



Gram-negative, glucose non-fermenter

Causes a variety of infections

- Respiratory
- Bloodstream
- Wound

Can also cause asymptomatic colonization

· Respiratory, skin, gastrointestinal, wounds

Slides courtesy Dr. Cal Ham, CDC



# Kansas A. baumannii in Healthcare Settings

### Environmental pathogen

- · Resistant to effects of desiccation
- · Contaminates:
- · Medical equipment
- · Environmental surfaces



Infections linked to healthcare outbreaks (rare outside healthcare settings)

- · Acute care hospitals: ICUs and other settings with very ill patients
- · Long-term care facilities

Our mission is to protect and improve the health and environment of all Kans



# Kansas Carbapenem-Resistant Acinetobacter

Multidrug-resistant Acinetobacter considered a serious public health threat in the U.S.

- 7,000 infections
- 500 deaths



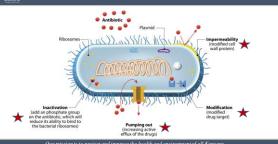
Carbapenems: "antibiotics of last resort", used to treat highly resistant infections

Carbapenem resistance in Acinetobacter dramatically increased from early 2000s to ~2010



Our mission is to protect and improve the health and environment of all Kan

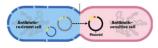
# Kansas Mechanisms of Antibiotic Resistance



# Kansas Carbapenemases

Carbapenemases are enzymes that degrade carbapenem antibiotics
• Public Health concern due to potential for rapid spread, outbreaks

Carbapenemase genes are often on mobile genetic elements that can be transferred among other gram-negative organisms



Common carbapenemases: KPC, NDM, VIM, OXA, and IMP

## Kansas Carbapenemase Classifications

| Enzyme  | Classification | Activity  |  |
|---|----------------|---|--|
| Klebsiella pneumoniae carbapenemase (KPC)             | Class A        | Hydrolyzes all β-lactam agents  |  |
| New Delhi Metallo-β-<br>lactamase ( <b>NDM</b> )      |                |   |  |
| Imipenemase (IMP)                                     | Class B        | Hydrolyzes all β-lactam<br>agents except aztreonam  |  |
| Verona Integron Mediated<br>Metallo-β-lactamase (VIM) |                | agents except aztreonam   |  |
| Oxacillinase ( <b>OXA</b> )                           | Class D        | Hydrolyzes carbapenems<br>but not active against 3 <sup>rd</sup><br>generation cephalosporins |  |

## Kansas Carbapenem-resistant A. baumannii (CRAB)

Acquired class A, B, and D carbapenemases reported

- Metallo-β-lactamases and KPC rare
- Multiple acquired class D oxacillinases
  - OXA-23 • OXA-24/40
  - Plasmid-associated (transferrable) OXA-58
  - OXA-48 • OXA-51
  - Chromosomal-associated (intrinsic resistance)
- Phenotypic methods for carbapenemase production in CRAB are unreliable
  - Verigene is capable of detecting OXA-23, -24, -58, and -51
  - Cepheid is only able to detect OXA-48

Slide courtesy Dr. Jennifer Dale, Minnesota Department of He

alth and environment of all Kan



## Kansas Carbapenem-resistant A. baumannii (CRAB)

#### CRAB isolates tested at Minnesota Dept. of Health

- PCR is recommended approach to identify carbapenemase genes
  - · MDH tests for most common genes (KPC, NDM, OXA-48, VIM, IMP) Missing most common CRAB carbapenemase genes and novel genes
- MDH is validating non-OXA-48 variants and will soon be reported out to facilities



# Kansas OXA-producing CRAB

### CRAB specimen testing by MN ARLN (2018)

- · Kansas: 34 CRAB isolates
  - · All producing OXA-51 (intrinsic)
  - 27 (79%) OXA-23 or OXA-24



• 5 cases from 3 states (January 2017-July 2018)

NDM (2), OXA-24 (1)



\*data are preliminary and subject to change



## Kansas OXA-Producing CRAB Isolates

Three clusters of CRAB isolates from May - Dec. 2018

- 12 OXA-23 isolates (2 clusters)
- MLST 208, 1806 and MLST 281, 1839
- 15 OXA-24 isolates (1 cluster)
  - MLST 208, 1806
  - · Potentially related to MO cluster (WGS pending)

All OXA-24 isolates were clinical specimens; all taken from healthcare facilities in the greater KC metro area

· Long-term care facilities, skilled nursing facilities, acute care hospitals

ry and subject to change; "MSLT is based off of the Center for Genomic Epidemiology bioinforms Our mission is to protect and improve the health and environment of all Kans



Patient location at time of isolate collection

- · Acute care hospital: 7 (41%)
- · Long-term acute care facility: 5 (29%)
- · Nursing facility: 5 (29%)

#### Specimen sources

- Respiratory: 6 (35%)
- Wound: 6 (35%)
- Urine: 3 (18%)
- · Rectal (screening): 2 (12%)



