The Impact of a Pharmacist Managed Culture Review for Discharged ED Patients

May 2, 2017

Tracey A. King, Pharm.D., MSP, BCPS
Lead Clinical Pharmacist – Emergency Medicine
Riverside Methodist Hospital

Amy Durell, Pharm.D., BCPS
Clinical Pharmacist
Riverside Methodist Hospital
Learning Objectives

- List the various responsibilities of emergency medicine pharmacist
- Examine the utility of an emergency medicine pharmacist in managing the culture review process
- Describe the role of emergency medicine pharmacists in managing culture review process
- Discuss the future impact of pharmacist managed culture review
Riverside Methodist Hospital

- Private not-for-profit, teaching hospital with the OhioHealth Healthcare system
- Over 1000 licensed beds
- 96 Emergency Department (ED) beds
- Approximately 90,000 ED visits
- Resulting in about 35,000 admissions annually
## ED Pharmacist Roles

### Direct Patient Care Roles

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct patient care rounds</td>
<td>Care of boarded patients</td>
</tr>
<tr>
<td>Medication order review</td>
<td>Medication histories and reconciliation</td>
</tr>
<tr>
<td>Medication therapy monitoring</td>
<td></td>
</tr>
<tr>
<td>High-risk medications and procedures</td>
<td></td>
</tr>
<tr>
<td>Resuscitation</td>
<td></td>
</tr>
<tr>
<td>Medication procurement and preparation</td>
<td></td>
</tr>
<tr>
<td>Medication information</td>
<td></td>
</tr>
<tr>
<td>Documentation</td>
<td></td>
</tr>
</tbody>
</table>

### Administrative Roles

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication and patient safety</td>
<td>Education</td>
</tr>
<tr>
<td>Quality improvement initiatives</td>
<td>Research and scholarly activity</td>
</tr>
<tr>
<td>Leadership duties and professional service</td>
<td></td>
</tr>
<tr>
<td>Emergency preparedness</td>
<td></td>
</tr>
</tbody>
</table>
RMH History

Jan. 2008 Clinical ED Pharmacist position

June 2008 ED Satellite Opened

Jan. 2012 Satellite coverage 24/7

Jan. 2016 Clinical ED Pharmacist coverage 0700-2300
ED RPH Roles

- Primary Role is a two sided approach
  - Front End
    - Primary resource to the ED team
    - Respond to all traumas, Code blues, STEMI's, stroke, etc
    - Answer drug information questions
    - Assist in therapeutic drug selection and dosage
    - Procure and assist in drug admixture
  - Back End
    - Review and assist with boarded and admitted patients
    - Assist with medication reconciliation
    - Round on boarded patients
Impact of Pharmacist Involvement of Culture Reviews
Background

- Multi-drug resistance pathogens are growing concern when treating nosocomial and community-associated pathogens
  - Associated with increased morbidity, mortality, and costs
  - Linked to the overuse and inappropriate prescribing of antimicrobial therapy
    - lead to readmission to the hospital and complications
- Antimicrobial stewardship programs
  - One method used to control the rise in resistance and improve the quality of patient care
  - Supported by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America
  - Pharmacist play a crucial role
    - knowledge on the appropriate use of the antimicrobials, dosing, drug interactions, etc.

Dumkow LE, Kenney RM, MacDonald NC et al. Impact of a multidisciplinary culture follow-up program of antimicrobial therapy in the emergency department. Infectious Disease Therapy. 2014;3:45-53
The ED serves as a link in transitions of care
- ~15.7% of patients discharged home with a prescription for antimicrobial agent
- 5.6% of patients receive an inappropriate medication at discharge

Dumkow LE, Kenney RM, MacDonald NC et al. Impact of a multidisciplinary culture follow-up program of antimicrobial therapy in the emergency department. Infectious Disease Therapy. 2014;3:45-53
Need for change

- Results of follow up cultures assigned to case management team and daytime ED charge RN
  - manage the patient flow, answer emergency medical service radio calls, alert various teams for cardiac and trauma services, and review nursing ED assignments
- According to protocol, nurses would review positive culture and sensitivity reports and any antimicrobials the patient was prescribed
- If specimen not sensitive to the therapy prescribed, nurses consult a physician to modify the treatment
  - Appropriateness often overlooked
    - pharmacokinetics of various antibiotics, appropriate dosing, patient allergy or pregnancy status, and potential drug interactions
- Physician availability for consultation delayed the time to culture follow-up

