

Outbreak Investigation of Carbapenem Resistant Enterobacteriaceae in ICU

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Objectives

- To understand the **CRE significance**
- To know the outbreak **threat** in ICU
- To learn lesson from **AAH experience**

Introduction

A CRE Case

- A 67 year old male
 - **4 weeks in the ICU** following a colon resection
 - Difficult to extubate due to COPD and renal dysfunction
 - Awaiting tracheostomy
- On **29th day** in the ICU, developed fever 39C & hypotension
 - 3 blood cultures were drawn
 - **2 of the blood cultures grew CRE**

Background

What are CRE?

- ❑ Carbapenem R esistant E nterobacteriaceae, including *Klebsiella pneumoniae* and *Escherichia coli*,
- ❑ Resistant to the carbapenem class of antimicrobials
- ❑ Carbapenem antibiotics (ertapenem, imipenem, meropenem, and doripenem)



CRE Clinical & Epidemiological Importance

- **Resistance** is highly **transmissible**
- **Treatment** options are **limited**
- Potential for **spread** into the community
- High **mortality** rate
 - Up to 50% case mortality rate associated with invasive infections



Risk Factors

- ❑ CRE are more likely to affect patients on:
 - Mechanical ventilation
 - Invasive medical devices
 - Open wounds
 - Long courses of antibiotic therapy



Outbreak: Definition

- The occurrence of **cases of disease in excess** of what would normally be expected in a defined community, geographical area or season

Al Ain Hospital CRE Outbreak

- April 2014
- No case of CRE in Al Ain Hospital
 - 19 May 2014 every thing changed
- 1st case of CRE diagnosed in Al Ain Hospital ICU

Beginning of an Outbreak

Challenges for AAH PCI Team

- What went wrong?
- Is it a tip of an ice berg?
- How to minimize the panic?
- How to face senior management?
- What is a future plan?

Beginning of an Outbreak

- 19 May 2014, 1st CRE case was identified
- 30 May 2014, 3 more CRE cases were diagnosed

Beginning of an Outbreak

- 19th May 2014
 - 1st CRE case identified in medical 1 unit
- 30th May 2014
 - 2nd in ICU
 - 3rd in stroke unit
 - 4th in stroke unit
- 17th June 2014
 - 5th CRE case identified in medical 2 unit
 - 6th in surgery
 - 7th in ICU
 - 8th in LTVU

Beginning of an Outbreak

- PCI team was lost
- In 30 days
 - **8 CRE cases from 6 different clinical units**



Beginning of an Outbreak

- Bigger Questions
- What? Why? Where? How?



Now We Know What Happened in AAH !

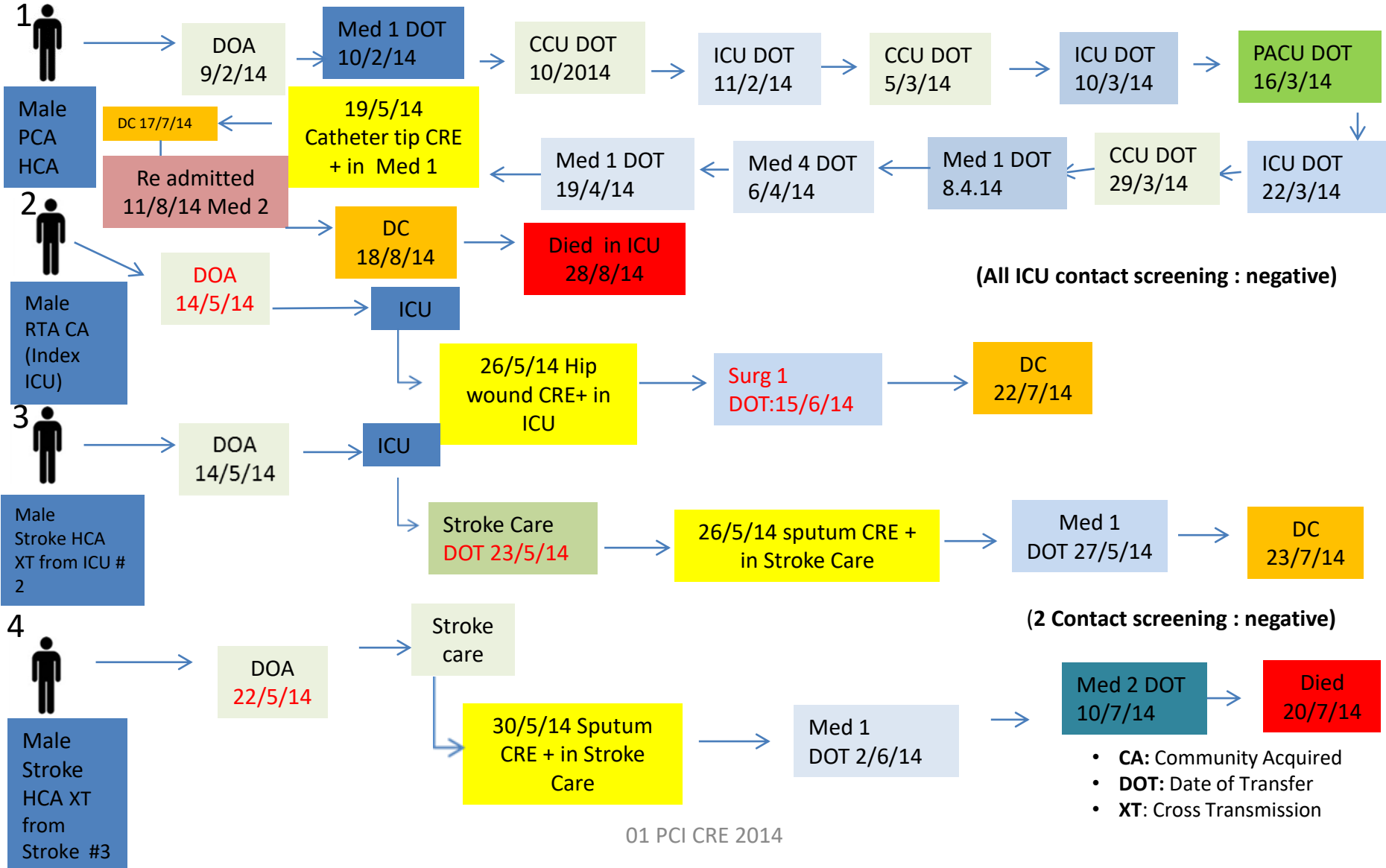
- Here are all the facts?

