and initiating follow-up calls to patients under the supervision of the ED or ID pharmacist. The PGY1 pharmacy residents begin training to conduct culture follow-up services in July during their orientation month and rotate through the service as a longitudinal responsibility with approximately 6 months of coverage required for each resident. The training program and advancement to autonomy are tailored to skills of the individual resident. The first week of orientation typically includes the residents shadowing the ED or ID pharmacist during culture follow-up activities; outside of the first week of orientation, the residents conduct all culture audits and independently develop a follow-up plan. These activities are directly supervised by the ED or ID pharmacist preceptor to ensure appropriate interpretation of culture results and CPA compliance. The residents conduct follow-up phone calls to the patient under the direct supervision of a preceptor. No specific scripting is required; however, there are certain elements of each call that are required (e.g., confirming patient identity using approved patient identifiers, symptom assessment, delivery of culture result, patient verbalizes understanding of care plan). A standard template is used for documentation in the electronic medical record; all notes are reviewed for accuracy by the ED or ID pharmacist until the resident demonstrates competency.

Data Collection and Analysis

Data were collected for all patients with culture results reported between 1 January 1 and 31 December 2016 and included the number of cultures reviewed, the proportion and type of cultures requiring intervention, and the number of follow-up interventions able to be made using the CPA. Additionally, pharmacist workload was characterized by the number of call attempts made, new prescriptions written, and median time to complete follow-up per patient. Call attempts included any instance where the pharmacist spent time on the phone, including when patients returned a call after a message was left. Data were presented using descriptive statistics.

Compliance with Ethics Guidelines

This article was approved by Mercy Health Saint Mary's Institutional Review Board with a waiver

of informed consent. It is based on previously conducted studies and does not involve any new studies of human or animal subjects performed by any of the authors.

RESULTS

Over the study period, 1461 positive culture results were reviewed for antibiotic appropriateness as part of the UC culture follow-up program. Of these, 320 (22%) required follow-up intervention. An average of 27 interventions were made per month with 309 (96.5%) interventions made independently by a clinical pharmacist under the UC CPA. The culture types most commonly requiring pharmacist follow-up and intervention were urine cultures (25%), sexually transmitted infections (25%), and streptococcal throat cultures (20%). Of the 320 patients requiring follow-up, 106 (33%) required a new prescription (Fig. 1). Four patients required a revisit to UC for re-evaluation and treatment: three patients for *N. gonorrhoeae* treatment and one because of a severe adverse drug reaction thought to be due to the antibiotic prescribed; this patient was instructed to return to UC for re-evaluation in accordance with the CPA. The majority of STI-positive patients ($n = 57$, 72.1%) needing follow-up required only notification of results and counseling as they had been treated during their index visit.

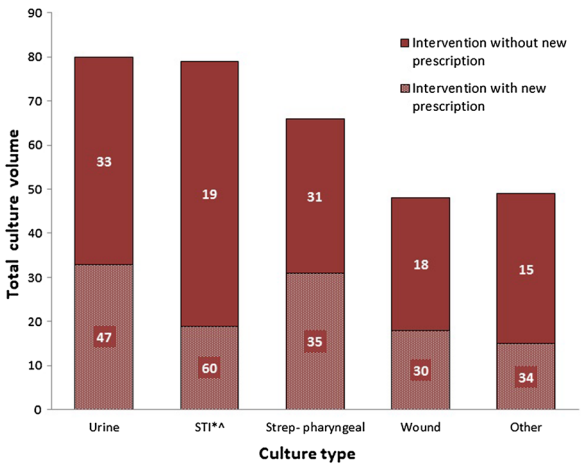

Fig. 1 Cultures requiring interventions and new prescriptions. *STI-sexually transmitted infection; ^STI numbers do not include HSV

There was a median of one follow-up phone call (range 1–6) attempts made by the clinical pharmacists per patient. Twenty-four patients were unable to be reached via telephone and required a registered letter to be sent to the patient for notification of results. For patients needing follow-up, the median pharmacist time spent to conduct follow-up audit, intervention, and documentation was 15 min per patient (range 5–90 min).

DISCUSSION

Over the 1-year study period an average of five positive UC cultures per day were reported for the pharmacy team to review, with 22% of patients requiring follow-up intervention. This is similar to what has been reported with pharmacist-led ED culture follow-up programs with 15–25% of patients requiring follow-up intervention [6, 7]. We additionally found that less than half of patients required a new prescription at follow-up. Unique to our site, our CPA recommends no additional antibiotics be prescribed if patients are asymptomatic at the time of the follow-up call for follow-up of urine cultures, wound cultures, or strep throat cultures. When excluding the 57 patients that required only notification of positive STI results and post-discharge counseling at follow-up, 263 patients were potentially eligible for a new antimicrobial prescription with only 106 (40%) requiring a therapy change. By conducting a follow-up phone interview with each patient or guardian to assess for ongoing symptoms prior to changing therapy, we are able to avoid prescribing additional antibiotics to many patients with positive cultures and antibiotic discordance.

