

# 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**
  - ▶ Pneumonia (MRSA–doxycycline)
  - ▶ **Stage III renal disease**
  - ▶ **PICC and Foley**
- ▶ PMH
  - ▶ Morbid obesity
  - ▶ Hypothyroidism
  - ▶ Hypertension
  - ▶ CA breast (double mastectomy)
  - ▶ DM
  - ▶ Ankylosing spondylitis
  - ▶ Hysterectomy
- ▶ Transferred to LTAC 8-30 with **PICC, Foley, and trach**

Courtesy of Dr. Ellie Goldstein.

# 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.



# 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.)

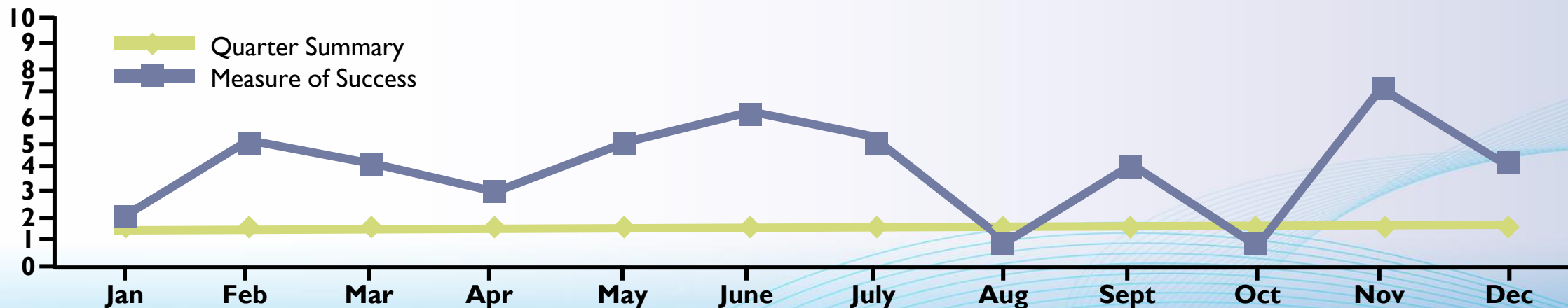
- ▶ 12-2 **Bld c/s + *K. pneumoniae* (CRE)**
- ▶ 11-30 **Urine c/s + *Enterococcus*, *P. stuartii*, *Proteus*, *K. pneumoniae* (CRE)**
- ▶ 12-2 **Sputum c/s *P. aeruginosa*, *P. stuartii*, *K. pneumoniae* (CRE)**
  - ▶ Wound c/s *Proteus* spp., *E. aerogenes*, other GNRs
- ▶ Rx changed meropenem + polymyxin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

Courtesy of Dr. Ellie Goldstein.

# Performance Improvement Report Central Line–Associated Bloodstream Infections

CLABSI 2016

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



▶ About this indicator: high cost, high volume

Courtesy of Dr. Ellie Goldstein.



# 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**

Courtesy of Dr. Ellie Goldstein.

# 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**

Courtesy of Dr. Ellie Goldstein.

# 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-hygiene 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 provokable:** 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

Axelrod RM, Hamilton WD. *The Evolution of Cooperation*. New York: Basic Books, 1984.

# Declination by Outlier Physicians January to June 2014

No Declinations per Proposed Intervention			Physician Number
<b>Total Reviewed</b>	<b>589</b>		Five Physicians Take
<b>Appropriate Total</b>	<b>228</b>	<b>38.8%</b>	80% of the Time
<b>Accepted Total</b>	<b>318</b>	<b>53.9%</b>	
<b>Declined</b>	<b>43</b>	<b>7.3%</b>	
<b>15/48</b>	<b>31.3%</b>		MD A # XX915
<b>14/48</b>	<b>77.8%</b>		MD B # XX599
<b>6/29</b>	<b>20.7%</b>		MD C # XX303
<b>8/12</b>	<b>77.7%</b>		MD D # XX790

Goldstein EJ, et al. *Clin Infect Dis*. 2016;63:532-8.