Now We Know What Happened in AAH !

- 1st step taken by AAH PCI team: Traced CRE patients journey
 - What was the Purpose?
 - Find the epidemiological link
 - Source or reservoir of CRE
 - Possibility of cross transmission
 - Immediately implement strict PCI practices

Prevention and Control of Infection Department

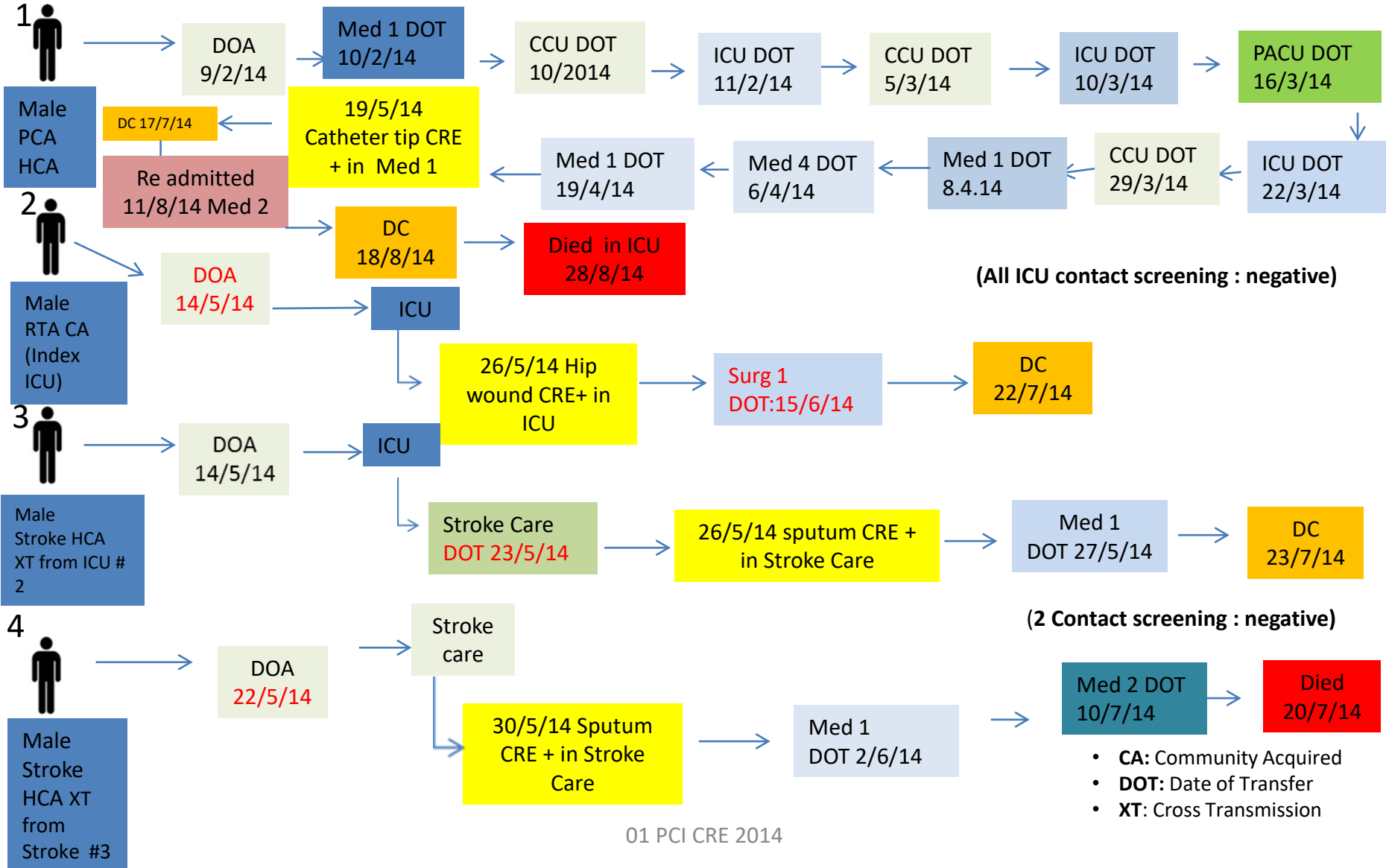
CRE Patient in AAH: March 23, 2015



- CA: Community Acquired
- DOT: Date of Transfer