# Kansas OXA-24 CRAB Susceptibility

| Susceptibility          | Card:      |                | Lot<br>Number:                 | Expires:            |                |
|-------------------------|------------|----------------|--------------------------------|---------------------|----------------|
| Information             | Completed: |                | Status: Final                  | Analysis 6.38 hours |                |
| Antimicrobial           | MIC        | Interpretation | Antimicrobial                  | MIC                 | Interpretation |
| ESBL                    |            |                | Meropenem                      | >= 16               | R              |
| Ampigitin               |            |                | Amikacin                       |                     |                |
| Ampicialn/Sulbactam     | [4"]       | *R             | Gentamicin                     | >= 16               | R              |
| Piperacillin/Yazobactam | >= 128     | R              | Tobramycin                     | >= 16               | R              |
| Cefazolin               | >= 64      | R              | Ciproflexacin                  | >= 4                | R              |
| Cefaxitin               |            |                | Levofloxacin                   | 4                   | 1              |
| Ceftazidime             | >= 64      | R              | Nitrofurantoin                 |                     |                |
| Ceftriaxone             | >= 84      | R              | Trimethoprim/Sulfamethox azole | >= 320              | R              |
| Cefepime                | 32         | R              |                                |                     |                |

Our mission is to protect and improve the health and environment of all Kar

## Kansas Core Infection Control Practices for CRAB



Standard Precautions

· Hand hygiene, PPE

# **Contact Precautions**

- Wound care
- · Ventilator maintenance
- · History of MDRO

#### Patient Screening

 Screening options limited due to OXA variants other than 48 not being detected on Cepheid

## Kansas Core Infection Control Practices for CRAB

#### Environmental Infection Control

- · Daily enhanced environmental cleaning
- Mobile medical equipment
- · High-touch areas
- · Keyboards

### Inter-facility patient transfer forms

KDHE developing an inter-facility transfer form with transmission-based precautions based on the type of facility (e.g., skilled nursing, LTACH)



Our mission is to protect and improve the health and environment of all Kan

# Kansas Core Infection Control Practices for CRAB

#### Competency assessments and adherence monitoring

· How good are your staff members' practices



| for each paties |             |                      |
|-----------------|-------------|----------------------|
| he coch paties  |             |                      |
| he coch paties  |             |                      |
| he such paties  | Manager 1   |                      |
|                 |             |                      |
|                 |             | Not Present to Stone |
| Chunch          | Net Cleaned | Nat Prepart to Roses |
|                 |             |                      |
|                 | _           |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 | _           |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |
|                 |             |                      |

r mission is to protect and improve the health and environment of all Kans

# Kansas Reporting to Public Health (KS)

## Kansas Regulations (K.A.R. 28-1-2, 28-1-18)

- · Any carbapenem-resistant bacterial infection or colonization report to KDHE within one business day
  - Carbapenem-resistant Enterobacteriaceae (CRE), Acinetobacter baumannii (CRAB), and Pseudomonas aeruginosa (CRPA)
  - · Reporting form: www.kdheks.gov/epi/disease\_reporting.html
- · Laboratories must submit isolate to Kansas public health laboratory
- Outbreaks or clusters of any disease are reportable to KDHE within 4 hours by telephone (877-427-7317).



Our mission is to protect and improve the health and envir

# Kansas Reporting to Public Health (MO)

#### Missouri Regulations (19 CSR 20.20-020)

- · CRE shall be reported in aggregate on a quarterly basis
  - · January, April, July, October
- Carbapenemase-producing CRE (CP-CRE) shall be reported within 24-hours to the Bureau of Communicable Disease Control and Prevention
  - Once CP-CRE is reported, an isolate may be sent to the Missouri State Public Health Lab for further testing
- · Any outbreaks of Hospital Acquired Infections that pose a risk to public health must be reported regardless of the organism identified

Our mission is to protect and improve the health and environment of all Kans

# Kansas Additional Resources

CDC Acinetobacter in Healthcare Settings
• www.cdc.gov/hai/organisms/Acinetobacter.html

APIC Guide to Elimination of MDR-Acinetobacter baumannii Transmission in Healthcare Settings:
• https://apic.org/Professional-Practice/Implementation-guides#Acinetobacter

Pennsylvania Department of Health Wound Care Observation Checklist for Infection Control:

www.health.pa.gov/topics/Documents/Programs/HAIP-AS/Wound%20care%20observation%20checklist.FINAL.pdf

CDC Inter-facility Infection Control Transfer Form:

www.cdc.gov/hai/pdfs/toolkits/InfectionControlTransferFormExample1.pdf

# Kansas Contact Information

Kansas Department of Health and Environment Infectious Disease Epidemiology and Response Section

> Epidemiology Hotline (24/7) 877-427-7317 Epidemiology Fax 877-427-7318 Email kdhe.epihotline@ks.gov

Website www.kdheks.gov/epi/index.html Missouri Department of Health and Human Services Bureau of Communicable Disease Control and Prevention

> Telephone 573-751-6113 Email HAI\_reporting@health.mo.gov Address 930 Wildwood Dr., PO Box 570

Jefferson City, MO 65109

Our mission is to protect and improve the health and environment of all Kansans