Case Study 2
Cherchez Le LTAC

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Learning Objectives

- Recognize when to be concerned about potential emerging infections
- Outline universal actions that can and should be taken to care for patients, staff, and public
- Describe diagnostics for different pathogens
LTAC Case: Introduction

- 66-year-old woman admitted to STAC 8-18 for fever and AMS

**STAC Course**
- Pulmonary edema → intubation and unable to be weaned → tracheostomy and peg
- Sepsis
- Coronary stent placement (EF 70%)
- Diarrhea CDI negative
- Sacral decubitus ulcer

**PMH**
- Morbid obesity
- Hypothyroidism
- Hypertension
- CA breast (double mastectomy)
- Transferred to LTAC 8-30 with PICC, Foley, and trach

- Sepsis
- Stage III renal disease
- PICC and Foley

- MRSA–doxycycline
- PICC and Foley

- DM
- Ankylosing spondylitis
- Hysterectomy

LTAC Case

**LTAC Course**

- 9-3 Sepsis Doxy d/c’d → Vanco
- 9-5 Continued sepsis → ERTA added
- 9-21 Blood cultures (+) Staph epidermidis VRE faecalis & VRE faecium S linezolid & Dapto → Started on Dapto (Erta & Vanco D/c’d)
- 9-22 Trach Asp c/s (+) Burkholderia pickettii Piperacillin/tazobactam & CTRX → CTRX started
- 9-23 to 10-5 Fevers persist Increased WBC

Courtesy of Dr. Ellie Goldstein.
LTAC Case (cont.)

- **10-5** CXR diffuse infiltrates; febrile
- **10-6** Dapto D/C (14 D)
  - Remains febrile; cultures repeated
- **10-7** Fluconazole added → **10-16**
- **10-8** CTRX → piperacillin/tazobactam for PNA →
- **10-18** Afebrile and improves until 11-1, then fever
- **11-2** Bld c/s + Staph capitis → Vanco started
  - Rifampin added 11-6
  - Antibiotics ended 11-19 (17 days)

Courtesy of Dr. Ellie Goldstein.

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LTAC Case (cont.)

- ~New fever of 102 on **12-2**~ (hospital day 94)

Start your root cause analysis!

- What is the source of the new fever?
- Given the patient’s history of multiple antibiotics:
  - a) What therapy would you initiate?
  - b) Should we expect an MDR and, if so, what?
  - c) Can we change or discontinue any of the patient’s devices?

Courtesy of Dr. Ellie Goldstein.
LTAC Case (cont.)

- **12-2** Bld c/s + *K. pneumoniae* (CRE)
- **11-30** Urine c/s + *Enterococcus, P. stuartii*, Proteus, *K. pneumoniae* (CRE)
- **12-2** Sputum c/s *P. aeruginosa, P. stuartii, K. pneumoniae* (CRE)
  - Wound c/s Proteus spp., *E. aerogenes*, other GNRs
- Rx changed meropenem + polymyxin B (both 12-18)
- **12-30** Sputum + CRE, *Providencia* - Poly B restarted
- **12-31** Quinton inserted for dialysis

Performance Improvement Report Central Line–Associated Bloodstream Infections

CLABSI 2016

<table>
<thead>
<tr>
<th>Measure of Success</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>YTD</th>
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<tbody>
<tr>
<td>Central Line–Associated Bloodstream Infections</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>47</td>
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<tr>
<td>District Benchmark Indicator</td>
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<td></td>
</tr>
<tr>
<td>Numerator (Number BSI Meeting NHSN Definition)</td>
<td>1.61</td>
<td>1.61</td>
<td>1.61</td>
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<td>1.61</td>
<td>1.61</td>
<td>1.61</td>
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<td>1.61</td>
<td>1.61</td>
<td>1.61</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td>Denominator (Total Number Central Line Days)</td>
<td>1104</td>
<td>1085</td>
<td>1109</td>
<td>1006</td>
<td>1204</td>
<td>846</td>
<td>944</td>
<td>835</td>
<td>810</td>
<td>773</td>
<td>623</td>
<td>685</td>
<td>11024</td>
</tr>
</tbody>
</table>