- XT: Cross Transmission

Prevention and Control of Infection Department

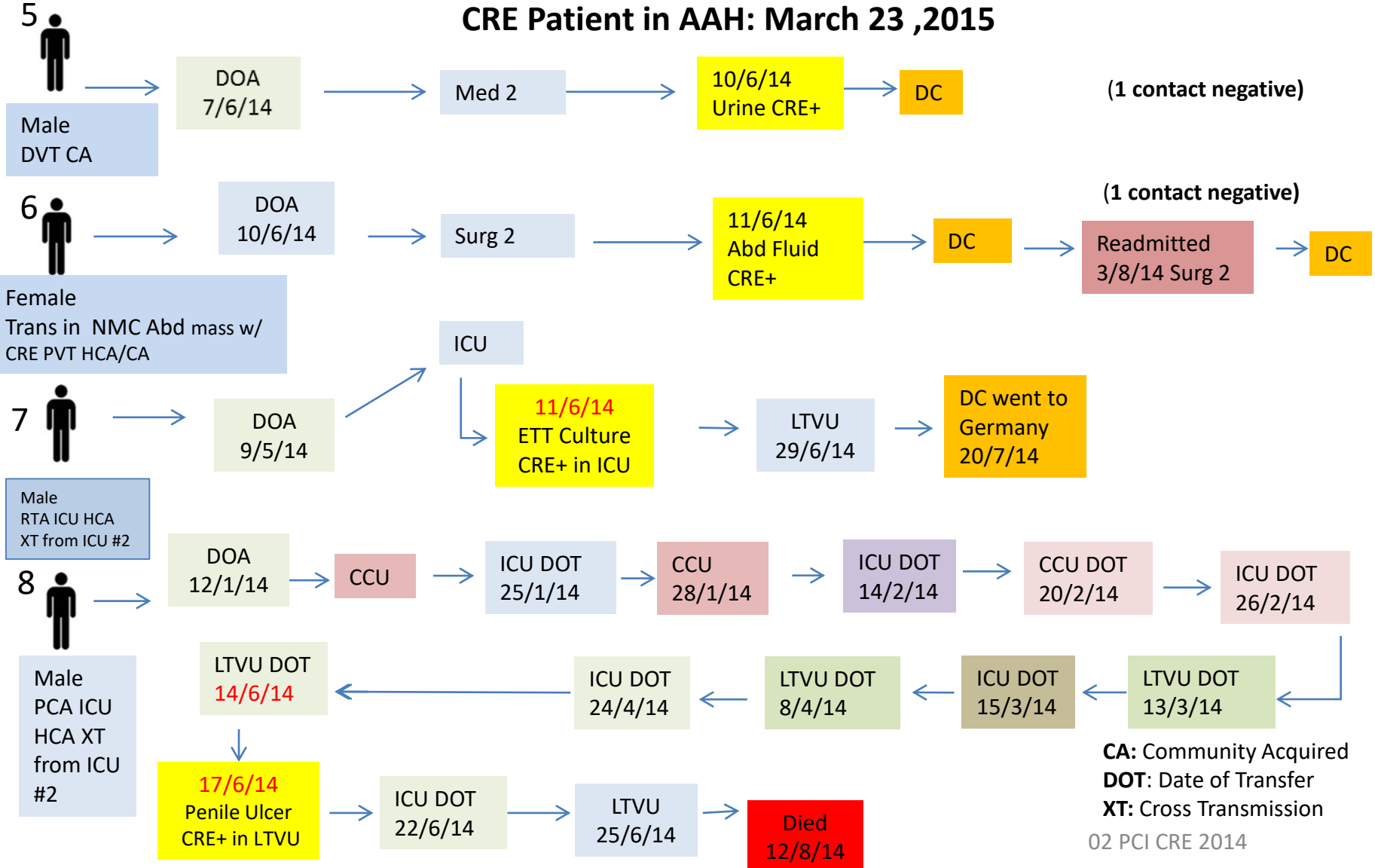
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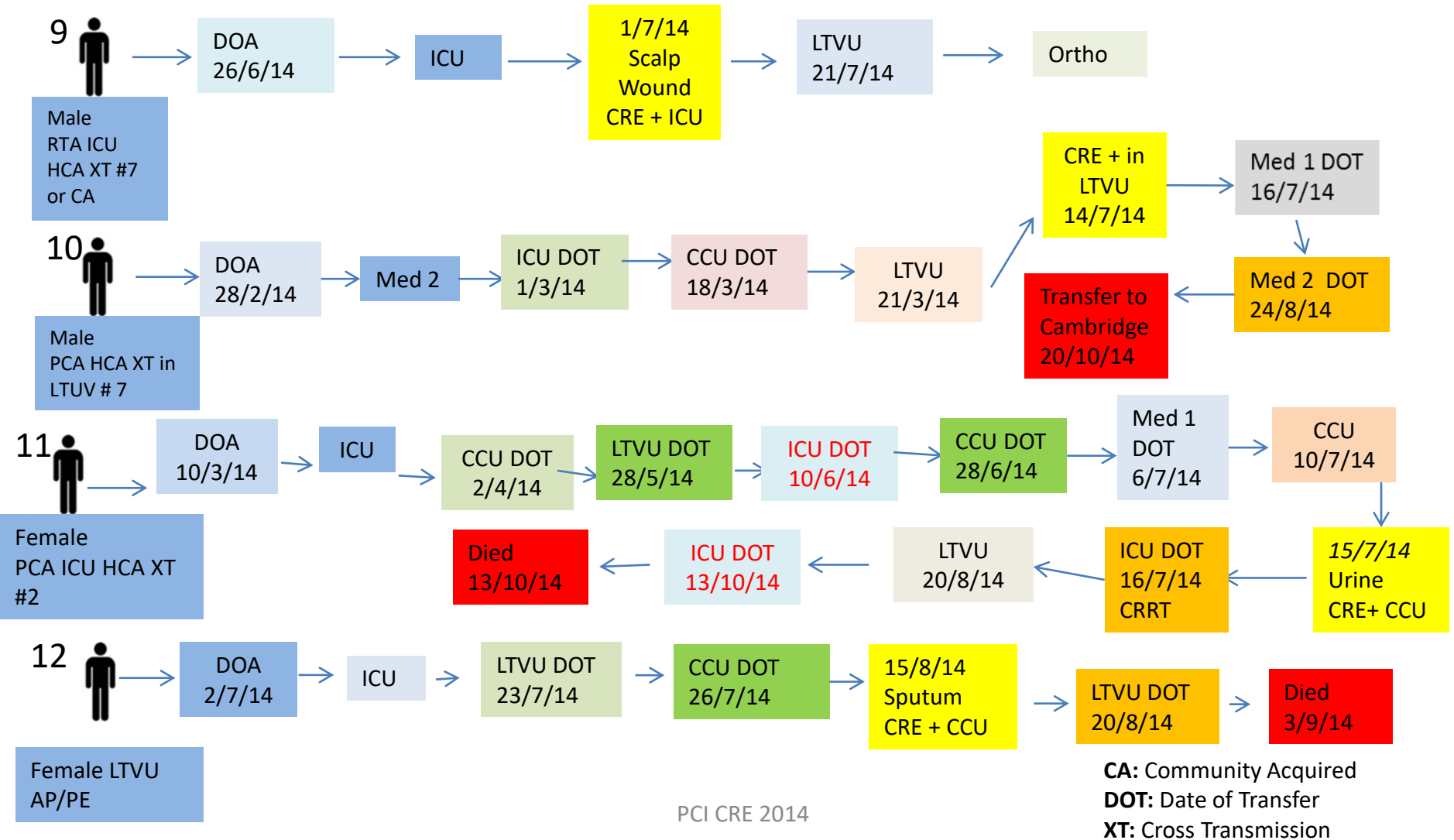
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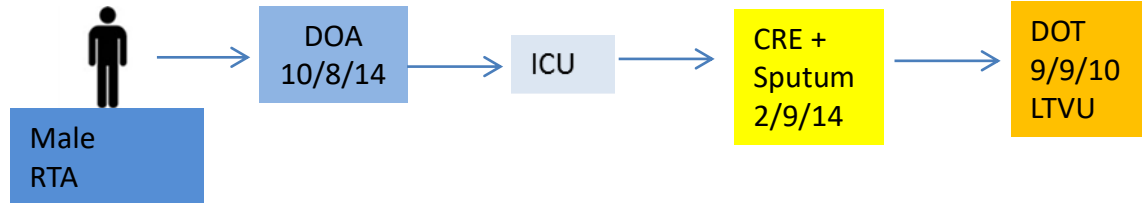
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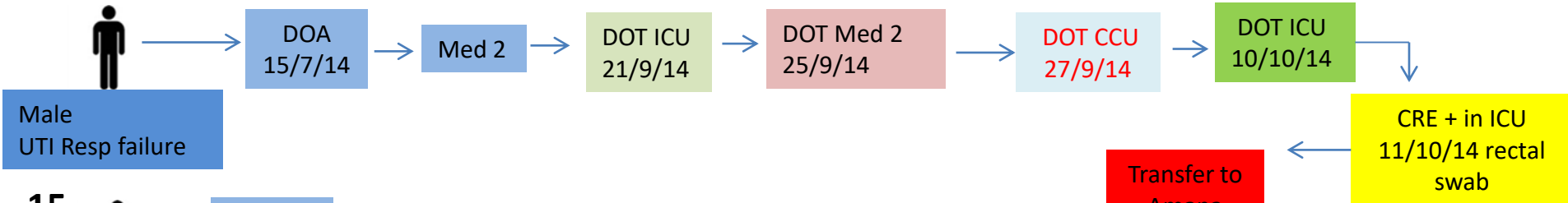
Prevention and Control of Infection Department

