
# Antimicrobial Stewardship in the ED
# WI HAI in LTC Coalition
# Spring Conference 2017

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## Disclosures

- Cempra Pharmaceuticals –
  - Consulting Fees/Advisory Board Member

## Goals

1. Understand how the ED approach to patient care impacts patients from LTC settings
2. Identify unique elements of infectious disease manifestations among geriatric population
3. Highlight potential interventions to improve antibiotic stewardship for LTC patients managed in the ED

## Presentation Outline

- Emergency Medicine 101
- Antibiotic Stewardship in the ED - The Final Frontier
- Geriatric Infections - A Wolf in Sheep's Clothing?
- A Tale of Two Settings - The ED and LTC
- 5 Stewardship Interventions for LTC Patients in the ED

## Board Certified Emergency Medicine

Approved as specialty in 1979

3 year residency after medical school
- Focus on managing multiple patients simultaneously
- Multiple critical care rotations

Expertise areas
- Pediatric and Trauma critical care
- Resuscitation of patients in shock
- Airway management
- Stabilization of any illness/injury
- Toxicology

## A Day in the Life

| | |
|---|---|
| ACS | Sprained ankle |
| Ring worm | Suicidal overdose |
| Scalp laceration | Psychosis |
| TIA | Septic shock |
| MVA/Whiplash | Urinary infection |
| Pneumonia | Delirium |
| Asthma attack | Concussion |
| Allergic reaction | Appendicitis |
| DVT | Threatened miscarriage |

## Providers

- Variable levels and types of training
  - EM, IM, FP, Peds
- 24/7/365
- Shift workers, Locums
- Hard to reach on shift for report
- Compensation linked to volume & satisfaction
- Regional practice variations

## ED Priority #1

- Patient safety
  - Must rule out any life threatening disease processes
  - Assume there **is** one present until proven otherwise
    - Opposite from outpatient clinic mentality
      - No implied emergency from clinic visit
    - Prudent layperson standard
      - Did patient decide to visit ED?
- **Standard of care in ED is different than clinic and LTC settings**

http://www.triducive.co.uk/news/

## The Nexus of the Healthcare System

- ~1/4th of population in US visits ED each year
  - 136 million encounters in 2014
  - >75% of all hospital admissions via ED
- 1/3rd of all acute care visits
  - Regardless of insurance status or if pt has PCP
  - Convenience is a huge factor
  - Large % of patient sent by PCP
- 5% of healthcare dollars spent in ED
  - We control a much larger portion of costs with disposition decision

"In few other domains of medicine, indeed in few other domains of human endeavor, is there such variety, novelty, distraction, and chaos, all juxtaposed to a need for expeditious and judicious thinking." ~Pat Croskerry

## Interface with LTC

- 25% LTCF residents treated in ED per year
  - 10% came with no information at all
  - ~90% missing some critical information
  - Patients most often sent back from ED without information
- Infectious diseases = most common reason for ED visit
  - LTC residents at increased risk of MDRO infections

Jones et al 1997, Davis et al 2005, Terrell and Miller 2007, Goto et al 2015

## Interface with LTC

- 2009 SAEM Geriatrics Task Force
  - Bidirectional transitions of care between LTC and ED

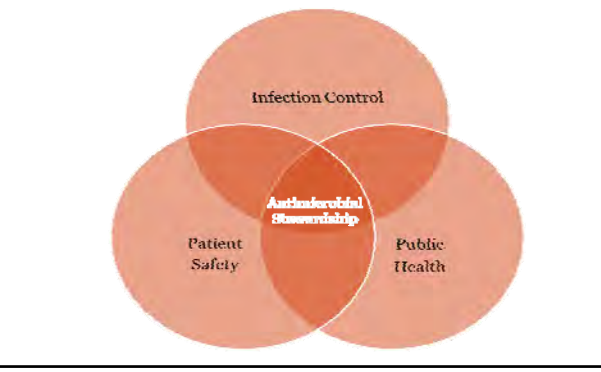
Terrell et al 2009

## ED Antibiotic Use

Respiratory Tract Infections
- Highest rates of prescribing for non-responsive or viral conditions
  - BronchitisSinusitis
  - Pneumonia
  - COPD

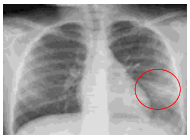
Skin and soft tissue infections
- Fail to adhere to guidelines in up to 90% of cases

