Sepsis Learning Collaborative:
Antibiotics and Source Control Essentials in Sepsis
Sepsis Pitfalls and Barriers to Quality Improvement
Presenters

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Dr. Don Yealy, MD
Antibiotic Selection in Sepsis

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Balance

Coverage

Stewardship
Sep-1 Guidelines for Antibiotics

**Severe Sepsis**
Within 3 hours:
- Measure lactate
- Obtain blood cultures
- **Administer antibiotics**

**Septic Shock**
Within 3 hours:
- Measure lactate
- Obtain blood cultures
- **Administer antibiotics**
- 30 cc/kg fluid resuscitation
Delay in Antibiotics is Associated with Increased Mortality


7.6% decrease in survival / hour
Stewardship Really Does Matter

Morbidity & Mortality Weekly Report


News > Science

Superbug resistant to 'antibiotic of last resort' found in US

'It basically shows us that the end of the road isn't very far away for antibiotics'

Lena H. Sun and Brady Dennis | Thursday 26 May 2016 | ▼30 comments

iWonder

Human vs superbug: Too late to turn the tide?
Not every patient requires (or benefits from) vancomycin and zosyn

Limited drug space – I recommend 2 grams Ceftriaxone To be supplemented as needed by arriving facility (Example: air ambulance protocol)
How I think about Patients

Community or Hospital Acquired?

- Generally Healthy or Immunosuppressed / special circumstance?
  - Identified Source? (NO) → Broad Antibiotics
  - Identified Source? (YES) → Tailored Antibiotics
  - Broad Coverage for Special Organisms

Broad Antibiotics

Tailored Antibiotics
Has the Patient been Healthcare Exposed?

**ESBL**
- Carbapenems
- +/- Pipercillin/tazobactam
- Fosfomycin

**C. Diff**
- Flagyl
- Vancomycin (oral)

**MRSA**
- Vancomycin
- Linazolid

**Influenza**
- Tamiflu

**VRE**
- Carbapenems
- Ampicillin
- Doxycycline
- Tigecycline

**Herpes**
- acyclovir

**Pseudomonas**
- Carbapenems (except Ertapenem)
- Cefepime
- Pipercillin/ tazobactam

Don’t forget anti-fungals or antivirals if indicated!
Consider Source Control

1. ...intervention be undertaken for source control *within the first 12 hr* after the diagnosis is made, if feasible (grade 1C).

2. When infected *peripancreatic necrosis* is identified as a potential source of infection, *definitive intervention is best delayed* until adequate demarcation of viable and nonviable tissues has occurred (grade 2B).

3. ...the *least physiologic insult* should be used (eg, percutaneous rather than surgical drainage of an abscess) (UG).

4. If *intravascular access devices are a possible source* of severe sepsis or septic shock, they should be *removed promptly* after other vascular access has been established (UG).

Consider Source Control

Abscesses must be drained.

Infected kidney stones must be IDENTIFIED and drained.

Consider replacing foleys/ G-tubes, etc.

Look under bandages and casts!
## Monotherapy

<table>
<thead>
<tr>
<th>Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doribax/Doripenem</td>
</tr>
<tr>
<td>Invanz/Eratepenem</td>
</tr>
<tr>
<td>Imipenem/Cilastatin</td>
</tr>
<tr>
<td>Meropenem/Merrem</td>
</tr>
<tr>
<td>Cefotaxime/Claforan</td>
</tr>
<tr>
<td>Ceftazidime/Fortaz</td>
</tr>
<tr>
<td>Ceftriaxone/Rocephin</td>
</tr>
<tr>
<td>Cefepime/Maxipime</td>
</tr>
<tr>
<td>Ceftaroline</td>
</tr>
<tr>
<td>Fosamil/Teflaro</td>
</tr>
<tr>
<td>Avelox/Moxifloxacin</td>
</tr>
<tr>
<td>Gatifloxacin/Tequin</td>
</tr>
<tr>
<td>Levaquin</td>
</tr>
<tr>
<td>Augmentin</td>
</tr>
<tr>
<td>Ticarcillin/clavulanate/Timentin</td>
</tr>
<tr>
<td>Unasyn</td>
</tr>
<tr>
<td>Zosyn</td>
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</tbody>
</table>