CRE Patient in AAH: March 23 ,2015

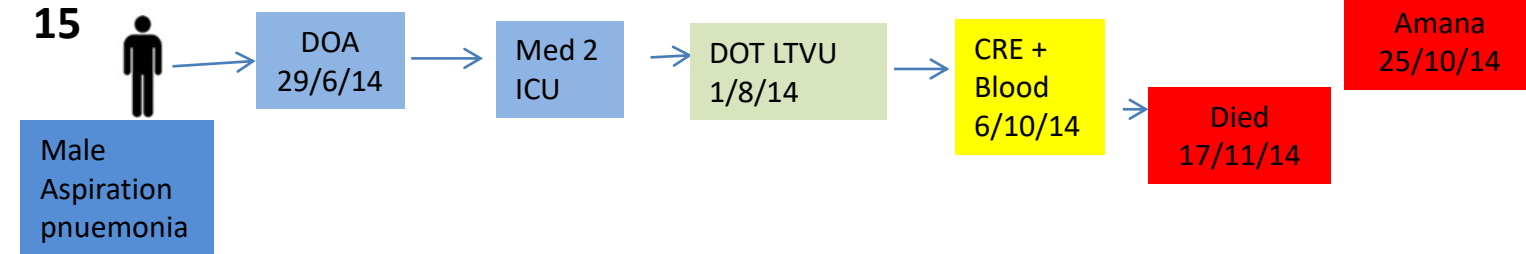
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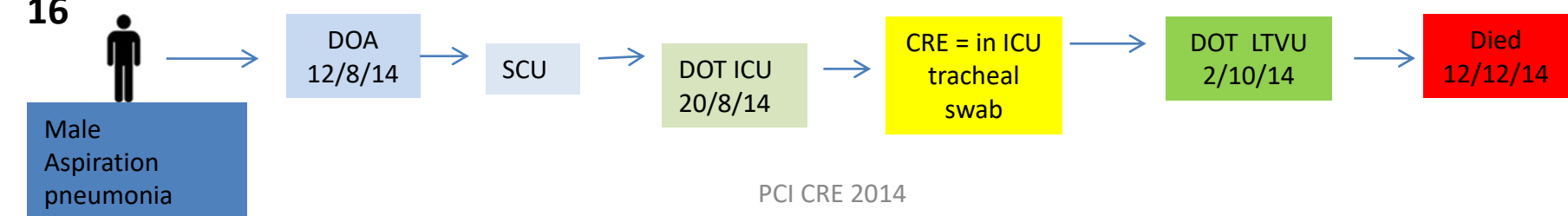
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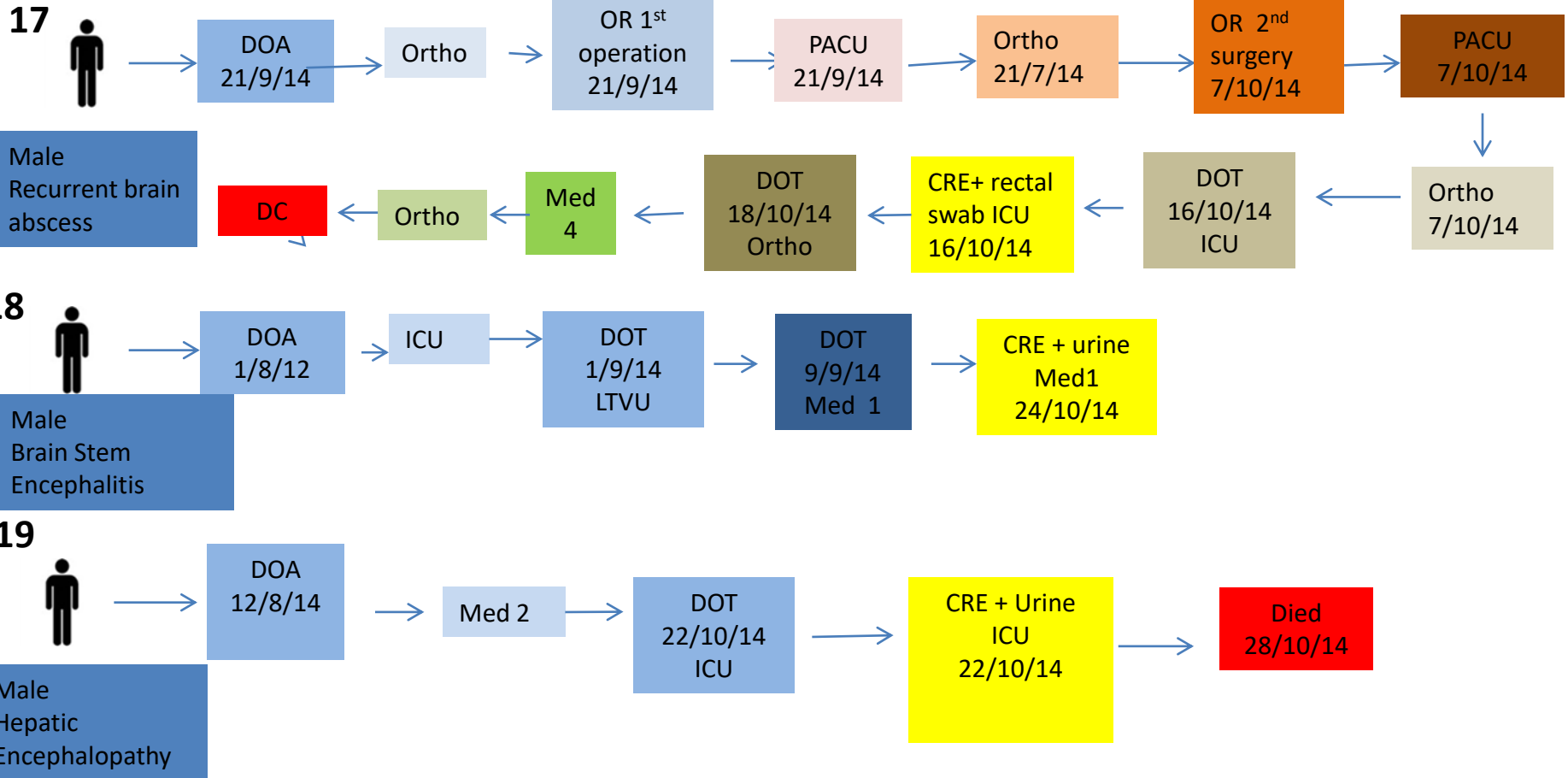


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Prevention and Control of Infection Department