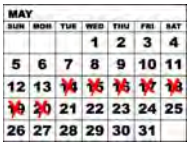
Downstream impact from ED antibiotic prescribing

## Defining Antibiotic Stewardship

- The 4 "D's"
  - Diagnosis
  - Drug
  - Dose
  - Duration






## What Drives ED Antibiotic Use?

- Relative lack of concern about adverse effects
  - No follow-up
  - Fear of missing infection

Kravitz, Medscape 2012

- Systems factors
  - Crowding, decision support, staffing model, available diagnostics

May et al, ICHE 2014

- Patient factors
  - Reliability
  - Access to care
  - Expectations
  - Satisfaction scores

## A Delicate Balance

A Call to Action for Antimicrobial Stewardship in the Emergency Department: Approaches and Strategies

Larissa May, MD, MSPH, Sara Cosgrove, MD, MS, Michelle L'Archevegue, MS, David A. Talan, MD, Perry Payne, MD, JD, MPP, Jeanne Jordan, PhD, Richard E. Rothman, MD, PhD

- 2012: ED = critical setting for stewardship
- Paucity of ED specific stewardship research
- Challenges unique to ED
  - Crowding, rapid pt turnover, satisfaction and liability concerns, cognitive overload

## Why now and why the ED?

- Increasing clinical impact of MDROs
- Barriers & facilitators to optimal ED antimicrobial use unknown
- CDC calls for physician leadership
  - Create novel, EM specific stewardship program
- ED quality measures for antimicrobial use
  - CDC, NQF, NCQA are developing these

Get Smart About Antibiotics Week
November 17–23, 2014
GET SMART
Know When Antibiotics Work
www.cdc.gov/getsmart

SAEM
Society for Academic Emergency Medicine

AMERICAN ACADEMY OF EMERGENCY MEDICINE

**Antibiotic Stewardship 101: An Intro for Emergency Physicians**

Michael S. Pulia, MD FAAEM; Stephen Liang, MD; Larissa S. May, MD MSPH

**EMERGENCY PHYSICIANS AS CHAMPIONS FOR PUBLIC HEALTH: OPTIMIZING ANTIBIOTIC USE IN ED SETTINGS**

Larissa S. May, MD; Michael S. Pulia, MD; Stephen Liang, MD


1. Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections.
2. Strengthen National One-Health Surveillance Efforts to Combat Resistance.
3. Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria.
4. Accelerate Basic and Applied Research and Development for New Antibiotics, Other Therapeutics, and Vaccines.
5. Improve International Collaboration and Capacities for Antibiotic Resistance Prevention, Surveillance, Control, and Antibiotic Research and Development.

## AAEM Works for Antibiotic Stewardship on the National Stage

- Key stakeholders
  - Human health and agriculture
- ED is link between inpatient/outpatient settings
- Stewardship is an access to care issue
- Need rapid diagnostics
  - Organism ID
  - Viral vs bacterial
- Safe harbors for guideline adherence

## UW EM Antimicrobial Stewardship Program

- Housed in Clinical Operations
  - July 1st, 2014
- Director Role
  - WI HAI in LTC Coalition Member
  - WI DHS Antibiotic Stewardship EM Subcommittee Co-Chair
  - UW Infection Control Committee
  - UW Antimicrobial Use Committee
  - Implement QI projects
  - Liaison with inpatient stewardship team
  - Continue to engage professional societies, CDC and stewardship researchers
  - Develop an external funded research program

## Program Goals

- Improve antimicrobial stewardship in the UW ED
  - Develop novel, ED specific interventions
  - Build a national reputation for excellence
- Benchmark ED antimicrobial use
  - Audit and feedback
- Provide education on best practices in antibiotic prescribing
- Partner with lab to make rapid diagnostics available to ED
  - Procalcitonin
  - Rapid polymerase chain reaction assays (C diff, MRSA, influenza)

## Program Achievements

- Comprehensive disease specific antibiotic order-sets
  - Integrated into EHR ordering system
  - Built on ED specific, local antibiogram
- Automated sepsis screening program
  - Fever + any SIRS or RN screening or any 2 SIRS
  - 50% improvement in lactate ordering in suspected sepsis
- 40% reduction in inappropriate Foley catheter use
- 50% reduction in unnecessary urine cultures

## Back to the Source

Evaluation and Management of Geriatric Infections in the Emergency Department

Jeffrey M. Caterino, MD[a,b,*]