## Combination Therapy

### Column A

- Choose one:
  - Aminoglycosides
  - OR
  - Aztreozam
  - OR
  - Ciprofloxacin

### Column B

- Choose one:
  - Cephlosporins (1st/2nd Generation)
  - Clindamycin IV
  - Daptomycin
  - Glycopeptides
  - Linezoid
  - Macrolides
  - Penicillins
## Proposed Changes to Sep-1 Table 5.0

### Monotherapy
- Doribax/Doripenem
- Invanz/Eratepenem
- Imipenem/Cilastatin
- Meropenem/Merrem
- Cefotaxime/Claforan
- Ceftazidime/Fortaz
- Ceftriaxone/Rocephin
- Cefepime/Maxipime
- Ceftaroline
- Fosamil/Teflaro
- Avelox
- Gatifloxacin/Tequin
- Levaquin
- Moxifloxacin
- Augmentin
- Timentin
- Unasyn
- Zosyn

### Combination Therapy

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>+ Cephalosporins</td>
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</tr>
<tr>
<td>OR Daptomycin</td>
<td>OR Daptomycin OR Aztreonam</td>
</tr>
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Workgroup Members include representatives from: IDSA, SCCM, SHM, ACEP
How I think about Patients

Community or Hospital Acquired?

- Generally Healthy or Immunosuppressed / special circumstance?
  - Identified Source? NO Broad Antibiotics
  - Identified Source? YES Tailored Antibiotics
  - Broad Coverage for Special Organisms


Common Sepsis Pitfalls and Barriers to Quality Improvement

Donald M. Yealy, MD

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School of Medicine, University of Pittsburgh
Financial disclosures

- My external funding past 36 months
  - NHLBI – Emergency Care Research K12 (PI); PETAL Network (PI)
  - NIGMS - RO1 ProACT (procalcitonin in LRTI)
- Royalties from:
  - Three texts
    - *Tintinalli’s Study Guide* (editor; chapters including pneumonia)
    - *The Trauma Manual and Acute Care Surgery* (editor)
    - *ED Critical Care* (editor)
  - and *UpToDate* (pneumonia decision making author)

- Expert opinions - civil
Barrier – “Another regulation!!?”

- **Sepsis not seen as highest emergency**
  - Under-recognized
  - Insidious and bad things happen, albeit elsewhere
  - Fatalism
  - Mortality – short term 15-30% - worse than STEMI, CVA, trauma

- **“I don’t miss it”**
  - Self-reflection limits
  - Limited feedback, asymmetric

- **Real goal of efforts**
  - “Hassling us”
  - Want “university look” (sic)
  - Take $$ away
Barrier – Early recognition

- Outside of extremes (overt infection and shock), no “one test” – SIRS vs qSOFA, sensitivity vs specificity
  - Partially compensated
  - Lactate value and noise
  - Many have features, but not at same time or recognized

- Signal : noise unfavorable
  - Many infected or inflamed, few “septic”
  - False positives (see sensitivity); late positives
  - Collecting info to judge hard – even VS
  - NY Times 2 days ago – “Could it be sepsis?”

- Fallibility
  - Extremes of age
  - Confounders (trauma, inflammation, meds)
Barrier – Changing Behavior

Looking early
- Starts prehospital and triage
- Use a tool – NYHA, SIRS, whatever; liberal lactate ordering
- Think sensitive, deploy *prompts* (checklist; e-record; labs)

Looking often
- Repeat exam and VS if unsure
- Then comes 3-6 hour reassessment – *use exam or tool, > one*

Acting early
- Bolus fluid – *isotonic, 1-2 L* unless issue (target 30 cc/kg)
- Antibiotics – *broad, prompt* – don’t hold for cultures

Acting often
- Titrate – volume (500-1000cc boluses plus maintenance), pressors, lactate repeat if elevated
Barriers – Nonsensical requests

- ? Time zero
- Set fluid boluses (CHF/CRF; ecologic fallacy)
- Blood cultures
- Antibiotics (what if you know source?)
- Reassessment
- Vasopressors and CVC vs peripheral
Barrier – Changing behavior

Axioms

- Easy
- Aligned with daily work
- Prompts
- Focused (simple, works 85%++)
- Automated (order sets, triage)
- Clear information
  - Start/stop of fluid/ATB
  - Timing of lab return
Barrier – Measuring What We Do

EMS data
- Diagnostic features
- Intervention – fluids (When/what/how? Where noted?)