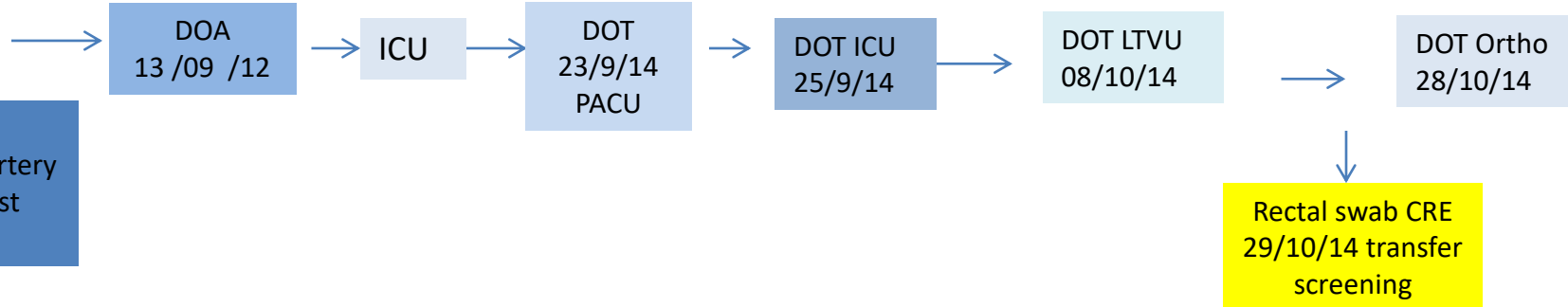
CRE Patient in AAH: March 23, 2015



Prevention and Control of Infection Department

CRE Patient in AAH: March 23 ,2015

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