Emerg Med Clin N Am
26 (2008) 319–343

## Geriatric Infections – A High Risk Encounter

1. Atypical presentations
2. Mortality Risk ↑↑↑
   - 3x pneumonia
   - 5-10x UTI
   - Higher incidence of bacteremia
3. Factors
   - Immunosenescence
   - Indwelling devices
   - ↓Skin and cough reflex
   - Cognitive impairment

## Respect the Fever

- Temp > 37.8°C (100°F)
  - Vast majority bacterial in origin
  - Marker of serious pathology
    - +blood cx
    - Death at 1 month
    - Emergency surgery
    - Admit for >4 days
    - 3 days of IV abx
    - Repeat ED visit at 72 hrs

Keating HJ III, Klimek JJ, Levine DS, et al. Effect of aging on the clinical significance of fever in ambulatory adult patients. J Am Geriatr Soc 1984;32(4):282–7.

Marco CA, Schoenfeld CN, Hansen KN, et al. Fever in geriatric emergency patients: clinical features associated with serious illness. Ann Emerg Med 1995;26(1):18–24.

## Respect the Absence of Fever

- Failure to mount fever to bacterial infection
  - Common in elders
  - Particularly noted in LTC patients

- Absent fever cannot rule out infection
  - 38.3°C (101°F) only 40% sensitive
  - <20% report fever with bacteremia
- Change temp from baseline helpful but limited in ED

Castle SC, Norman DC, Yeh M, et al. Fever response in elderly nursing home residents: are the older truly colder? J Am Geriatr Soc 1991;39(9):853–7.

Norman DC. Fever in the elderly. Clin Infect Dis 2000;31(1):148–51.

## A High Index of Suspicion

- Nonspecific presentation of bacteremia
  - AMS/confusion, weakness, falls
  - **'Functional decline'**
- WBC and CRP do not predict (↓ sensitivity)
  - L shift (bandemia) may be helpful
- Altered mental status independent predictor
- >85 years particularly at risk
- UTI most common source

Chassagne P, Perol MB, Doucet J, et al. Is presentation of bacteremia in the elderly the same as in younger patients? Am J Med 1996;100(1):65–70.

Fontanarosa PB, Kaeberlein FJ, Gerson LW, et al. Difficulty in predicting bacteremia in elderly emergency patients. Ann Emerg Med 1992;21(7):842–8.

Windsor AC. Bacteraemia in a geriatric unit. Gerontology 1983;29(2):125–30.

## Pneumonia

- Pneumonia
  - Only 26% with measured fever
  - Only 44% with either cough, fever or dyspnea
  - Fatigue is most common symptom 80+%
- LTC patients less likely to have cough vs AMS
  - 1/3 present without cough or fever
  - Possible increased risk of MDRO-HCAP?

Loeb M, McGeer A, McArthur M, et al. Risk factors for pneumonia and other lower respiratory tract infections in elderly residents of long-term care facilities. Arch Intern Med 1999;159(17):2058–64.

Marrie TJ, Haldane EV, Faulkner RS, et al. Community-acquired pneumonia requiring hospitalization: is it different in the elderly? J Am Geriatr Soc 1985;33(10):671–80.

## HCAP - What is it good for?

- What is the reason for distinguishing HCAP from CAP?
  - Retrospective cohort study of 50,758 patients admitted to the Veterans Affairs health care system
  - Hospital HCAP mortality rates were nearly twice that of CAP (9.9% vs 5.0% respectively)
  - 1-year cumulative mortality rates were also nearly twice that of CAP (40.9% vs 21.2%)
  - Average HCAP hospitals stays were 23% (1.6 days) longer and cost 31% ($3640) more than CAP stays (*P*<.01)

Hsu JL et al. *Int J Infect Dis*.2011;15(6):e382-e387.

Healthcare-Associated Pneumonia Does Not Accurately Identify Potentially Resistant Pathogens: A Systematic Review and Meta-Analysis

James D. Chalmers,[1] Catriona Rutter,[1] Waleed Salih,[1] and Santiago Ewig[2]

[1]Lapwith Respiratory Research Group, University of Dundee, Ninewells Hospital and Medical School, Dundee, Scotland, United Kingdom; [2]Pneumologie und Infektiologie, Evangelisches Krankenhaus Mettmann und Augusta-Kranken-Anstalt, Bochum, Germany

(See the editorial commentary by Restrepo and Alibert on pages 380–1.)