Literature review

- Effect of a pharmacist-managed culture review process on antimicrobial therapy in ED
  - Compared 12 months of physician-managed culture review to 12 months of pharmacist-managed culture review in ED
  - Retrospective review (n=4636)
    - Required Modified antimicrobial regimen
      - Physician managed=275 cases (12%) vs Pharmacist managed=355 cases (15%)
      - Pharmacist managed group had significantly fewer unplanned subsequent visits to ED
        - Physician- managed 19% vs. Pharmacist- managed 7%
  - Estimated pharmacy services reduced ED physician’s monthly workload by 50 hours
  - ED pharmacist made more antimicrobial regimen modifications and reduced the rate of unplanned admissions in 96 hours of initial culture review, allergic reactions and compliance

Literature review

- Compare the times to culture follow up and patient/provider notification and appropriate antimicrobial therapy before and after an ED pharmacist-managed antimicrobial stewardship program
- Retrospective case-control study
- Compared pre and post implementation
  - 177 patients identified with positive cultures
    - Median time to culture review
      - pre-group 3 days vs. post-group 2 days (p=0.0001)
    - Median time to patient or provider notification
      - pre-group -3 days vs. post group- 2 days (p=0.01)
    - Positive culture required notification
      - pre-group n=74 (71.2%) vs. post-group n=36 (49.3%)
    - No difference in appropriate antimicrobial therapy seen
  - ED pharmacist antimicrobial stewardship program significantly reduced time to positive culture review and time to patient or provider notification when indicated

Optimizing antimicrobial therapy through a pharmacist-managed culture review process in the ED

Retrospective chart review (January thru December 2013)
- n=819 patients discharged from ED with positive cultures
  - Positive cultures:
    - 50% urine, 12% wound/abscesses, 9.2% sexually transmitted disease test, 8.6% throat cultures
  - 174 (21.2%) required additional intervention/follow up due to inappropriate antimicrobial coverage
    - 97 (56%) required an antibiotic change or addition
    - 24 (14%) were referred to their PCP or another specialist
    - 28 (16%) doing fine on current therapy
    - 25 (14%) were lost to follow-up (homeless, indigent patient without permanent addresses and not easily contacted once leave the ED)

Van Devender EA. Optimizing antimicrobial therapy through a pharmacist-managed culture review process in the ED. American Journal of Emergency Medicine. 2014;32:1138
Literature review

- Assess the impact of a culture follow-up (CFU) program on the frequency of ED revisits within 72 hours and hospital admissions within 30 days compared to the standard of care (SOC)
- Single group, pre-test, post-test quasi-experimental study to compare a retrospective SOC group to a prospective CFU group
- 4 month intervention period:
  - CFU evaluated 197 cultures and modified antimicrobial therapy in 25.5%
  - Appropriate Empiric therapy: SOC cultures (63.1%) vs. CFU cultures (73%) (p=0.081)
    - SOC group: Bactrim (most common abx) → cipro → Keflex vs. CFU group: Cipro (most common abx) → Nitrofurantoin → Bactrim
  - Average length of empiric therapy: 8.45 days (SOC) vs. 7.59 (CFU)
  - Median time for follow up and receipt of appropriate therapy: 2 days

Dumkow LE, Kenney RM, MacDonald NC et al. Impact of a multidisciplinary culture follow-up program of antimicrobial therapy in the emergency department. Infectious Disease Therapy. 2014;3:45-53
Modification of antibiotic therapy needed in 25.5% of cases screened in CFU group

- Reason for intervention: (n=50 patients)
  - Pathogen non-susceptibility (76%)
  - Dose adjustments (10%)
  - Increasing duration of therapy (8%)
  - Admission to the hospital for IV therapy (4%)

- Rate of combined ED revisits within 72 hours and hospital admissions within 30 days was 16.9% SOC group vs. 10.2% CFU group (p=0.079)
  - Uninsured patient population alone: revisits to ED within 72 hours were reduced from 15.3% in the SOC group to 2.4% in CFU group (p=0.044)
RMH Culture Review History and Pharmacist Impact
Prior to Jan 2016

- Part time Nurse reviews all cultures when available
  - If not available covering charge nurse responsible
- Nurse writes up culture results, prints chart and gives to ED doctor to review
- If a question of resistance or drug allergy, physician may ask for pharmacy input
Prior to Jan 2016