CLINICAL PRACTICE: Ellie J. C. Goldstein, Section Editor

# Approaches to Modifying the Behavior of Clinicians Who Are Noncompliant With Antimicrobial Stewardship Program Guidelines

Ellie J. C. Goldstein,<sup>1,2</sup> Debra A. Goff,<sup>3</sup> William Reeve,<sup>4</sup> Snezana Naumovski,<sup>5</sup> Erin Epton,<sup>6</sup> Jonathan Zenilman,<sup>7</sup> Keith S. Kaye,<sup>8</sup> and Thomas M. File Jr<sup>9</sup>

## Establish a Dialogue

<http://knowyourmeme.com/memes/you-keep-using-that-word-i-do-not-think-it-means-what-you-think-it-means> Goldstein EJ, et al. *Clin Infect Dis.* 2016;63:532-8.

# 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

Courtesy of Dr. Ellie Goldstein.



Los Angeles County Department of Health.  
[www.cdc.gov/hai/pdfs/toolkits/infectioncontroltransferformexample2.pdf](http://www.cdc.gov/hai/pdfs/toolkits/infectioncontroltransferformexample2.pdf)

# 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?

Courtesy of Dr. Ellie Goldstein.

# 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.



**Line Care**

- 1. **Does the dialysis company have dressing change procedures?**
  - a. Is training documented?
  - b. Notify company of need for observer

IP,A, RN, MD

- 2. **Notify Charge Nurse and supervisors need** for auditors
  - a. Train auditors what to observe for

IP, RN

**INFECTION PREVENTION**

**3. Develop Observation Checklist**

IP, RN, MD

**Water Testing**

- 4. **IP should review water culture testing data**
  - a. Frequency of testing? sent monthly?
  - b. Who does the testing?
  - c. What laboratory is the culture sent to? Are they certified?
  - d. Method of notification to the hospital by the dialysis company?
  - e. If test failure, are the results called and to whom?
  - f. How are failure machines taken out of service?

IP, RN, Q,A

**Dialysis-Related Infections**

- 5. **IP should report data and trends to more committees than just the Infection Prevention Committee to highlight important events and direct leadership energy**
  - a. These committees include: Quality, EOC, Critical Care, Surgery, Medical Executive, and the Board of Directors

IP,A, RN, Q, EOC, MD

- 6. **IP should maintain good relationships and regular communication with:**
  - a. Dialysis company on contract
  - b. Local, state, and national APIC groups (to be up to date on the latest research and best practices)
  - c. Local health authority

IP

**Education**

- 7. **IP should conduct ongoing education for:**
  - a. All disciplines including MD, RN, CNA, RT, EVS, ASP pharmacists, etc.

IP, RN, CNA, MD, RT, EVS, PharmD

Vassallo A, et al. *Expert Rev Anti Infect Ther.* 2014;12:1087-102.

