Implementation of Pharmacist-Driven Culture Follow-Up Service in the Emergency Department (ED)

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Primary Intended Outcomes

1. Reduce unnecessary treatment for asymptomatic bacteriuria in patients discharged from the emergency department (ED).
2. Decrease overall antimicrobial length of therapy in patients discharged from the ED with a specific focus on positive urine cultures.

Relevant PAI Recommendations

- **B23.** The following characteristics or activities should be considered essential to pharmacist-provided drug-therapy management in optimal pharmacy practice models:
  - **B23e.** Adjustment of medication doses based on patient response or pharmacokinetic characteristics of the medication.

- **B23j.** Participation in antimicrobial stewardship.

- **B24.** Every pharmacy department should:
  - **B24a.** Identify drug therapy management services that should be provided consistently by its pharmacists.
  - **B24l.** Routinely review hospital or health-system antibiotic resistance patterns.

**Situation Analysis**

Mercy Health St. Rita’s Medical Center is a 52-bed ED servicing approximately 65,000 patients per year in Lima, Ohio. Patients frequently present to the ED with concerns for infection. The suspected source is cultured, if possible, and the patient may be discharged from the ED on an antimicrobial depending on the severity of the infection.

Urinary tract infections are a common infection encountered in the ED that results in patients being discharged directly from the ED on an antibiotic. Unfortunately, a urinalysis may be collected in the ED and a reflex urine culture performed regardless of urinary tract infection symptoms. Asymptomatic bacteriuria is often treated unnecessarily resulting in overutilization of antimicrobials, which can lead to increased antimicrobial resistance, adverse drug effects, and increased cost. The Infectious Diseases Society of America guidelines for adults recommend that the treatment of asymptomatic bacteriuria be avoided unless treatment in the specific patient population has been documented to be beneficial, such as in pregnant women or in patients undergoing urologic interventions. Recommendations for the duration of
antimicrobial therapy for acute uncomplicated cystitis is three to five days and acute complicated cystitis is five to seven days depending on the antibiotic used. \(^2\)

Prior to implementing a pharmacist-driven service to review ED cultures, physicians or advanced practitioners would review the culture results for patients discharged from the ED once they were available. The ED prescriber would determine if a change in therapy was warranted based on the culture result. The prescriber would then instruct the ED charge nurse to contact the patient to make therapeutic adjustments and phone in prescriptions as needed. Therapeutic changes may include, but are not limited to, the dose, the duration, or the frequency of the prescribed antibiotic, the antibiotic itself, or the addition of a second antibiotic. This often led to overtreatment of asymptomatic bacteriuria along with a longer than recommended duration of antimicrobial therapy for urinary tract infections. Thus, a pharmacy ED culture follow-up service was implemented. This pharmacy service was designed for all positive culture results in patients discharged from the ED, but had specific goals to reduce unnecessary treatment of asymptomatic bacteriuria and decrease overall antimicrobial length of therapy in patients discharged with a positive urine culture.

**Service Description**

The service was implemented on April 1, 2017 and involves a clinical pharmacist reviewing all positive cultures for patients discharged from the ED daily. A clinical pharmacist is staffed in the ED seven days a week from the hours of 2:00 p.m. to 10:00 p.m. Cultures commonly evaluated by the pharmacist include urine cultures, skin and soft tissue cultures, genital cultures, and throat cultures. Positive culture results are compiled nightly from a report generated by microbiology which is placed into a mailbox for the pharmacist. This is approximately six positive cultures per day for our ED. The majority of culture results and sensitivities are available within 48 to 72 hours of patient discharge for the pharmacist to review. If a patient is found to have a positive blood culture, microbiology immediately contacts the charge nurse to avoid a delay in patient care if the pharmacist is unavailable. The pharmacist reviews patients’ charts for allergies, chief complaint, prior antibiotics prescribed, renal function, culture results, and any ED follow-up visits with other healthcare providers that have already occurred. The pharmacist then determines appropriate treatment, if needed, and discusses all cultures and recommendations with an ED physician or mid-level practitioner.

Patients are contacted by the pharmacist via telephone if changes to their current therapy are warranted. The pharmacist documents both the telephone encounter and the intervention in the electronic medical record using a standardized note. Telephone calls are made for three subsequent days. Documentation of the telephone call in the electronic medical record allows for communication between different pharmacists and the charge nurses if a patient returns a phone call. Follow-up phone calls can be routed through the electronic medical record to the pharmacist covering the next day. If a patient cannot be reached after three attempted phone calls from the pharmacist, the telephone encounter is closed, and a standardized letter is mailed to the patient's address on file. If a patient contacts the ED after receiving a letter, the telephone encounter is reviewed and the pharmacist or charge nurse takes action if required. Additional healthcare providers, nursing homes, and pharmacies are contacted as needed.