Quarter Summary

- **About this indicator:** high cost, high volume
LTAC Case

- 1-7: CXR and resp. status worse—imipenem added
- 1-14: Fever continues—Quinton removed and later reinserted
- 2-7: PICC removed and reinserted
- 2-8: On antibiotics
- **Septic shock & dies**

Surrounding Rooms

- Patients at this facility are cohorted
  - Cohorting is reviewed once a day by the Charge RN
- This patient is in a shared room
  - The other patient transferred in from the ICU and is in isolation for VRE and trached
  - 12-20: Sputum c/s *K. pneumoniae (CRE)* of roommate (18 days later)
  - 12-24: Blood c/s *K. pneumoniae (CRE)* of patient down the hall
How Did This Happen?

- One nurse to 4 patients
- Patient down the hall has a different nurse
- One respiratory therapist for most of the wing
  - How did we get 2 new CRE patients?
  - How is the hand-hygien compliance?
  - What is the patient ratio for nurse assistants? Have they received infection-prevention training?
  - Who does environmental services? Have they been trained in infection prevention? Has anyone rounded to watch their cleaning practices?

Courtesy of Dr. Ellie Goldstein.

How Did This Happen? (cont.)

- Who do you involve in the **root cause analysis** of this outbreak?
  - Doctors
  - Nurses
  - Nurse assistants (“CNAs”)
  - Line integrity rounding
  - Dialysis nurse
  - Wound care nurse
  - Respiratory therapist
  - Infection prevention
  - Antimicrobial stewardship
  - Family and visitors
  - Environmental services

Courtesy of Dr. Ellie Goldstein.
**Success** in an Evolutionary “Game” Correlated With Certain Characteristics

- **Be nice:** cooperate, never be the first to defect
- **Be provicable:** return defection for defection, cooperation for cooperation
- **Don’t be envious:** be fair with your partner
- **Don’t be too clever:** or, don’t try to be tricky


Declination by Outlier Physicians January to June 2014

<table>
<thead>
<tr>
<th>No Declinations per Proposed Intervention</th>
<th>Physicians Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Reviewed: 589</td>
<td>Five Physicians Take 80% of the Time</td>
</tr>
<tr>
<td>Appropriate Total: 228</td>
<td>MD A # XX915</td>
</tr>
<tr>
<td>Accepted Total: 318</td>
<td>MD B # XX599</td>
</tr>
<tr>
<td>Declined: 43</td>
<td>MD C # XX303</td>
</tr>
<tr>
<td></td>
<td>MD D # XX790</td>
</tr>
<tr>
<td>15/48</td>
<td>31.3%</td>
</tr>
<tr>
<td>14/48</td>
<td>77.8%</td>
</tr>
<tr>
<td>6/29</td>
<td>20.7%</td>
</tr>
<tr>
<td>8/12</td>
<td>77.7%</td>
</tr>
</tbody>
</table>

Establish a Dialogue

Findings From Root Cause

- Limited Transition of Care Data Available
  - Prior cultures
  - Prior antibiotic therapies
  - What is the CRE rate/SIR at the STAC facility?
- Antimicrobial Stewardship Program
  - Limited review of pre-admission antibiotic therapy
  - Selective pressure of multiple antibiotics
  - Antibiotic duration of therapy difficult to enforce
  - What is the follow-up with outlier MDs?
- Doctors complain about constant movement of patients for cohorting
  - Physicians have lowest performance level of hand hygiene

Findings From Root Cause (cont.)

- Infection preventionist is a **new hire** and has not received any nationally recognized training (ie, APIC, CDC, etc.)
- Is administration responsible? Are we setting this person up to fail?

**Environmental Services**

- Has anyone rounded with the housekeepers to learn their cleaning processes? Have they been trained in infection prevention?
- What are their daily and terminal cleaning processes?
Findings From Root Cause (cont.)