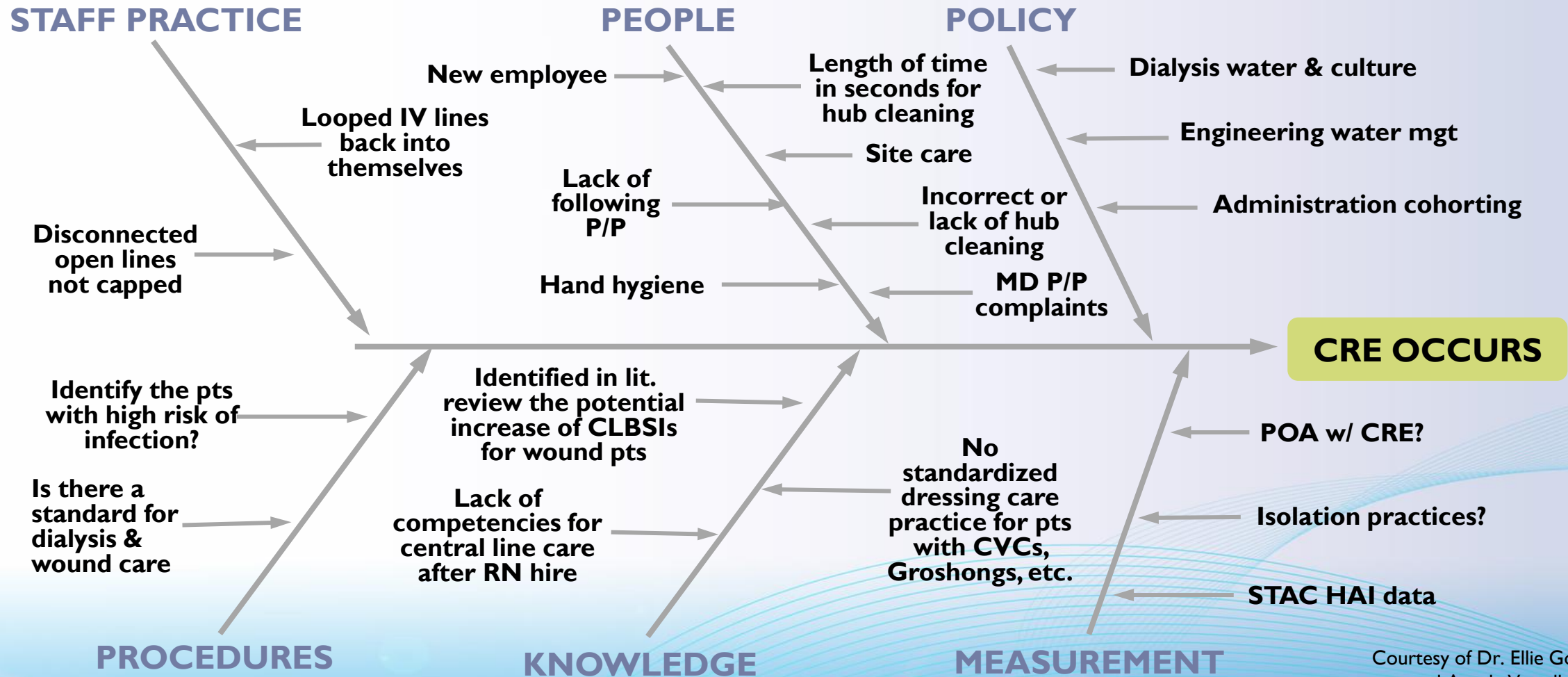


# Don't Forget About Engineering

- ▶ 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



Courtesy of Dr. Ellie Goldstein and Angela Vassallo, MPH.

# 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**

Courtesy of Dr. Ellie Goldstein.



# LTAC CRE Initiative

- ▶ CRE noted to occur in some system hospitals
- ▶ All sites with **> 3/month or 10 CREs in quarter** period become a “focus hospital”- regional variation
- ▶ **PLAN**
  - ▶ New isolation signage (purple)
  - ▶ CRE screening on admission
  - ▶ Proper cohorting
  - ▶ Monitor PPE and hand hygiene compliance
  - ▶ Daily CHG bathing
  - ▶ CRE education to staff

Courtesy of Dr. Ellie Goldstein.

# CRE in LTACs Southern California—2014

	January				February				March			
	POA		HAC		POA		HAC		POA		HAC	
	Col	Inf	Col	Inf	Col	Inf	Col	Inf	Col	Inf	Col	Inf
<b>1</b>	1	1	10	1	0	0	11	1	14	4	3	0
<b>2</b>	1	0	0	0	0	0	0	0	0	0	1	0
<b>3</b>	3	0	1	1	7	0	0	1	5	0	0	0
<b>4</b>	5	1	4	0	2	0	4	0	1	0	7	0
<b>5</b>	5	3	5	2	4	0	5	2	4	2	0	0
<b>6</b>	7	4	0	4	6	1	0	3	8	0	0	0
<b>7</b>	1	0	5	1	1	0	3	1	6	0	1	2
<b>8</b>	1	0	1	1	2	0	6	0	5	0	1	0
<b>TOTALS</b>	<b>24</b>	<b>9</b>	<b>26</b>	<b>10</b>	<b>22</b>	<b>1</b>	<b>29</b>	<b>8</b>	<b>43</b>	<b>6</b>	<b>13</b>	<b>2</b>