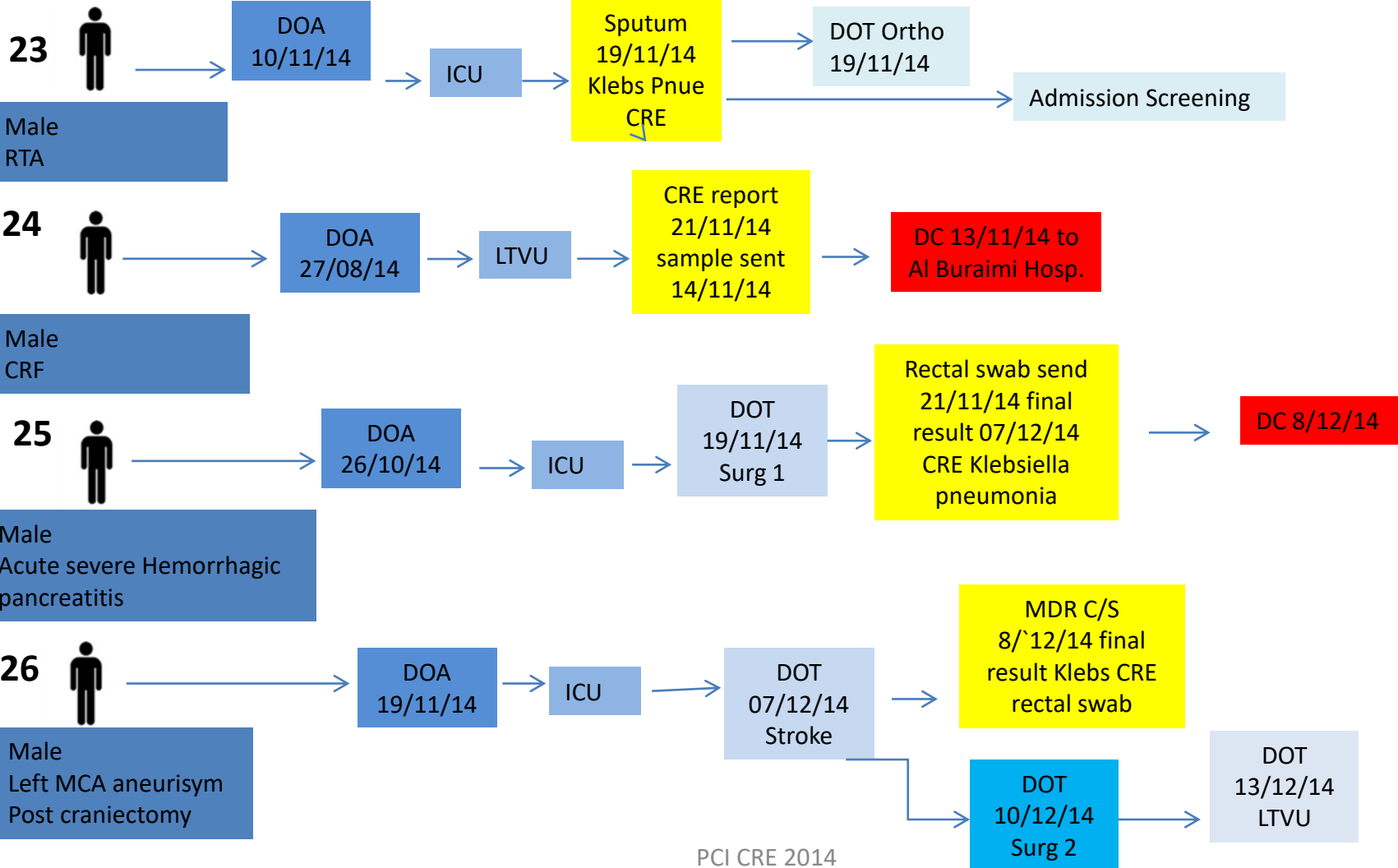


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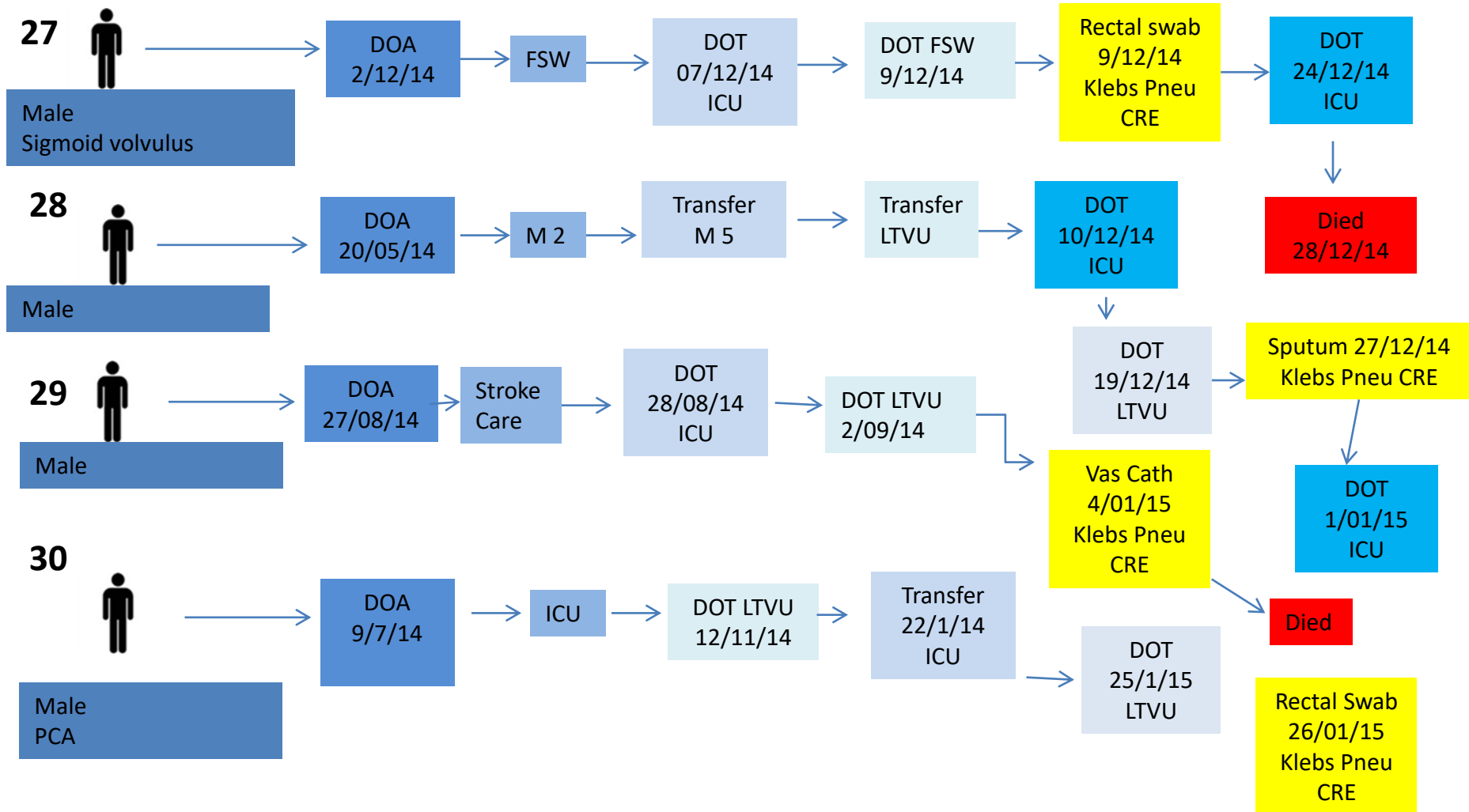
Prevention and Control of Infection Department