- When patients are transferred to a new room for cohorting, is a terminal clean of the previous room conducted before a new patient is moved to the room?
- Is enough time allotted to the housekeepers to clean the room and allow the disinfectants to dry at the appropriate time to kill germs?
- What is respiratory therapy’s process for trached patients? How is their hand hygiene?
  - What are their water sources?
  - Is their equipment one-time/one-patient use or is it reusable?
  - Are they regularly educated about infection prevention?
- How long do central line dressings, tubing, and bags stay before they are changed? What's the policy?
- Where does the PEG irrigation water come from? How is it transported?

Courtesy of Dr. Ellie Goldstein.

Dialysis

- What is the contracted dialysis company’s policy for dialysate and water cultures?
- Who cleans and disinfects the machines?
  - How often is it done?
  - Where is it done?
  - Do they have access to a clean water source for their machines?
- How many different dialysis RNs come to the facility?
  - What is their company's training? Have they been trained on infection prevention?
- What is their role in maintaining and caring for the dialysis line?
  - How often do they access the line?
  - When do they change the dressings?
  - Does anyone monitor their hand hygiene and isolation practices?
  - Does anyone monitor/observe dressing changes for dialysis lines?

Courtesy of Dr. Ellie Goldstein.
<table>
<thead>
<tr>
<th>Dialysis Infection Prevention Bundle</th>
<th>LEAN Stakeholder Analysis</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Does the dialysis company have dressing change procedures?</td>
<td></td>
<td>IPA, RN, MD</td>
</tr>
<tr>
<td>a. Is training documented?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Notify company of need for observer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Notify Charge Nurse and supervisors need for auditors</td>
<td></td>
<td>IP, RN</td>
</tr>
<tr>
<td>a. Train auditors what to observe for</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INFECTION PREVENTION</strong></td>
<td></td>
<td></td>
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<tr>
<td>3. Develop Observation Checklist</td>
<td></td>
<td>IP, RN, MD</td>
</tr>
<tr>
<td><strong>Water Testing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IP should review water culture testing data</td>
<td></td>
<td>IP, RN, Q, A</td>
</tr>
<tr>
<td>a. Frequency of testing? sent monthly?</td>
<td></td>
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<tr>
<td>b. Who does the testing?</td>
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<tr>
<td>c. What laboratory is the culture sent to? Are they certified?</td>
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<tr>
<td>d. Method of notification to the hospital by the dialysis company?</td>
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<tr>
<td>e. If test failure, are the results called and to whom?</td>
<td></td>
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<tr>
<td>f. How are failure machines taken out of service?</td>
<td></td>
<td></td>
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<tr>
<td><strong>Dialysis-Related Infections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. IP should report data and trends to more committees than just the Infection Prevention Committee to highlight important events and direct leadership energy</td>
<td></td>
<td>IP, A, RN, Q, EOC, MD</td>
</tr>
<tr>
<td>a. These committees include: Quality, EOC, Critical Care, Surgery, Medical Executive, and the Board of Directors</td>
<td></td>
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</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
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<tr>
<td>6. IP should maintain good relationships and regular communication with:</td>
<td></td>
<td>IP</td>
</tr>
<tr>
<td>a. Dialysis company on contract</td>
<td></td>
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<tr>
<td>b. Local, state, and national APIC groups (to be up to date on the latest research and best practices)</td>
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<td></td>
</tr>
<tr>
<td>c. Local health authority</td>
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</tr>
<tr>
<td>7. IP should conduct ongoing education for:</td>
<td></td>
<td>IP, RN, CNA, MD, RT, EVS, PharmD</td>
</tr>
<tr>
<td>a. All disciplines including MD, RN, CNA, RT, EVS, ASP pharmacists, etc.</td>
<td></td>
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</tr>
</tbody>
</table>

Don’t Forget About Engineering

- The water machine from which the water for PEG tubes comes should have a log for cleaning and disinfection
- Is an outside contractor hired to manage the water/ice machine?
- Has anyone looked at the contract to see what they’re supposed to be doing?