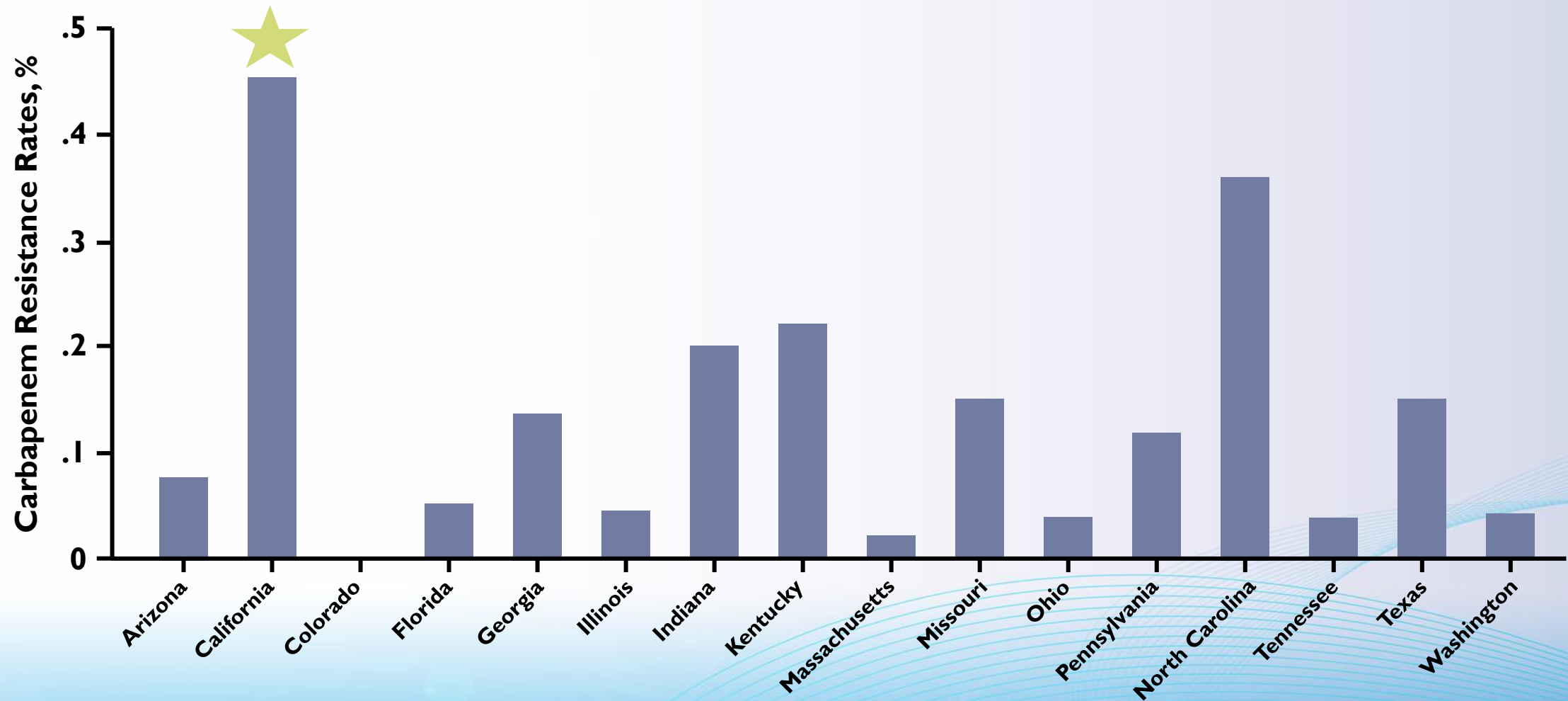
**POA 89 → 16 INF**

**HAC 68 → 20 INF**

- ▶ Don't take credit for POAs

Courtesy of Dr. Ellie Goldstein, unpublished data.

# CRKP Rates at Select LTACs by State, January 2014 to March 2015



Han JH, et al. *Clin Infect Dis*. 2016 Dec 24.

# Antibiotic Susceptibility Profiles of CRKP Isolates at LTACs, 2014-2015

Antibiotic	No. of Isolates Tested	Susceptible n (%)	Intermediate n (%)	Resistant n (%)
<b>Amikacin</b>	885	298 (33.7)	63 (7.1)	524 (59.2)
<b>Ciprofloxacin</b>	630	10 (1.6)	2 (0.3)	618 (98.1)
<b>Levofloxacin</b>	713	12 (1.7)	3 (0.4)	698 (97.9)
<b>Gentamicin or tobramycin</b>	630	11 (1.7)	3 (0.5)	616 (97.8)
<b>Colistin or polymyxin B</b>	690	579 (83.9)	--	<b>111 (16.1)</b>
<b>Tigecycline</b>	439	413 (94.1)	23 (5.2)	3 (0.7)

Han JH, et al. *Clin Infect Dis*. 2016 Dec 24.