○ When pharmacy consulted-presented with only the culture/sensitivity therefore unable to verify treatment appropriateness

○ Pharmacist would need to rework the patient and discuss with physician on medication choice

○ Lead to multiple physician distractions and increase review time as well as a nurse interpreting the culture
Starting Jan 2016

- Addition of a first shift ED Clinical Pharmacist - resources now available to streamline the culture review process
- Nurse in charge of cultures is notified of positive result
  - Prints results and chart for pharmacist review
  - ED clinical pharmacist reviews chart and culture
- ED clinical pharmacist determines if treatment is appropriate, insufficient or unclear
Starting Jan 2016

- For cultures with appropriate treatment, documentation is placed in the EMR
- For cultures with insufficient or unclear treatment, the pharmacist will discuss treatment with ED physician
  - Pharmacist presents patient case, discuss current treatment and recommendations for treatment based on culture, allergies and co-morbidities, etc
- After review, pharmacist will obtain a new prescription for the patient if needed
Starting Jan 2016

- Progress note and documentation is placed in the EMR
  - Review, recommendation and new treatment
- Pharmacist delivers completed charts/new orders to culture review nurse
- Culture review nurse follows up with patient/PCP of finalized cultures/updated treatment and new prescriptions called to patients’ pharmacy or mailed to patient as needed
Results of Pharmacist Review at RMH
Urine Cultures

- 6 month snapshot of urine cultures (Jan-June 2016)
  - 226 Urine samples
    - 189 Female : 37 Male
    - 147 Simple (12 pregnant) : 79 Complicated
    - UA and Culture ordered together : 109
UA Results

- **Leukocyte Esterase**
  - Negative – 29
  - Trace – 24
  - Small – 28
  - Moderate – 47
  - Large – 96

- **Squamous Cells**
  - <5 – 158
  - 5-14 – 48
  - >14 – 18

- **Bacteria**
  - None – 8
  - Rare – 42
  - Few – 52
  - Many – 122
Culture Results

Microbiology

- Ecoli: 13%
- Beta Hemolytic Strept Gp A: 4%
- Enterobacter faecalis: 5%
- Kleb: 11%
- Staph A, Strept Viradon, Candida Albicans, MRSA, Enterbacter aerogenses, Enterbacter Cloacae: 9%
- CNS: 4%
- P.A.: 13%
- Proteus M: 5%
- GDB: 13%
- Providencia, Serratia, Panoea, MSSA, Yeast, Candida, samonella: 2%
- Citrobacter koseri: 12%
- Staph Saprophyticus: 4%
Antibiotic Prescribing
Duration of Therapy

<table>
<thead>
<tr>
<th>Duration</th>
<th>All UTIs</th>
<th>Complicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 days</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ED Pharmacist Interventions

- Addition: 35%
- Modification: 33%
- Follow up: 16%
- No change: 9%
- Modification/follow up: 3%
- Addition/follow up: 4%
ED Pharmacist Interventions

- **Additions (n=36)**
  - 15 of 36 patients were asymptomatic
    - 8 with >5 squamous cells on UA
    - 4 with <100K bacteria isolates

- **Modifications (n=33)**
  - Over half grew E. Coli and empirically treated with ciprofloxacin found to be resistant
    - Changed to either a cephalosporin or nitrofurantoin
Future Culture Review
Protocol
Future

- Route all institution’s microbiology laboratory through the EMR system to pharmacy department
- Pharmacist assess all positive culture results immediately otherwise review within 72 hours to determine the most appropriate therapy
- Updated/standardize dosing guidelines based on current literature (IDSA guidelines, ID specialist)
- Standardize EDMR notes
Asymptomatic bacteriuria defined:

- Women - 2 consecutive urine samples with greater than 100,000 of the same bacteria
- Men – 1 clean catch urine sample with greater than 100,000 of bacteria
- Single catheterized urine with greater than 100 CFU per ml of urine

IDSA Guideline

- Uncomplicated UTI
  - Symptomatic bladder infection
    - Frequency
    - Urgency
    - Dysuria
    - Suprapubic pain

- Complicated UTI
  - Symptomatic urinary infection with functional or structural abnormalities of the GU tract
    - Men