**Key Elements for Success**

1. Buy-in from the clinical pharmacist in the ED to review and ensure follow-up on positive cultures daily;
2. Collaboration between the clinical pharmacist, ED providers, and ED nursing staff;
3. Information technology resources and electronic medical record access to document the culture review process and interventions.

**Resource Utilization**

**Personnel:** A clinical pharmacist who is trained in reviewing cultures along with determining appropriate treatment for different types of infections. Ideally, this would be a clinical pharmacist already allocated to the ED. It is also essential to have physicians and mid-level practitioners in the ED who are willing to collaborate with the clinical pharmacist to ensure that patients receive the most appropriate care.
IT and other infrastructure: Development and utilization of a standard follow-up culture intervention that is quickly accessible and requires minimal time to enter information. Our note includes basic patient information, the source of the culture, the culture result, any active antimicrobials, the recommended intervention, the prescriber who agreed to the changes, and the patient response.

Supply Expense: None.

Return on Investment: While no financial outcomes were calculated, patients did receive a shorter average duration of antimicrobials for urinary tract infections. There was also a reduction in treatment of asymptomatic bacteriuria. Theoretically, the decreased utilization of antimicrobials could reduce the burden of antimicrobial resistance and the number of return ED visits for drug-related adverse events, including Clostridium difficile. The selection of the most appropriate therapy may also reduce the number of repeat ED visits due to worsening infection or lack of symptom improvement.

Recognized Intangible Benefits
1. Direct pharmacist interaction with prescribers enabled education regarding appropriate empiric therapy, asymptomatic bacteriuria, and our institution’s antibiogram;
2. Pharmacists are recognized for their ability to provide safe and effective patient care;
3. Pharmacy student and pharmacy resident involvement augments education and reinforces the necessity of culture review and antimicrobial management.

Outcome Measures
After the first month of the order set’s implementation, the following were assessed:
1. Fifty-four patients with positive urinary cultures discharged from the ED that were followed-up by a prescriber between February 1, 2017 through March 31, 2017 were reviewed. Sixty-eight patients followed-up by a pharmacist during service implementation between April 1, 2017 through May 31, 2017 were analyzed. The result was that a pharmacy-driven service reviewing ED cultures decreased average length of antimicrobial therapy for patients discharged from the ED with a positive urine culture from 7.1 days pre-implementation to 4.5 days post-implementation;
2. Unnecessary treatment of asymptomatic bacteriuria was also reduced from 31.5% to 7.4% after implementation of the pharmacy-driven service.

Lessons Learned
1. A pharmacist-driven ED culture review service can have a positive impact on patient care and prescriber-pharmacist relationships.
2. Excellent time management is crucial. Reviewing positive ED cultures daily and contacting patients can be time-intensive. Design a quick and efficient way to document discussions, interventions, and patient telephone conversations. Training and utilizing pharmacy students and residents is also beneficial. Our ED averages approximately six positive cultures per day and the outlined process takes about one hour from start to finish. Our pharmacists accomplish the culture review in-between completing additional ED tasks, including verifying ED orders, attending codes, and making therapeutic recommendations.
3. Urinalysis with a reflex culture is often ordered on patients presenting to our ED without any urinary tract infection symptoms. This is an opportunity for improvement in our ED and a source of ongoing prescriber education.

Other Considerations
Our program does involve discussing cultures with prescribers for final approval of recommendations. Buy-in from prescribers is essential; however, prescribers recognize the time benefit of not reviewing each culture themselves. While a collaborative care agreement may reduce the time of discussing each culture with a prescriber, this discussion leads to invaluable educational opportunities and enhanced prescriber-pharmacist
relationships in the ED. Another consideration should be given on how to facilitate vacation coverage in order to prevent delays in culture follow-up if your hospital has dedicated ED pharmacists. Our solution was to resort to the pre-implementation process and have the prescriber and charge nurse complete culture follow-ups or, if available, utilize a pharmacy resident who has been previously trained for ED culture follow-up.

**Suggestions for Other Hospitals/Health Systems**

Every ED has some procedure, formal or informal, regarding culture follow-up. A clinical pharmacist working with prescribers and ED nurses can easily use this as a way to become more involved. Re-evaluate the current procedure and adjust the design to fit best with the pharmacist’s and the ED’s other workflows. Culture review and follow-up can be incorporated into a dedicated ED pharmacist’s daily routine.

**Helpful References**


**Team Members**

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