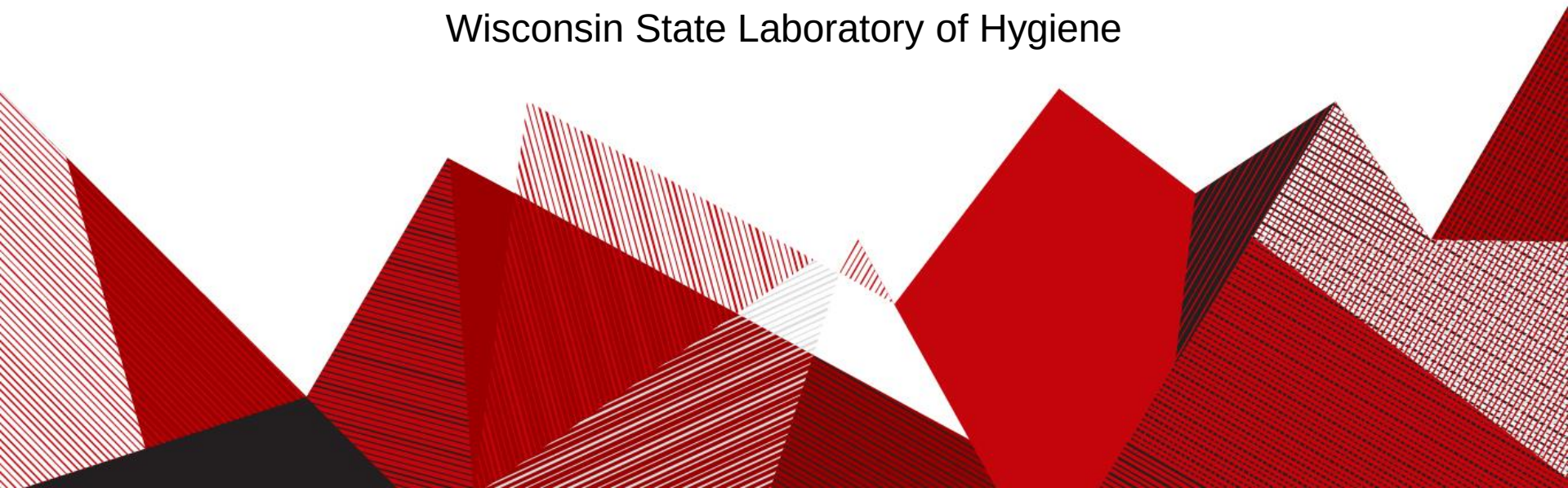
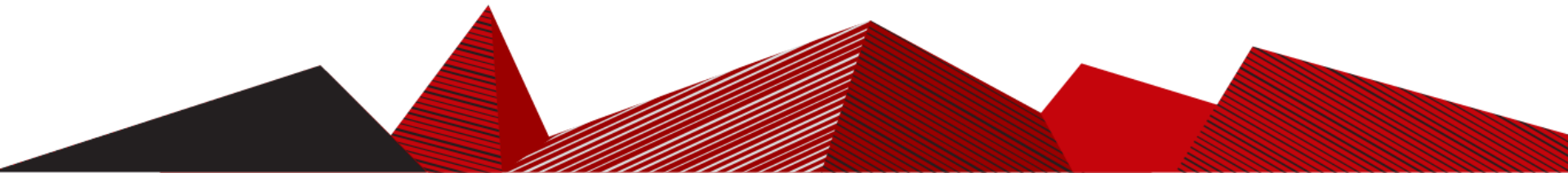
AR Lab Network Update: Wisconsin and the Midwest Region

Ann Valley
AR Lab Network Coordinator
Wisconsin State Laboratory of Hygiene



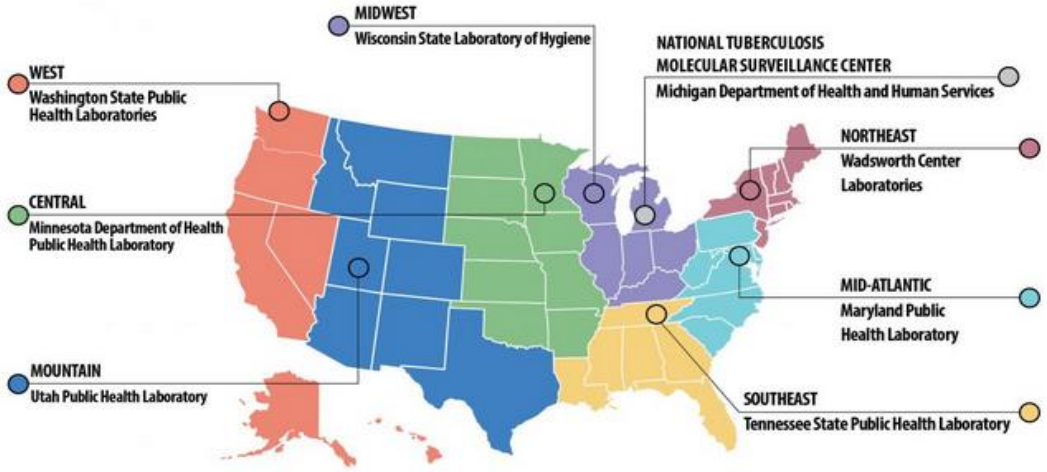
Outline

- Overview
- Core Testing
  - CRE and CRPA isolate testing (Region and State)
  - CPO colonization testing
  - Candida isolate surveillance
  - C. auris colonization testing
- Targeted surveillance
  - Overview
  - Data
  - New testing
- Expanded AST for hard to treat infections
  - Methods
  - Testing criteria
  - Test request