IDSA Guideline

- Pyuria accompanying asymptomatic bacteriuria does not indicate treatment
- Pregnant women should be treated for a positive urine culture
- Duration of treatment should be 3-7 days

IDSA Treatment Guideline

Uncomplicated Cystitis

- Nitrofurantoin 100mg PO BID x 5 days
- Sulfamethoxazole/Trimethoprim DS 1 tablet PO BID x 3 days
- Fosfomycin 3gm PO x1

- Fluoroquinolone (FQ) x 3 days
- B-lactams x 3-7 days (avoid ampicillin or amoxicillin)

Acute Pyelonephritis

Ciprofloxacin 500mg PO BID x 7 days
Sulfamethoxazole/Trimethoprim DS 1 tablet PO BID x 14 days

B-lactam for 10-14 days

New Electronic Order Set
Cystitis

1st Line
• Nitrofurantoin 100 mg PO BID x 5 days (avoid in est. CrCl < 30 ml/min)

2nd Line
• Sulfamethoxazole/Trimethoprim DS 1 tablet PO BID x 3 days (avoid if used for UTI in previous 3 months)

3rd Line
• Cefdinir 300 mg PO BID x 3 days  OR  Cephalexin 500 mg PO BID x 3 days  OR  Trimethoprim 100 mg PO BID x 3 days

4th Line
• Ciprofloxacin 250 mg PO BID x 3 days  OR  Fosfomycin 3 gram PO x 1 (restricted to ESBL or MDR organism)
Pyelonephritis

1st Line
- Ciprofloxacin 500 mg PO BID x 7 days

2nd Line or Allergy to FQ
- Sulfamethoxazole/Trimethoprim DS 1 tab PO BID x 14 days
  OR
- Cefdinir 300mg PO BID x 10 days
  OR
- Cephalexin 500 mg PO BID x 10 days
New Electronic Order Set

- Standardize order selection for the following as well
  - Strep Throat
  - Skin and Soft Tissue
  - Sexual Transmitted Infections
New Standardize Progress Note

- Outpatient Culture Progress Note
  - Cystitis/ Pyelonephritis Template
    - Demographics and local seen
    - Presenting symptoms
    - Current antibiotic regimen
    - Allergies
    - Pertinent Labs
      - WBC, SCr, BUN, HCG, Urinalysis
    - Est. CrCl
New Standardize Progress Note

- Cystitis/ Pyelonephritis Template
  - Tmax
  - Micro data
  - A/P with drop down choices as above
    - Stop Taking
    - Additional concerns/ information
Barriers to success

- Potential barrier: obtaining support from the various stakeholders involved (ED physician leadership, nursing leadership, administration, and pharmacy.
  - Not a perceived barrier for RMH pharmacy
    - previously established relationships
    - physicians readily amenable to the proposed collaboration b/c they already viewed pharmacists as integral part of the healthcare team
    - aware of the capabilities of the pharmacists in the ED
- Staffing responsibilities and psych round responsibilities
  - Reviewing RN with limited staffing therefore pharmacist don’t receive daily culture results
  - Reviewing RN doesn’t always present positive cultures to pharmacist if prescribed antibiotics sensitive to pathogen
  - Service homeless, indigent, and non-English speaking patients, making contact/follow up difficult

Barriers to success

- RMH vs OhioHealth
  - OhioHealth Emergency Departments
    - Do not all have an Emergency medicine pharmacist
    - Are not staffed by the same physician group
  - Different anti-biograms for different areas
Conclusions

- Success based on culture of trust between experienced pharmacists and clinicians under whose authority they act
- Provides appropriate outpatient therapy more quickly, saves physician and nursing time, and improves patient satisfaction
- Involvement of ED pharmacist in antimicrobial therapy management
  - allows more involvement in direct patient care
  - helped raise the standard of care for patients requiring antimicrobial therapy
References


2. Dumkow LE, Kenney RM, MacDonald NC et al. Impact of a multidisciplinary culture follow-up program of antimicrobial therapy in the emergency department. Infectious Disease Therapy. 2014;3:45-53


The Impact of a Pharmacist Managed Culture Review for Discharged ED Patients

May 2, 2017

Tracey A. King, Pharm.D., MSP, BCPS
Lead Clinical Pharmacist – Emergency Medicine
Riverside Methodist Hospital

Amy Durell, Pharm.D., BCPS
Clinical Pharmacist
Riverside Methodist Hospital