*Background.* The 2005 American Thoracic Society/Infectious Diseases Society of America guidelines introduced a concept of healthcare-associated pneumonia (HCAP) to define patients at higher risk of antibiotic-resistant pathogens, thus requiring broad-spectrum therapy. There has been no systematic evaluation of the ability of this definition to identify antibiotic-resistant pathogens.

*Methods.* We conducted a systematic review and meta-analysis of studies comparing the frequency of resistant pathogens (defined as methicillin-resistant *Staphylococcus aureus*, Enterobacteriaceae, and *Pseudomonas aeruginosa*) in populations with HCAP compared with populations with community-acquired pneumonia (CAP). Predictive accuracy was evaluated using the area under the receiver operator characteristic curve (AUC). The frequencies of pathogens in each group were pooled using a random effects model.

*Results.* Twenty-four studies were included (n = 22 456). Overall study quality was poor. HCAP was associated with an increased risk of methicillin-resistant *S. aureus* (odds ratio [OR], 4.72; 95% confidence interval [CI], 3.69–6.04) enterobacteriaceae (OR, 2.11; 95% CI, 1.69–2.63), and *P. aeruginosa* (OR, 2.75; 95% CI, 2.04–3.72; all *P* < .0001), but these analyses were confounded by publication bias. The discriminatory ability of HCAP for resistant pathogens was low (AUC, 0.70; 95% CI, 0.69–0.71) and was lower in high-quality (AUC, 0.66; 95% CI, 0.62–0.70) and prospective studies (AUC, 0.64; 95% CI 0.62–0.66). After adjustment for age and comorbidities, mortality was not increased in HCAP (OR, 1.20; 95% CI, 0.48–4.76; *P* = .80).

*Conclusions.* The HCAP concept is based on predominantly low-quality evidence and does not accurately identify resistant pathogens. Mortality in HCAP does not appear to be due to a higher frequency of resistant pathogens.

*"This therapy clearly represents heavy overtreatment for the majority of patients and is associated with antibiotic-related side effects, hospital-acquired infections such as Clostridium difficile, and promotion of antibiotic resistance [45, 46]. Without clear evidence that such broad-spectrum therapy can improve outcomes in HCAP, it is difficult to see how this recommendation can be justified."*

## UTI

- Controversy over atypical presentations
  - +Urine culture is flawed 'gold standard'
  - UA very limited but is all ED providers currently have
  - Minimum criteria often absent in advanced dementia
- ED study of UTI presentations
  - Age > 65 plus UA with >5 WBC and 1+ LE or nitrite
  - Variety of presenting complaints included
  - ¾ admitted with LOS average 5.4 days
  - 6 % mortality, 13% ICU
  - 51% + urine culture (>100,000 colonies/mL)
  - **Only 26% with urinary symptoms**
- **ED focused on ruling out pyelonephritis and urosepsis!**

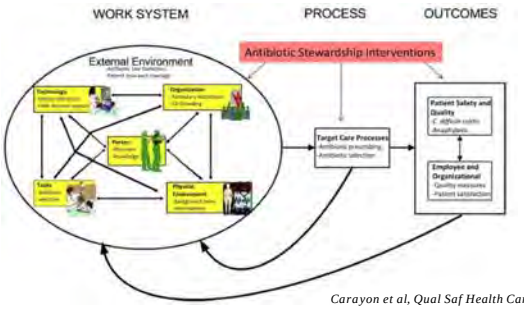

Agata E, Loeb M, Mitchell S. Challenges in Assessing Nursing Home Residents with Advanced Dementia for Suspected UTI. J Am Geriatr Soc 2013;61:62-66.

Ginde AA, Rhee SH, Katz ED. Predictors of outcome in geriatric patients with urinary tract infections. J Emerg Med 2004;27(2):101–8.

## ED Antibiotic Stewardship: A Pathway to Change

- Human Factors and Systems Engineering
  - Majority of stewardship intervention studies fail to incorporate barrier analysis *Charani et al, ID Clin North Am 2014*
  - Customize interventions to ED specific barriers
  - **Avoid the fundamental attribution error**
    - Over-attribute causality to personal factors
    - Move from individual blame to systems view