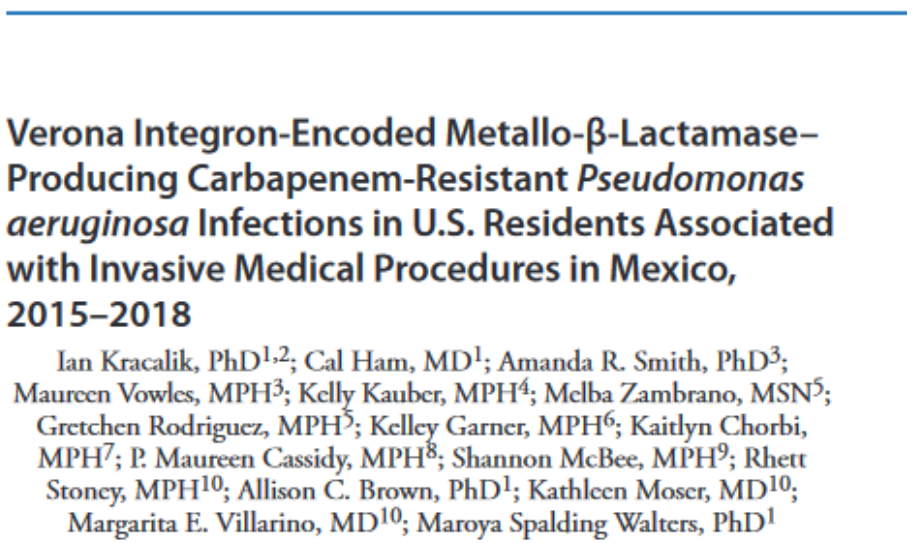
AR Lab Network

- **Detect** Stronger detection of new resistance and better trend tracking
- **Prevent** Better data for stronger infection control
- **Innovate** Lab samples may be available through the AR Isolate Bank
- **Respond** Collaboration to identify spread and support outbreak response



Carbapenem-Resistant *Enterobacteriaceae* and *Pseudomonas aeruginosa*

- **Statewide surveillance**
  - Carbapenem non-susceptible *Enterobacteriaceae*
    - *Carbapenemase positive if screened at clinical lab (mCIM or CarbaNP)*
    - *Big3 CRE reportable in NHSN*
    - *CP-CRE reportable in WEDDS (2018)*
  - Carbapenem Resistant *Pseudomonas aeruginosa* (doripenem, imipenem, meropenem)
    - **Up to 5 per month**
    - **Non-mucoid strains**
    - **CF patients excluded**
    - **413 (268 WI) isolates submitted**
      - **1 KPC (WI)**
      - **2 VIM**
      - **2 novel carbapanemases**
- **Regional Testing**
  - Novel carbapenemases
  - Pan-resistance
  - AST



Notes from the Field

Verona Integron-Encoded Metallo-β-Lactamase–Producing Carbapenem-Resistant *Pseudomonas aeruginosa* Infections in U.S. Residents Associated with Invasive Medical Procedures in Mexico, 2015–2018

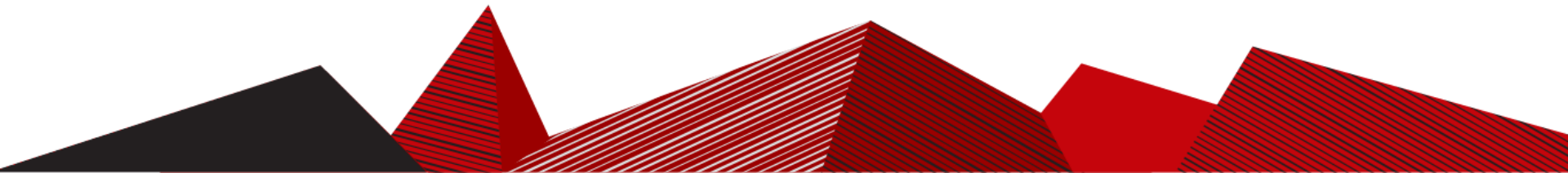
Ian Kracalik, PhD[1,2]; Cal Ham, MD[1]; Amanda R. Smith, PhD[3]; Maureen Vowles, MPH[3]; Kelly Kauber, MPH[4]; Melba Zambrano, MSN[5]; Gretchen Rodriguez, MPH[5]; Kelley Garner, MPH[6]; Kaitlyn Chorbi, MPH[7]; P. Maureen Cassidy, MPH[8]; Shannon McBee, MPH[9]; Rhett Stoney, MPH[10]; Allison C. Brown, PhD[1]; Kathleen Moser, MD[10]; Margarita E. Villarino, MD[10]; Maroya Spalding Walters, PhD[1]