CRE Patient in AAH: March 23 ,2015



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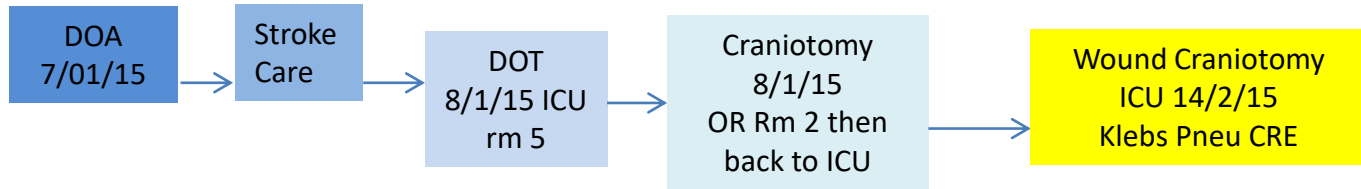
Prevention and Control of Infection Department

CRE Patient in AAH: March 23, 2015

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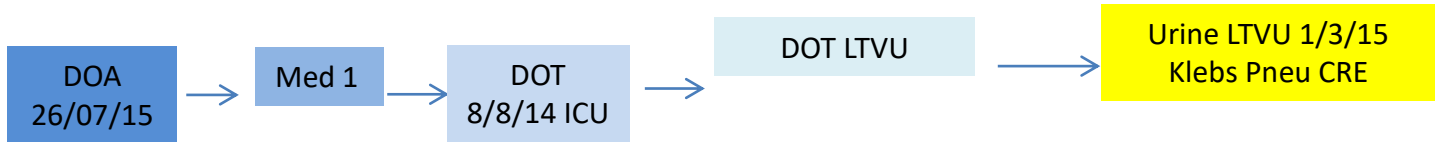
Female
Post craniotomy



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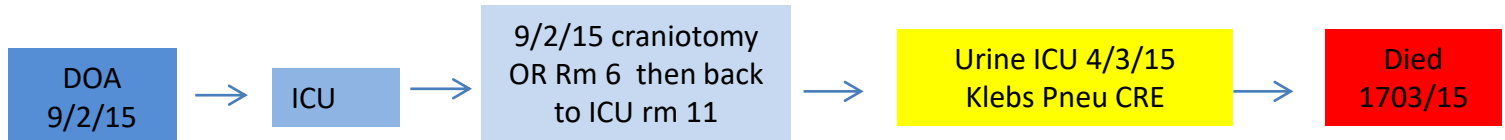
Female
Pneumonia IHD



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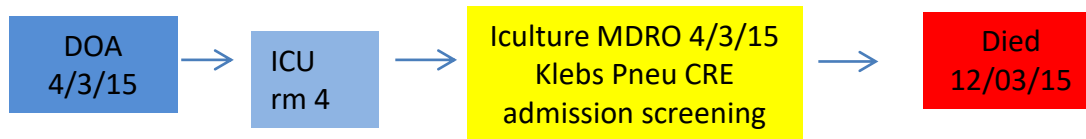
Male
Post craniotomy