ED data
- Key diagnostics – need method to track esp. if asynchronous
- Same fluid/ATB issues – what/when?
  - Bolus – body mass based for “30 cc kg” vs set but adequate volumes; timing

Labs
- Order sets

Follow-up info
- Automated re-checks of VS, labs, fluids
Barriers – Getting improvement

- **Measure, measure, measure**
  - It will be bad to start
  - It wont budge a lot at first
  - No magic bullet

- **Feedback**
  - To key ED clinicians
  - To assessors
  - To next level clinicians
  - To coders

- **Targeted actions**
  - **Plan, Do, Study, Act**
    - Ours – Fluid data
    - Rapid cycle
Barrier

Resources

- Training of clinicians
- Training of assessors
- Equipment
- IT solutions
- Time to measure and analyze
- Time to do PDSA

CMS not linked yet; when linked, wont add $$ - your job is to show value by noting savings (from no/less penalties; lowered cost of care; better outcomes that may attract more acre opportunities)
Barriers – Can you get a change of “asks”?

- Get involved
- CMS accepts feedback, needs data
- Focus on things that run counter to improving health / outcomes
  - Avoid “hassle” arguments
  - Show challenge
  - Offer alternatives
  - Recognize need
Sepsis Initiative- SEP-1 Challenge
Sepsis Initiative- Wave II
SEP-1 Challenge

What is the SEP-1 Challenge?
E-QUAL is collecting self-reported, confidential and de-identified data from EDs across the country on the CMS SEP-1 measure.

No Data Collection Required! Just submit the preliminary data that your hospital has provided you already! This data submission only takes 10 minutes and a benchmarking summary report will be published in 30 days!

Why join the SEP-1 Challenge?
• Get exclusive access to early benchmarking data on the new CMS SEP-1 sepsis measure (only sites participating in the SEP-1 challenge will receive the confidential, de-identified summary report initially)
• Prepare hospital leadership for national expectations on SEP-1
• Help the EM community identify improvements in the measure for CMS

Participating in the E-QUAL SEP-1 Challenge does not meet your PQRS reporting requirements; however, participation in the SEP-1 survey alongside participation in the E-QUAL Sepsis Learning Initiative can earn MOC Part IV Credit for you and your group!

Deadline to submit data for the SEP-1 Challenge November 11th, 2016.
Sepsis Initiative- Wave II

**Recruitment & Enrollment**
Now-November 30th
Readiness Assessment Survey

**Learning Period (6-9 months)**
Monthly Webinars
Office Hours
Tool kit guidelines and materials
Data Submission (Monthly)

**Wrap Up**
October 2017
Data Reports
Summary Report
Lessons Learned
eCME, MOC, MIPS credit
Why Participate in Wave II?

• Address Modifications of SEP-1 Definitions
• New Webinar Topics
• Additional Quality Improvement Activities
• Get access to high-quality eCME for FREE
• Earn ABEM MOC credit (LLSA and Part IV Activities)
• Meet new CMS MIPS requirements for Clinical Practice Improvement Activities
• Meet CMS quality reporting requirements by joining the CEDR
• Submit and receive benchmarking data to guide local quality improvement efforts
• Feature your ED’s commitment to quality improvement to hospital leaders and payers
• Learn from expert national faculty
• Gain access to toolkits including best practices, sample guidelines, and key talking points
SIGN UP TODAY!

Step 1: Contact Nalani Tarrant
Contact Nalani Tarrant at ntarrant@acep.org for more information on how to participate in the E-QUAL Sepsis Wave II and SEP-1 Challenge.

Step 2: Take the E-QUAL Readiness Assessment
Directors or an assigned leader in the clinician group will need to complete an online survey to assess the group’s quality improvement resources, needs and feature your existing work that you seek to highlight to other E-QUAL and TCPI members.

Deadline to sign up for Sepsis Wave II is November 30th

Step 3: Visit the E-QUAL Homepage
Visit the E-QUAL homage (www.acep.org/equal) for more information on the Sepsis Wave II, resources and upcoming webinars.