WSLH AR: Testing Algorithm CRE and CRPA

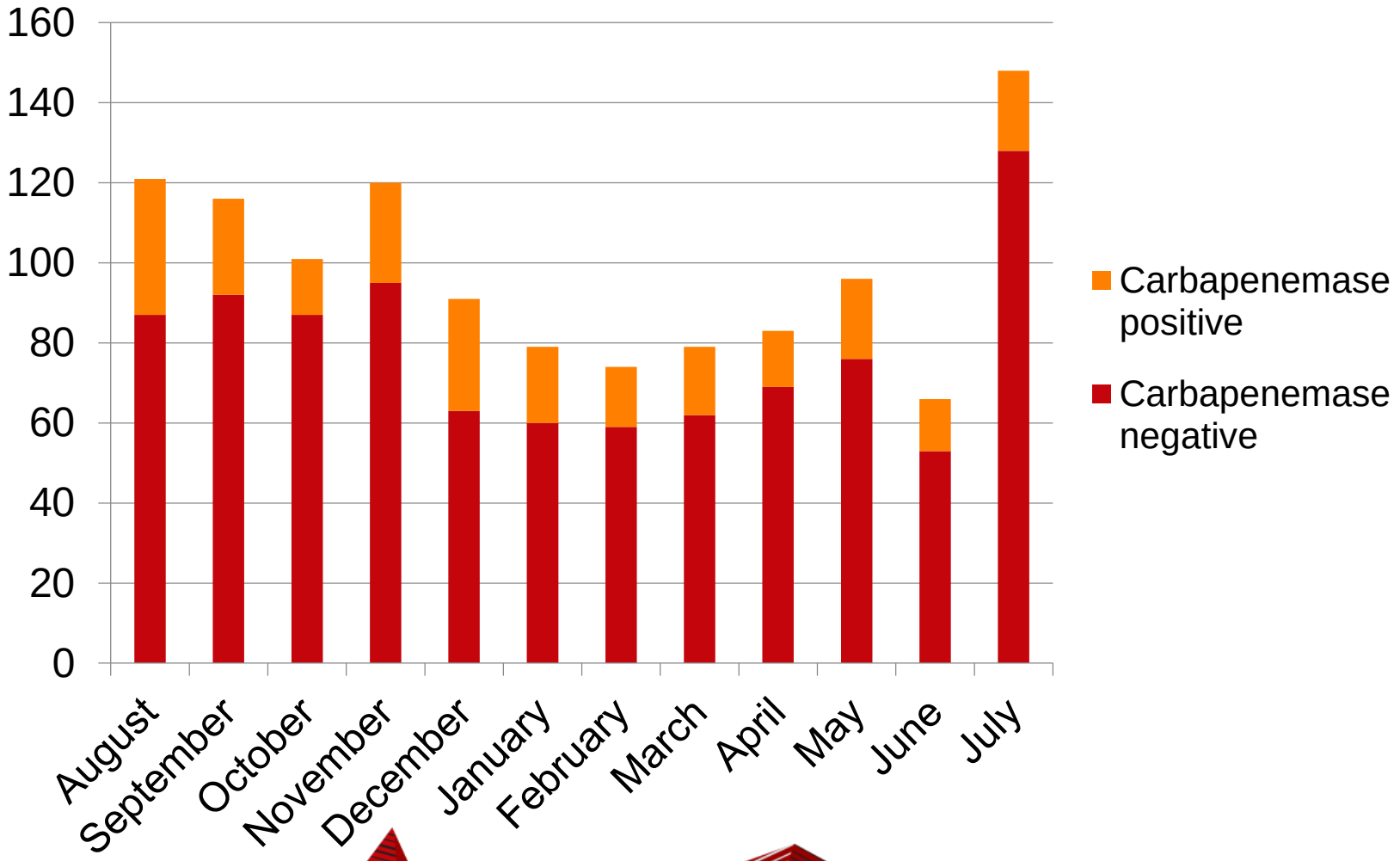
- **Isolate testing**
  - MALDI-TOF
  - AST
  - mCIM (carbapenemase screen)

  - PCR (carbapenemase positive)
    - KPC
    - NDM
    - VIM
    - IMP
    - OXA-48 like

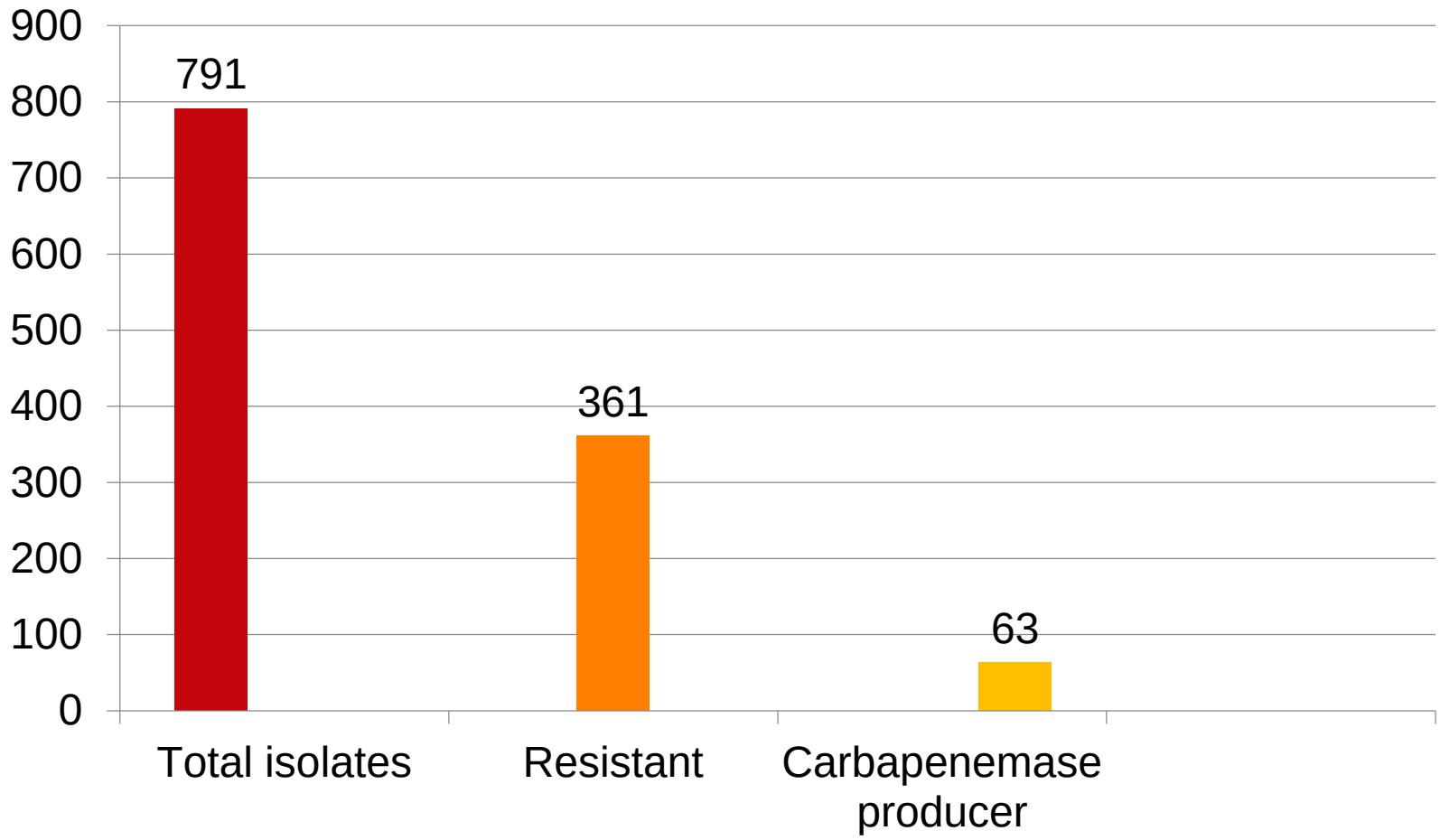
  - NGS
    - Novel
    - Outbreak response