<http://www.apic.org/About-APIC/Membership-sections/Long-Term-Acute-Care>.



SHEA/CDC OUTBREAK RESPONSE TRAINING PROGRAM

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<https://www.cdc.gov/nhsn/ltach/>



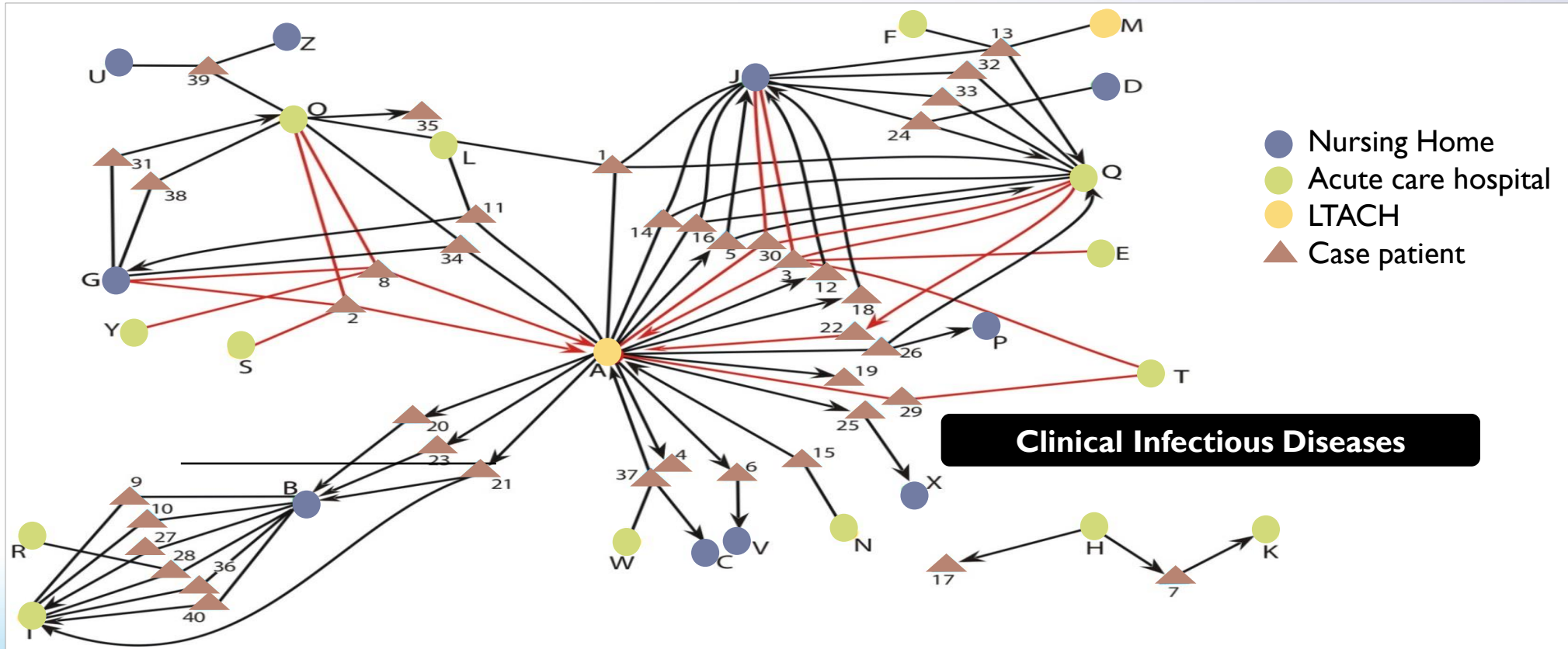
SHEA/CDC OUTBREAK RESPONSE TRAINING PROGRAM

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# Emergence and Rapid Regional Spread of *Klebsiella pneumoniae* Carbapenemase-Producing *Enterobacteriaceae*

