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

<table>
<thead>
<tr>
<th>ACS</th>
<th>Sprained ankle</th>
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<tbody>
<tr>
<td>Ring worm</td>
<td>Suicidal overdose</td>
</tr>
<tr>
<td>Scalp laceration</td>
<td>Psychosis</td>
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<tr>
<td>TIA</td>
<td>Septic shock</td>
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<tr>
<td>MVA/Whiplash</td>
<td>Urinary infection</td>
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<tr>
<td>Pneumonia</td>
<td>Delirium</td>
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<tr>
<td>Asthma attack</td>
<td>Concussion</td>
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<tr>
<td>Allergic reaction</td>
<td>Appendicitis</td>
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<tr>
<td>DVT</td>
<td>Threatened miscarriage</td>
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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

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


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
  - Bronchitis
  - Sinusitis
- 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

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

- 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

- 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
  - CDC calls for physician leadership
    - Create novel, EM specific stewardship program
- ED quality measures for antimicrobial use
  - CDC, NQF, NCQA are developing these

Antibiotic Stewardship 101: An Intro for Emergency Physicians

Emergency Physicians as Champions for Public Health: Optimizing Antimicrobial Use in ED Settings
1. Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections.


- 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
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
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 ºC (101 ºF) only 40% sensitive
  - <20% report fever with bacteremia
- Change temp from baseline helpful but limited in ED


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


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 MDR-HCAP?

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 ($332 = $387)


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
  - 94 admitted with LOS average 5.4 days
  - 8% morality, 15% ICU
  - 51% + urine culture (>100,000 colonies/mL)
  - Only 26% with urinary symptoms

- ED focused on ruling out pyelonephritis and urosepsis!
Human Factors and Systems Engineering
- Majority of stewardship intervention studies fail to incorporate barrier analysis  
  
- Customize interventions to ED specific barriers

**Avoid the fundamental attribution error**
- Over-attribute causality to personal factors
- Move from individual blame to systems view

ED Antibiotic Stewardship: A Pathway to Change

Systems Engineering Initiative for Patient Safety (SEIPS)
**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 require close monitoring/frequent reassessment

**Intervention 2: Provider Education**

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


- Bacteriuria
  - 5% of healthy, non-pregnant sexually active women aged 18-40
  - 90% of pregnant women
  - 90% of female nursing home residents
  - 100% chronically catheterized patients

- Up to 60% of + urine cultures = asymptomatic bacteriuria
  - Diagnosis of exclusion
  - Avoid early closure
  - Observe stable patients (see Intervention 3)

* JEMBE. 2014; 00(0): 1-4.
* 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
**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)

- 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)
  - Changed initial diagnosis in 23% of cases

  [PLOS One 2014, 3(9):e87899](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0087899)

  [JAC 2014; 69: 2857-2863](https://www.jac-journal.com/content/69/7/2857)

**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