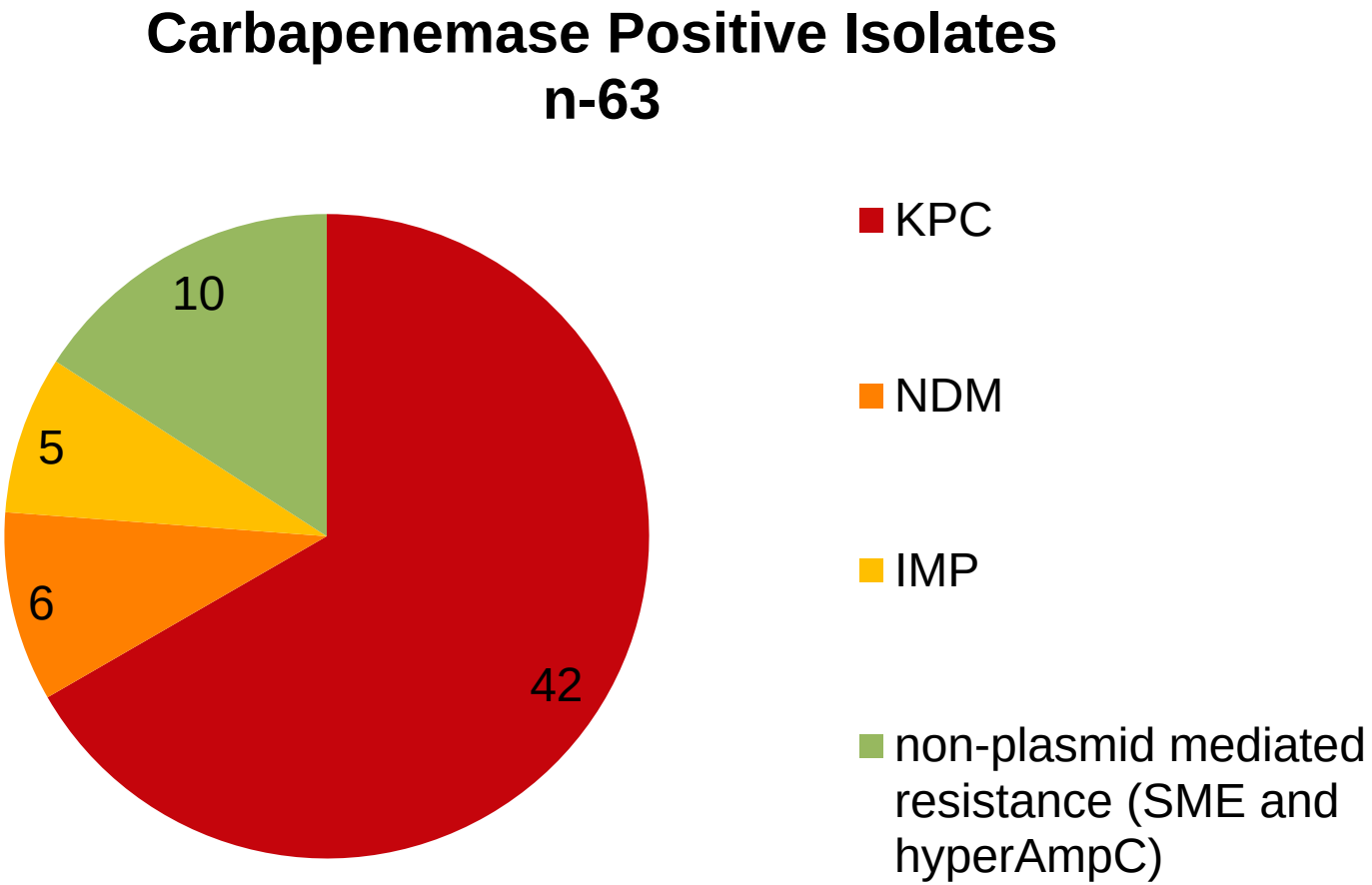
CRE Isolate Testing:2018-2019
Total isolates: 1107



CRE Isolate Testing-WI



CRE Isolate Testing-Wisconsin



Colonization screening for carbapenemases

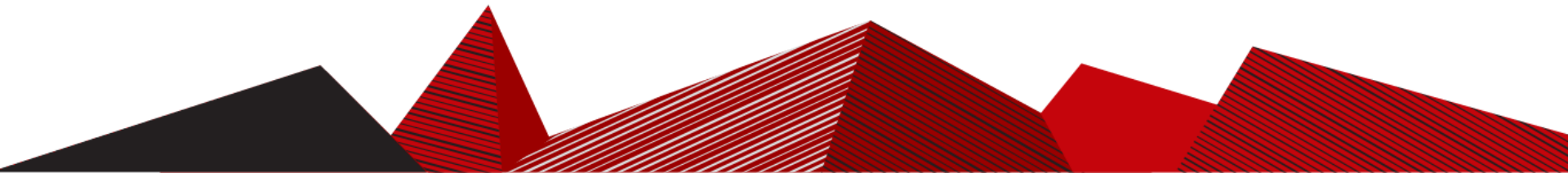
When a CPO is detected:

- Was patient on contact precautions?
- Previous healthcare exposures?
- Travel history? Hospitalizations outside the US?
- Did patient have any roommates?
- Any other patients overlap for ≥3 days?
- Are there multiple CPO's in the same facility within a short period of time?