## Systems Engineering Initiative for Patient Safety (SEIPS)




*Carayon et al, Qual Saf Health Care 2006*

## Intervention 1: Avoid the ED

- ED visits only when absolutely necessary
  - Care biased towards interventions
  - Benign presentations considered potentially serious = invasive interventions
  - 80% ED transfers get admitted with 34% in-hospital mortality (Dwyer 2014)
- Clearly define reason for visit (see Intervention 3)
  - Is infection a consideration/concern?
- Evidence based care pathways to safely manage infections at LTCFs
  - UTI – reduced cultures and antibiotic use (Loeb 2005)
  - Pneumonia – reduced admissions without increased mortality (Loeb 2006)
  - Patients requires close monitoring/frequent reassessment

## Intervention 2: MYTHBUSTERS

- Cloudy/smelly urine
- Bacteriuria
- + Leukocyte esterase
- Pyuria

≠ UTI

J Emerg Med. 2016;51(1):25-30

## Intervention 2: MYTHBUSTERS

- Bacteriuria
  - 5% of healthy, non-pregnant sexually active women aged 18-40
  - 30% of pregnant women
  - 50% of female nursing home residents
  - 100% chronically catheterized patients

  J Emerg Med. 2016;51(1):25-30.
- Up to 60% of + urine cultures = asymptomatic bacteriuria

  ICHE. 2014; 00(0): 1-4.
- UTI causing falls or altered mental status
  - Diagnosis of exclusion
  - Avoid early closure
  - Observe stable patients (see Intervention 3)

  JAMDA. 2014; 15: 133-139.

## Intervention 3: Enhanced Transitions

- Primary reason for visit
  - Is infection a concern?
  - Expected evaluation?
- Baseline functional information
  - Ambulation
  - Orientation
  - Mental status/alertness
- Verbal handoffs are ideal

## Improving Transitions of Care

Resident Name: _____

Reason for Transfer to ED: _____

Facility Name: _____

Level of Care: SNF ALF Independent Living

Other: _____

Resident's wing/unit: _____

Direct dial number: _____

Baseline Behavior: Cooperative Withdrawn

Disruptive Agitated Wanders

Other: _____

Usual Mental Status: Alert/Oriented to: _____

Alert/Disoriented, can follow instructions

Alert/Disoriented, cannot follow instructions

Usual Transfer: Independent Needs Assistance

Unable Transfers with: _____

Code Status: DNR DNI Full Code

Patient's Emergency Contact:

Name/number: _____

Notified of transfer to ER: Yes No

Preferred transportation option upon return to facility:

Family Taxi Ambulance Facility vehicle

Medications: Manages own meds MAR

Pharmacy name: _____

Pharmacy location: _____

Documents to include in Transfer Packet:

Facesheet Progress Notes (past 48 hrs)

MAR Facility Capabilities Form Code Status

HCPOA Paperwork: ___Activated ___Not on File

___Not Activated

** To be completed by post-acute care facility, adhered to blue envelope, and sent with resident to the emergency department

Updated 12/1/16

## Improving Transitions of Care

**The Protocol:** Elderly patients with altered mental status, no urinary symptoms, no signs of clinical deterioration, no clear alternate explanation for their symptoms, and a "positive UA" will be admitted to the medical floor with **NO ANTIBIOTICS FOR 24-48 HOURS** while the hospitalist evaluates for more likely causes of altered mental status in this population. If still altered after 48 hours with no other explanation of symptoms, then begin treated for UTI.

**Eligibility checklist:**

- ☐ Patient is over age 65 with altered mental status and a UA with bacteria, pyuria, leukocyte esterase, nitrites, or some combination thereof
- ☐ Patient has no urinary symptoms
- ☐ Standard history, physical, and work-up reveals no etiology for the altered mental status
- ☐ Patient shows no signs of clinical deterioration (especially no concerning vital signs.

## Intervention 4: Clinical Decision Support

- Guideline adherence for uncomplicated cystitis and pyelonephritis
  - Women 18-65, no structural or function urinary system abnormality
  - Electronic order set (period 1) and audit/feedback (period 2)
  - Guideline adherence: 44% (baseline) → 68% → 82% (P≤.015)

PLOS One 2014, 3;9(2):e87899

- Computerized decision support system (CDSS), 3 French EDs
  - All cases/types of UTI analyzed
  - Improved compliance with national guidelines when used (only 59% of cases)
  - Chanced initial diagnosis in 23% of cases

JAC 2014; 69: 2857-2863

## Intervention 5: Rapid Diagnostics

Urinary antimicrobial peptides

AUC >.75 for urine culture, large study ongoing

Rapid MRSA PCR

Improved selectivity of antibiotics for abscess

Procalcitonin

FDA approved 2017 for stewardship in LRTI