Courtesy of Dr. Ellie Goldstein.
Fishbone Diagram

**STAFF PRACTICE**
- New employee
- Disconnected open lines not capped
- Identified in lit. review the potential increase of CLBSIs for wound pts
- Is there a standard for dialysis & wound care
- Identify the pts with high risk of infection?

**PEOPLE**
- Hand hygiene
- Length of time in seconds for hub cleaning
- Incorrect or lack of hub cleaning
- Lack of competencies for central line care after RN hire

**POLICY**
- Dialysis water & culture
- Engineering water mgt
- Administration cohorting
- No standardized dressing care practice for pts with CVCs, Groshongs, etc.
- Isolation practices?

**PROCEDURES**
- Loop IV lines back into themselves
- Lacked of following P/P

**KNOWLEDGE**
- POA w/ CRE!

**MEASUREMENT**
- STAC HAI data

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**Summary**
- Multi-departmental initiatives
  - Microbiology lab rapid identification
  - Identify POAs & isolate
- Regular (daily) communication
- Disseminated and concordant Abx and micro ASP
- Use antibiogram to tailor ASP to local susceptibility patterns
- Concurrent review

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( Courtesy of Dr. Ellie Goldstein and Angela Vassallo, MPH. )
Facilities work together to protect patients.

Common Approach (Not enough)
- Patients can be transferred back and forth from facilities for treatment without all the communication and necessary infection control actions in place.

Independent Efforts (Still not enough)
- Some facilities act independently to enhance infection control but are not often alerted to antibiotic-resistant or C. difficile germs coming from other facilities or outbreaks in the area.
- Lack of shared information from other facilities means that necessary infection control actions are not always taken and germs are spread to other patients.

Coordinated Approach (Needed)
- Public health departments track and alert health care facilities to antibiotic-resistant or C. difficile germs coming from other facilities and outbreaks in the area.
- Facilities and public health authorities share information and implement shared infection control actions to stop spread of germs from facility to facility.

Figure from CDC Vitals Signs:
www.cdc.gov/vitalsigns/stop-spread/index.html
Reap What You Sow

What comes first? The chicken or the egg?

- While LTAC facilities may transmit CRE to new cases, approximately one-half originate from STAC patients either colonized or infected.
- Poor transition-of-care data between the LTAC facilities, STAC facilities, and SNFs.

Courtesy of Dr. Ellie Goldstein.
ABBREVIATIONS/ACRONYMS
Case Study 2: Cherchez Le LTAC

ABX = antibiotics
AMS = altered mental status
Asp = air sac primordium
ASP = antimicrobial stewardship program
Bld c/s = blood culture
BSI = bloodstream infection
c/s = culture
CA = cancer
CDI = Clostridium difficile infection
CHG = chlorhexidine
CLBSI = central line–associated bloodstream infections
CRE = carbapenem-resistant Enterobacteriaceae
CRKP = carbapenem-resistant Klebsiella pneumoniae
CTRX = ceftriaxone
CVC = central venous catheter
CXR = chest x-ray
d/c’d = discontinued
Dapto = daptomycin
DM = diabetes mellitus
EF = ejection fraction
ERTA = ertapenem
GNR = gram-negative rod
HAC = hospital-acquired condition
HAI = healthcare-associated infection
IV = intravenous
LTAC = long-term acute care
MDR = multiple drug resistance
MRSA = methicillin-resistant Staphylococcus aureus
NHSN = National Healthcare Safety Network
PEG = percutaneous endoscopic gastrostomy
PICC = peripherally inserted central catheter
POA = present on admission
PPE = personal protective equipment
RN = registered nurse
SIR = standardized infection ratio
SNF = skilled nursing facility
STAC = short-term acute care
Vanco = vancomycin
VRE = vancomycin-resistant enterococci
WBC = white blood cell