Contact Healthcare-Associated Infections Preventions Program

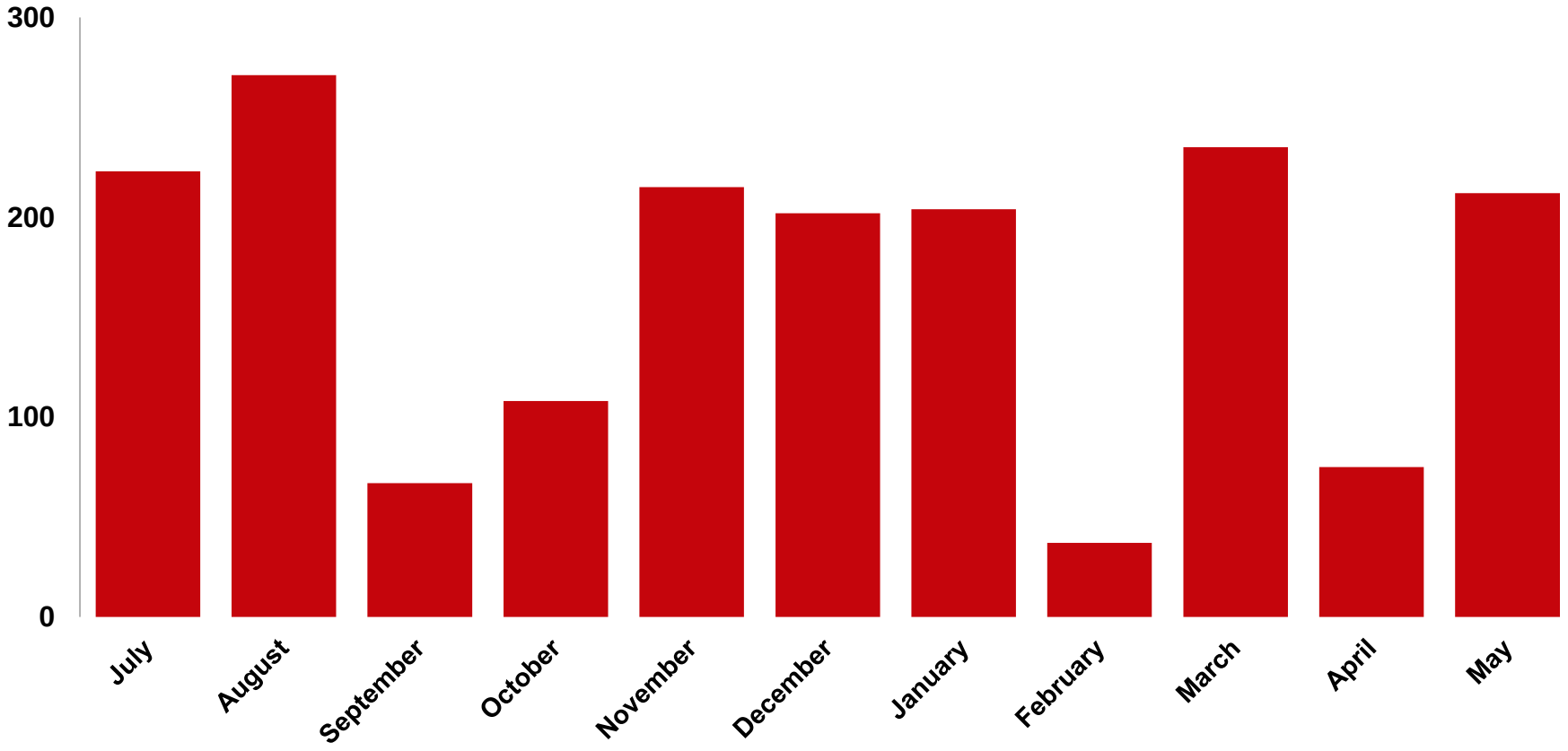
https://www.dhs.wisconsin.gov/hai/index.htm