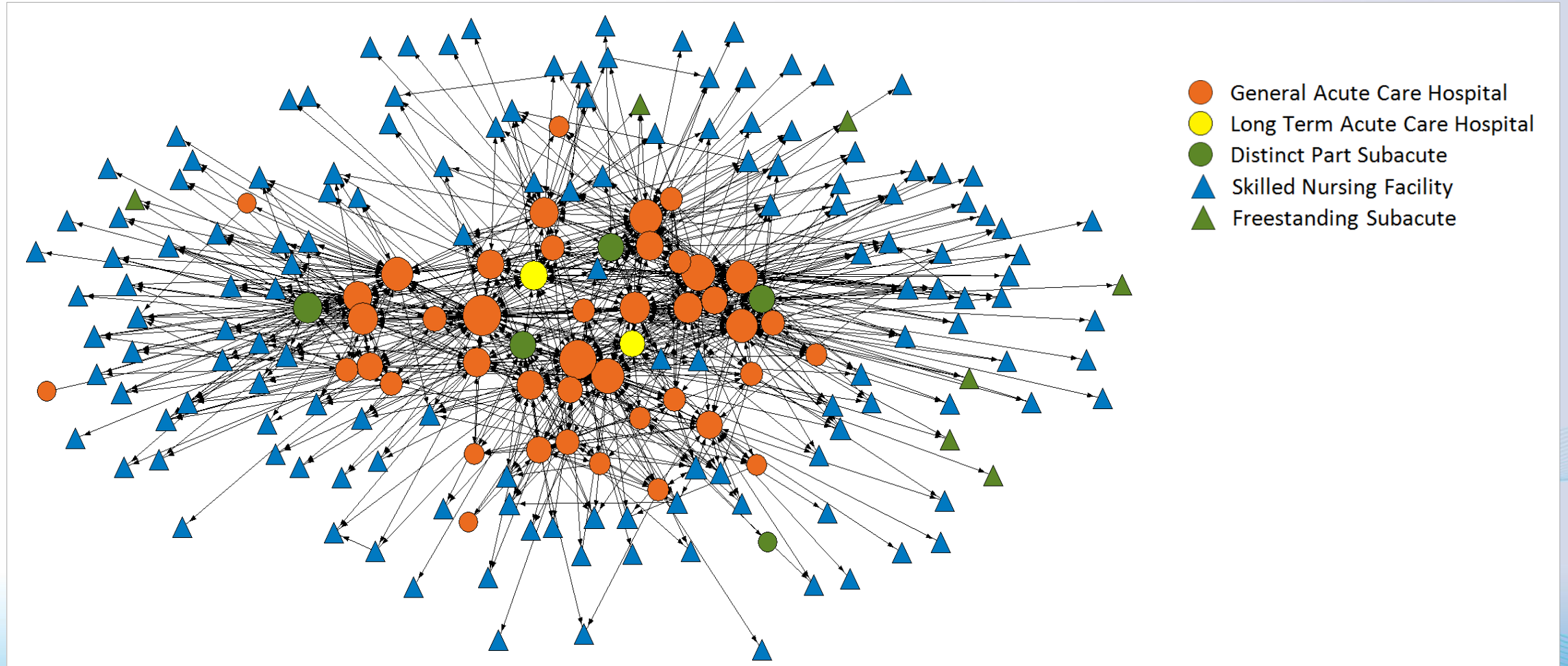
Sarah Y. Won,<sup>1,2</sup> L. Silvia Munoz-Price,<sup>3</sup> Karen Lolans,<sup>4</sup> Bala Hota,<sup>4,5</sup> Robert A. Weinstein,<sup>4,5</sup> and Mary K. Hayden<sup>4</sup> for the Centers for Disease Control and Prevention Epicenter Program



Won SY, et al. *Clin Infect Dis.* 2011;53:532-40.



# Patient Sharing Among San Francisco Bay Area Healthcare Facilities



Network analysis by Laura Blum, MPH. CDPH Healthcare-Associated Infections (HAI) Program

Figure from CDC Vitals Signs:  
[www.cdc.gov/vitalsigns/stop-spread/index.html](http://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.

Los Angeles County Department of Health.  
[www.cdc.gov/hai/pdfs/toolkits/infectioncontroltransferformexample2.pdf](http://www.cdc.gov/hai/pdfs/toolkits/infectioncontroltransferformexample2.pdf)