34



Male
Sever Malaria



Prevention and Control of Infection Department

CRE Patient in AAH: March 23 ,2015

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DOA
12/2/15



ICU



DOT
4/3/15
CCU



Rectal sawb 4/3/15
Klebs Pneu CRE



DOT
17/3/15
Med 2

Male
PCA

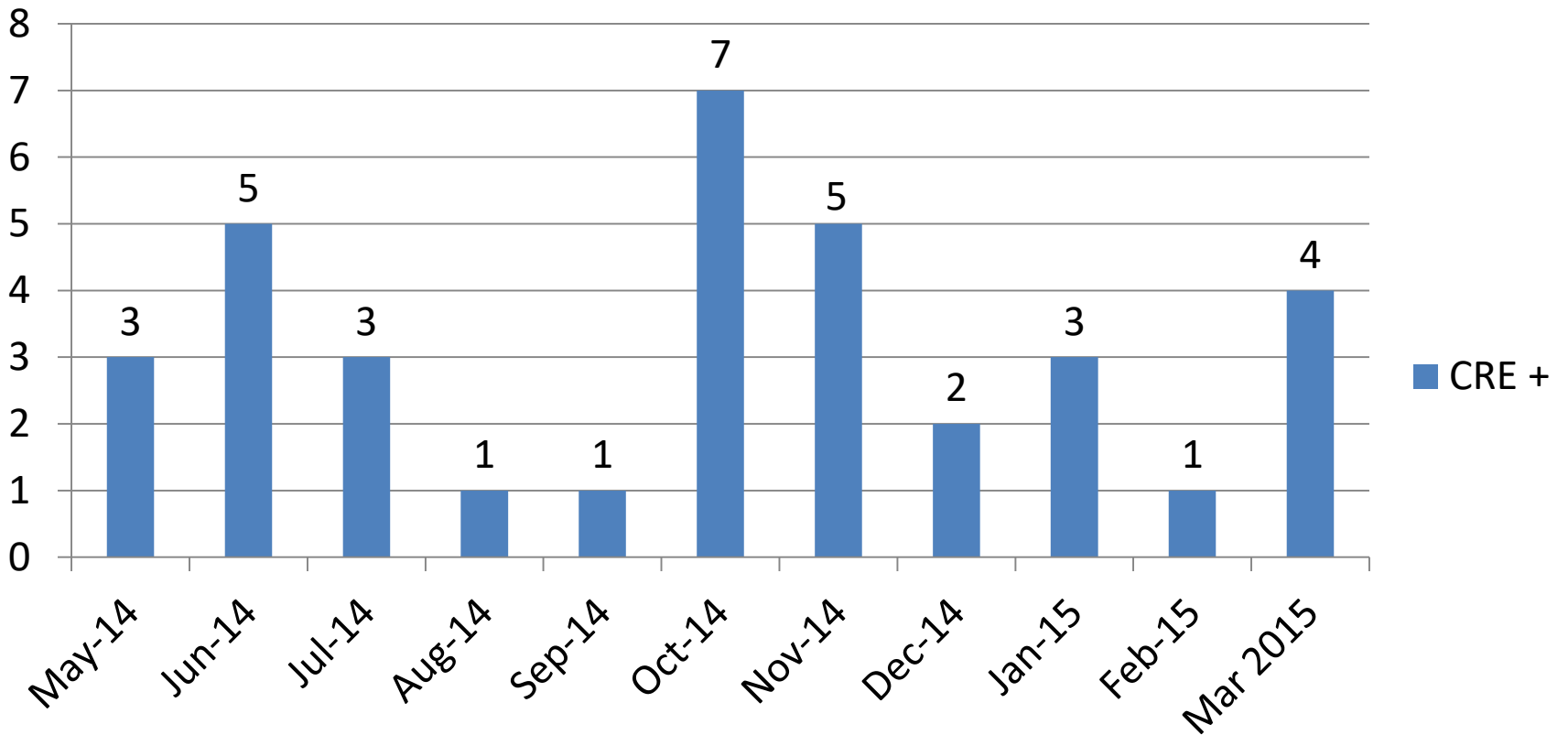
PCI Team Conclusion !

- CRE Reservoir ICU
- Cross transmission occurred
- 27/35 patients passed through ICU during their journey
- 3 patient diagnosed as community acquired CRE
- 5 patients were in long term unit admitted in LTVU under ICU

Prevention and Control of Infection Department

CRE Patient in AAH: March 23,2015

Total # of CRE + per month



Outbreak Management

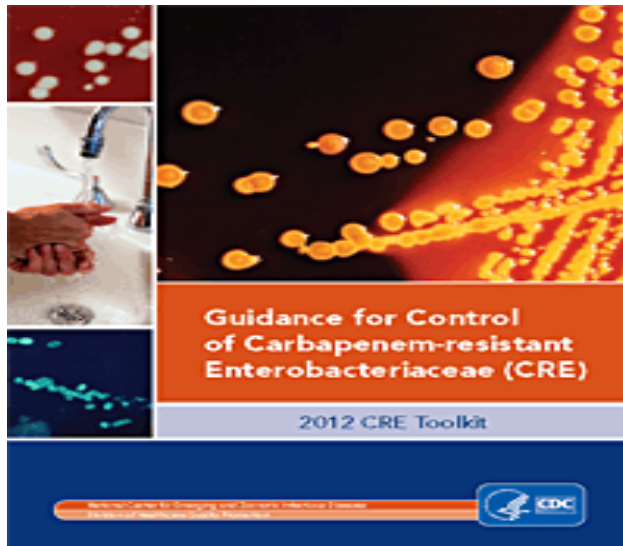
Further Actions by PCI Team to Control CRE



Outbreak Management

CDC Guidelines for Control of CRE

- Active surveillance



AAH Outbreak Management

- Strict Hand hygiene (S)
- Contact precautions (PS)
- Dedicated equipment (S)
- 2% Chlorhexidine bath (S)
- Dedicated staff (S)
 - S: Success PS: Partial Success NS: No Success

AAH Outbreak Management

- Restricted visitors (PS)
- Patient Transfer (S)
- Staff Transfer (NS)
- Minimized use of invasive devices (PS)
- Environmental cleaning & disinfection (NS)
- Post discharge cleaning (PS)

- S: Success PS: Partial Success NS: No Success

Critical Opportunity for CRE Control

AAH Strategy: “Detect and Protect”



Detect & Protect Strategy

- ❑ Environmental screening
- ❑ Check post screening
- ❑ Point prevalence screening
- ❑ Decolonization treatment

Detect & Protect Strategy (contd).

- Environmental screening
 - Reservoirs found positive with CRE
 - COWS
 - Sink

Detect & Protect Strategy (contd).

- Check post screening
 - At the time of
 - Patient **admission**
 - Patient **discharge**

Detect & Protect Strategy (contd).

- **Point prevalence screening**
 - **Rectal swab** screening of all admitted patients in ICU

Detect & Protect Strategy (contd).

- Decolonization treatment
- AAH protocol
- All known positive cases screened **every 10 days** for **4 consecutive months**
- **2** cases turned **negative** after 8 weeks **for** a period of just **a week**

Final Thought



Questions Remain Unresolved?

- ❑ **How long** to do **active screening surveillance** in affected unit?
- ❑ When to **take off** contact **precautions**?
- ❑ How to eliminate permanently the bug from ICU?
- ❑ How effective is AMS program in controlling CRE?
- ❑ How big is the problem in community?

Dr. Farrukh Sheikh Thank You All for the Attention!



**ANY MORE
QUESTIONS?**