Phone: 608-267-7711



CRE Colonization Testing – 2018-2019

Total tests: 1849



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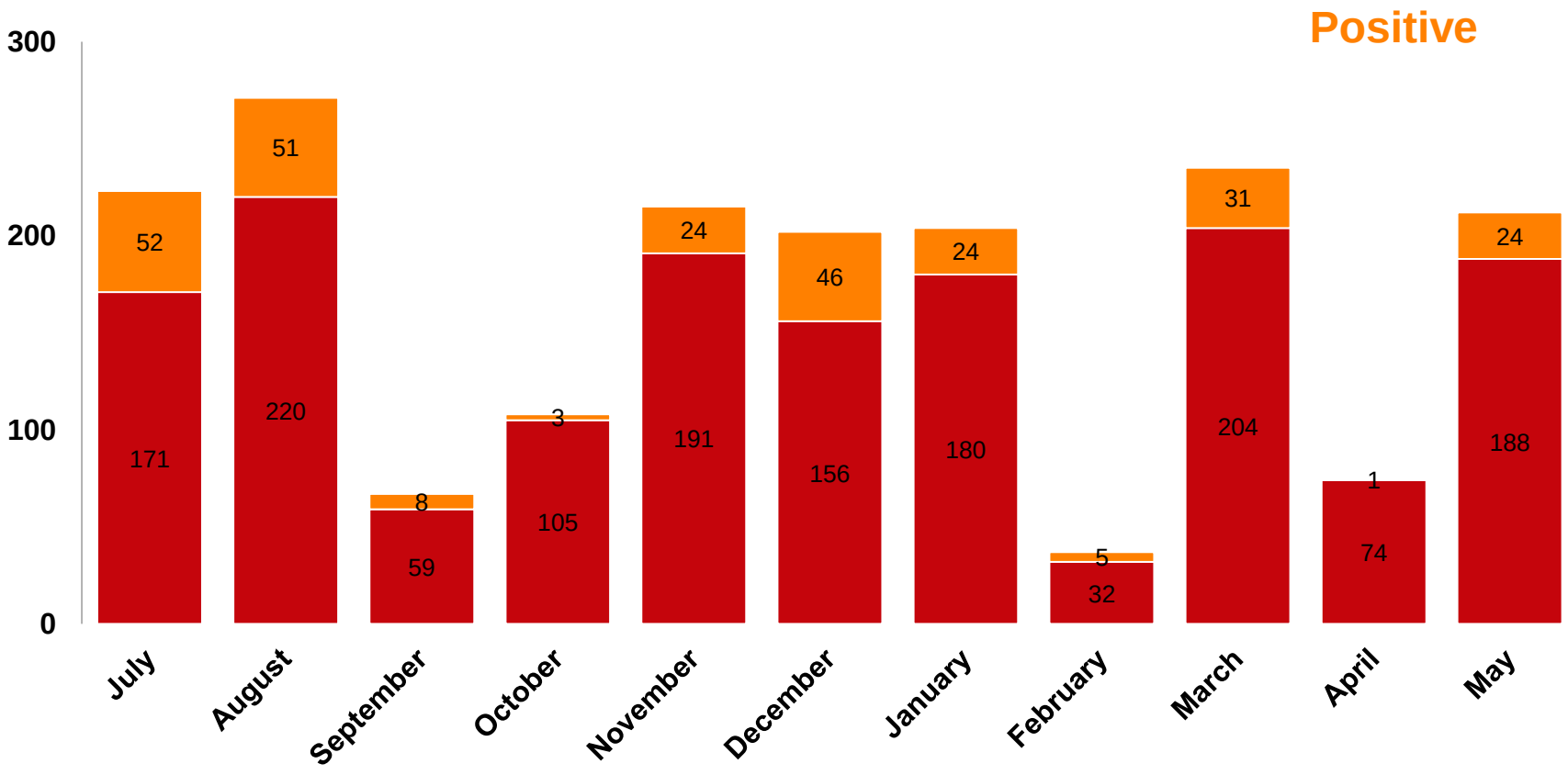
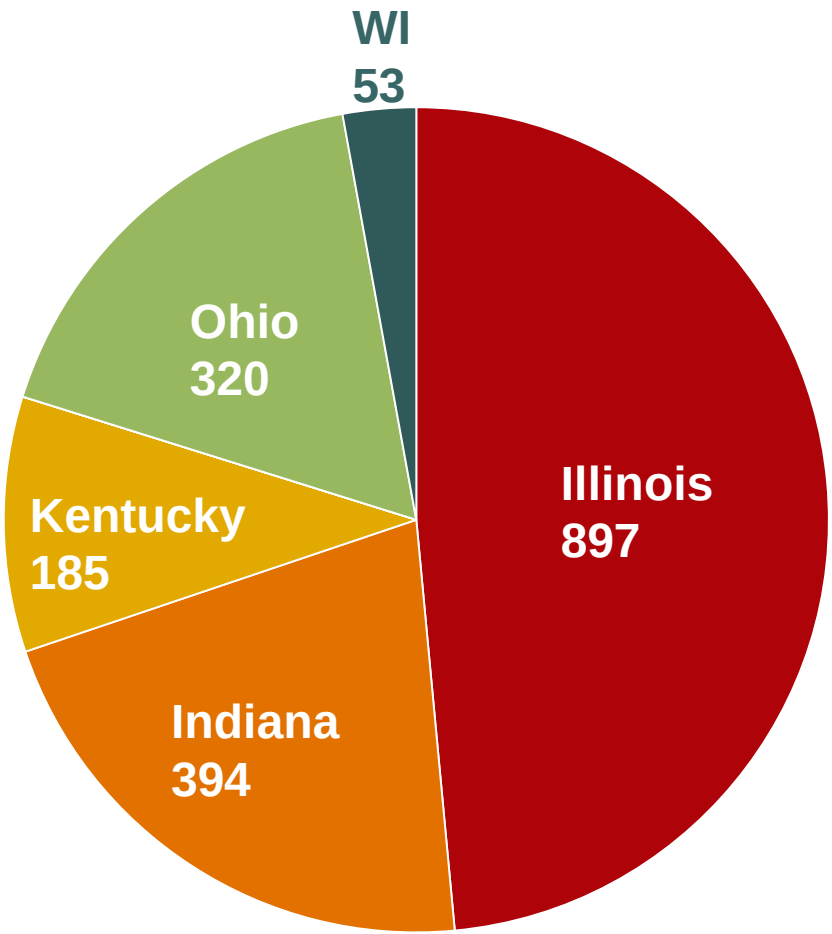
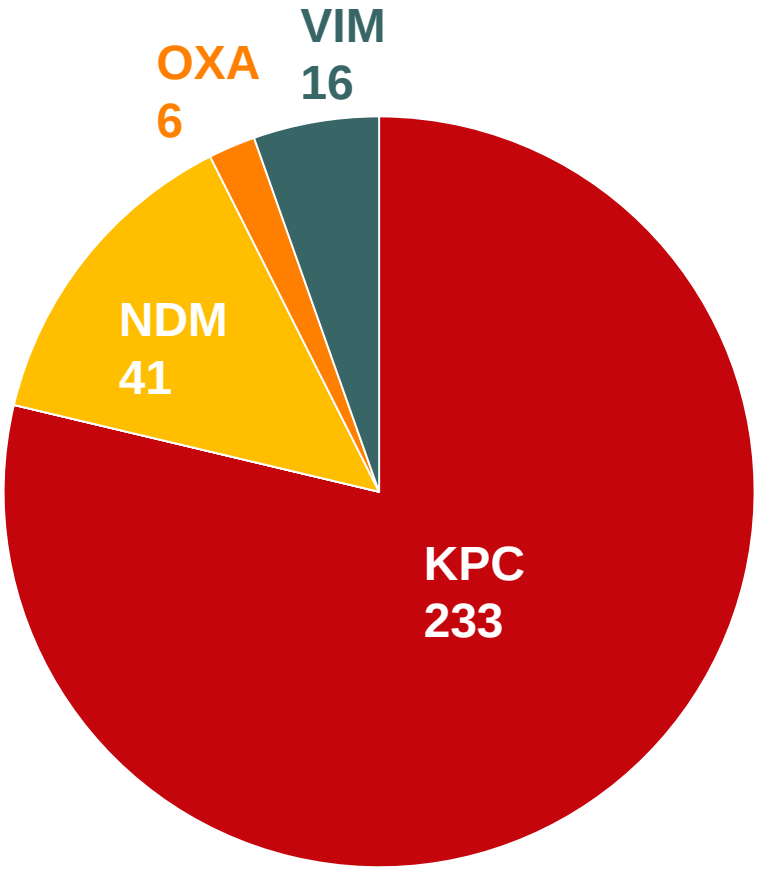