Urgent care sites represent a high-volume ambulatory setting where transitions of care and follow-up may be difficult. In this setting, there may be more pressure for providers to prescribe antibiotics as outpatient follow-up plans may be uncertain. In 2016, the Centers for Disease Control and Prevention (CDC) published core elements for outpatient

antimicrobial stewardship programs, noting that creative approaches to stewardship may need to be used for UC sites [10]. In our health system, we saw the UC sites as an opportunity to expand the reach of our antimicrobial stewardship program further into the outpatient setting using an already established ED program. Additionally, UC centers typically have fewer resources than the emergency department, such as case managers or charge nurses, to assist with completion of outpatient follow-up activities.

Culture follow-up programs can help bridge transitions of care and create an opportunity to provide feedback to providers regarding compliance with antibiotic treatment guidelines. While pharmacist-led culture follow-up programs have been well described in the ED setting, very few data have been published regarding culture follow-up programs or antimicrobial stewardship initiatives for UC sites. Saha and colleagues implemented a multidisciplinary protocol to review pediatric urine culture results for patients discharged from six off-campus pediatric UC sites to assess for opportunities to discontinue unnecessary antimicrobial prescriptions. The process, which involved a nurse and provider, resulted in the review of 910 cultures and an increase in antibiotic discontinuation for negative cultures from 4% pre-intervention to 84% post-intervention [11]. Weddle and colleagues utilized a provider education intervention targeting nurse practitioners working at four pediatric urgent care centers that reviewed appropriate first-line options for treatment of commonly seen infectious conditions. In the post-intervention group, they noted a decrease in inappropriate antibiotic prescribing from 10% to 8% [12].

There are several barriers to UC culture follow-up implementation that may be encountered when new programs are established. Responsibilities of ED pharmacists vary greatly based on the specific needs of the ED they work in, and expansion of culture follow-up efforts may not be feasible because of limited resources and personnel. Our baseline average number of ED cultures for review was 12 per day with a mean of 4 interventions per day. Expansion of the existing culture follow-up program to include the UC centers resulted in an average of five additional cultures reviewed per day with approximately one additional intervention per day. A median time of 15 min was needed for each intervention. With the incorporation of the PGY1 pharmacy residents in conducting follow-up audits and interventions, this service resulted in a minimal increase in ED and ID pharmacist as well as pharmacy resident workload. Annual training of pharmacy residents does temporarily increase the workload of the ED and ID pharmacists as residents undergo direct preceptor supervision, while completing all culture follow-up activities from orientation until achievement of competency is determined by the preceptor. Additional barriers to program implementation include the lack of an on-site contact person and limited interaction of ED and ID pharmacists with UC staff. We attempted to ameliorate this by providing education and resources to guide empiric therapy selection in the form of empiric therapy guidelines and access to local antibiograms. Diagnostic resources may additionally impact culture follow-up services as more sensitive forms of rapid diagnostic tests (e.g., polymerase chain reaction) for certain disease states may not be available at UC centers. As such, cultures reviewed by pharmacists as part of a CPA for a UC should be tailored based on diagnostic tools available at each site.

There are limitations that must be considered regarding this study including the retrospective nature of data collection, which is dependent on accurate documentation. Culture follow-up programs are inherently limited as treatment guidelines do not recommend cultures for all patients receiving antibiotic treatment (i.e., uncomplicated cystitis, well-drained abscess); as a result, these patients may not be reviewed routinely for appropriateness of antibiotic selection, dose, and duration. A method for capturing and providing feedback regarding antimicrobial prescriptions not associated with a culture is still needed. Also, our current CPA focuses on review of positive cultures and does not include review of negative cultures to identify patients for whom antibiotic therapy can be discontinued altogether. Clinical decision support software (e.g., Theradoc, MedMined, Sentri7) may provide a way

for ID and ED pharmacists to monitor antibiotics and intervene in real time with UC providers when inappropriate antibiotics are prescribed. However, these systems typically do not capture data for discharge antibiotic prescriptions, and inappropriate prescriptions could be missed if patients are not ordered their first dose of antibiotic prior to discharge from the UC. Additionally, quick patient turnover times may limit the feasibility of providing real-time feedback to UC from a remote location like the emergency department. Finally, as this was a descriptive report of program methods and follow-up activities, no outcome data were collected. Future study would ideally include a review of patient outcomes including the rate of revisit and hospital admission as compared to baseline data from before pharmacist-led culture follow-up was initiated.

CONCLUSION

A pharmacist-led culture follow-up program conducted using a CPA was able to be expanded to UC sites within the same health system using existing ED and ID pharmacist staff along with incorporation of PGY1 pharmacy residents. This expansion resulted in minimal increase in pharmacist workload. Approximately 20% of patients required follow-up, with less than 50% of patients requiring a new antimicrobial prescription. Including UC sites in culture follow-up programs can allow health systems to expand antimicrobial stewardship services to satellite locations.

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Disclosures. Lisa Dumkow, Thomas Beuschel, and Kasey Brandt have nothing to disclose.

Compliance with Ethics Guidelines. This article was approved by Mercy Health Saint Mary's Institutional Review Board with a waiver of informed consent. It is based on previously conducted studies and does not involve any new studies of human or animal subjects performed by any of the authors.

Data Availability. The data sets during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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