CRE Colonization Testing – 2018-2019



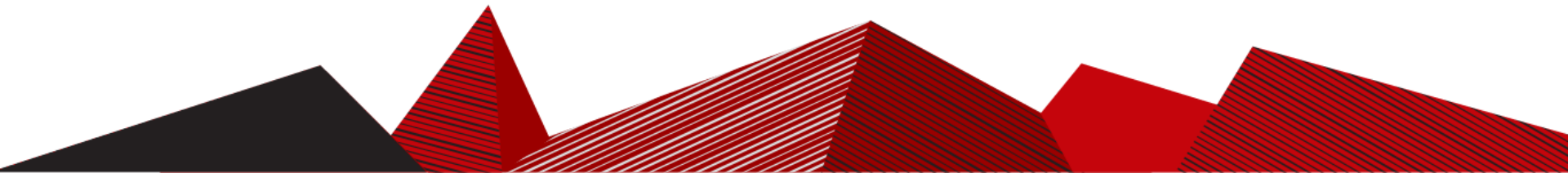
CRE Colonization Testing – 2018-2019



Candida Testing at WSLH

Colonization screening for *Candida auris*

Identification and susceptibility testing



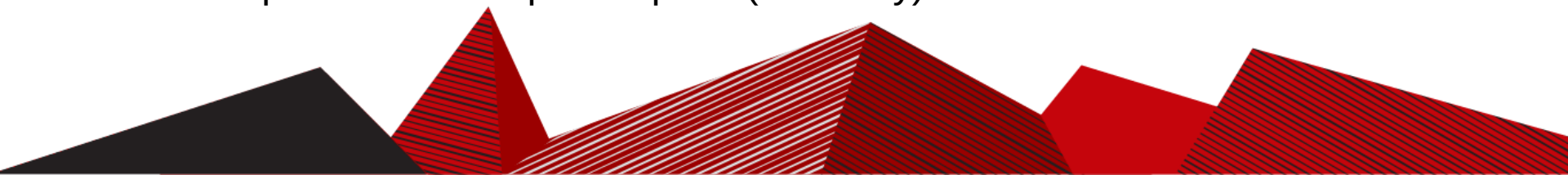
Candida sp. surveillance

WSLH Requests:

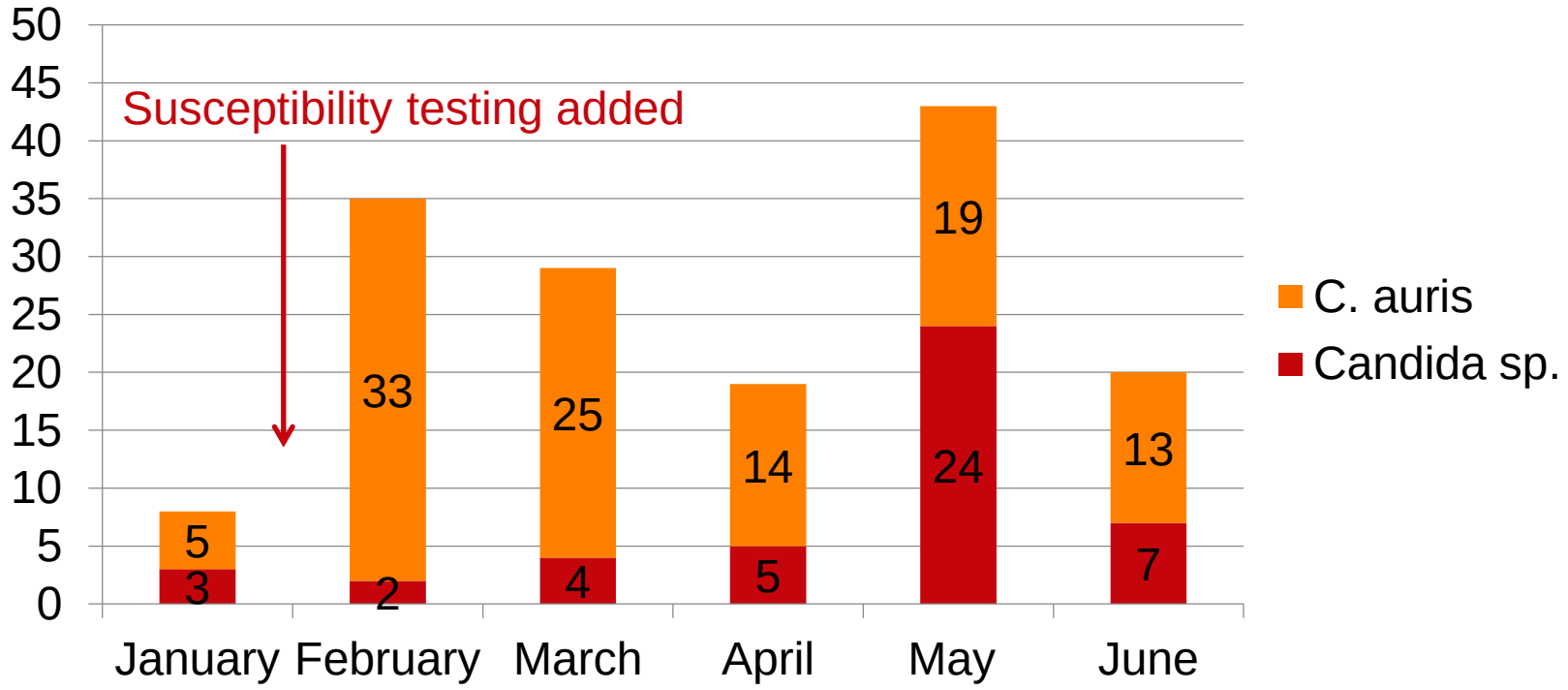
- *Candida auris* or suspect *C. auris*
- MDR Candida sp.
- Any “unusual or hard to identify” ID Candida sp.
- Invasive *C. glabrata*

- Identification by MALDI-TOF
  - Bruker RUO Database
  - MicrobeNet

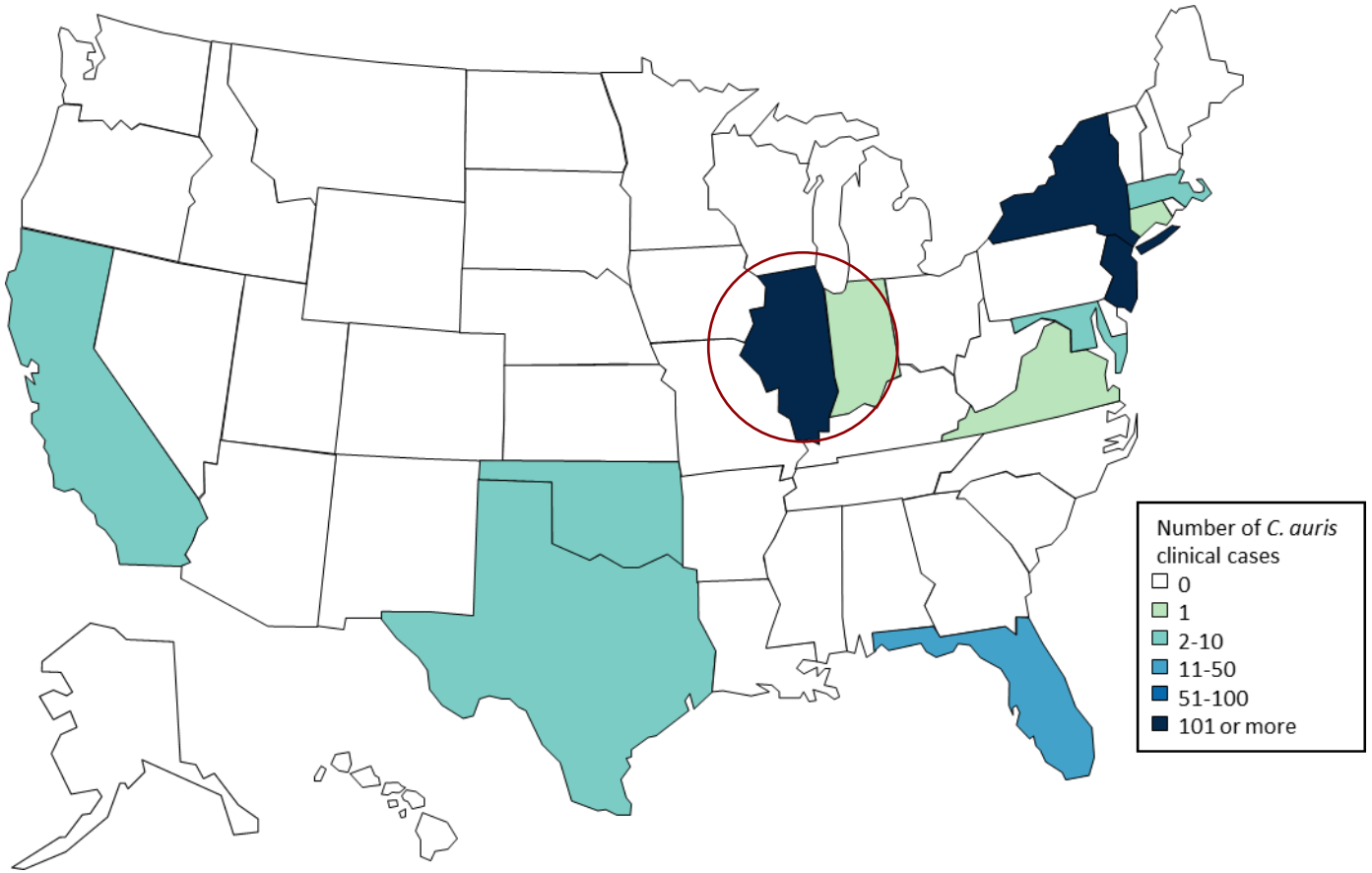
- Antifungal Susceptibility Panel
  - Azoles, Echinocandins, Polyenes
  - Report available upon request (MIC only)



Candida sp. surveillance January-June 2019
Total isolates: 154



Candida auris clinical cases by state of collection 2013-May 2019



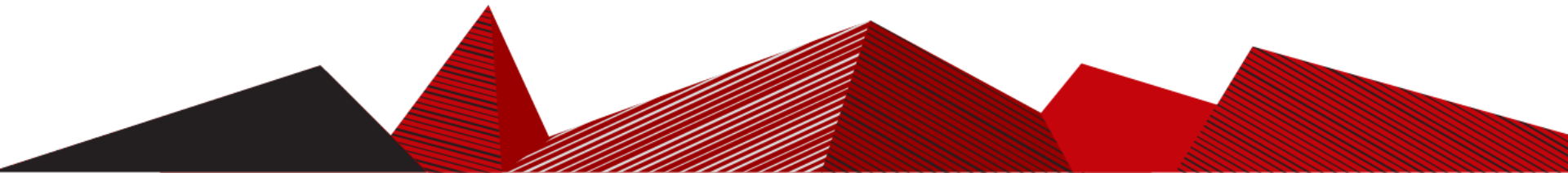
Candida auris

- Immuno-compromised patients
- High staff turnover
- Poor infection control
- Need for intensive response for control

Candida auris early detection strategies

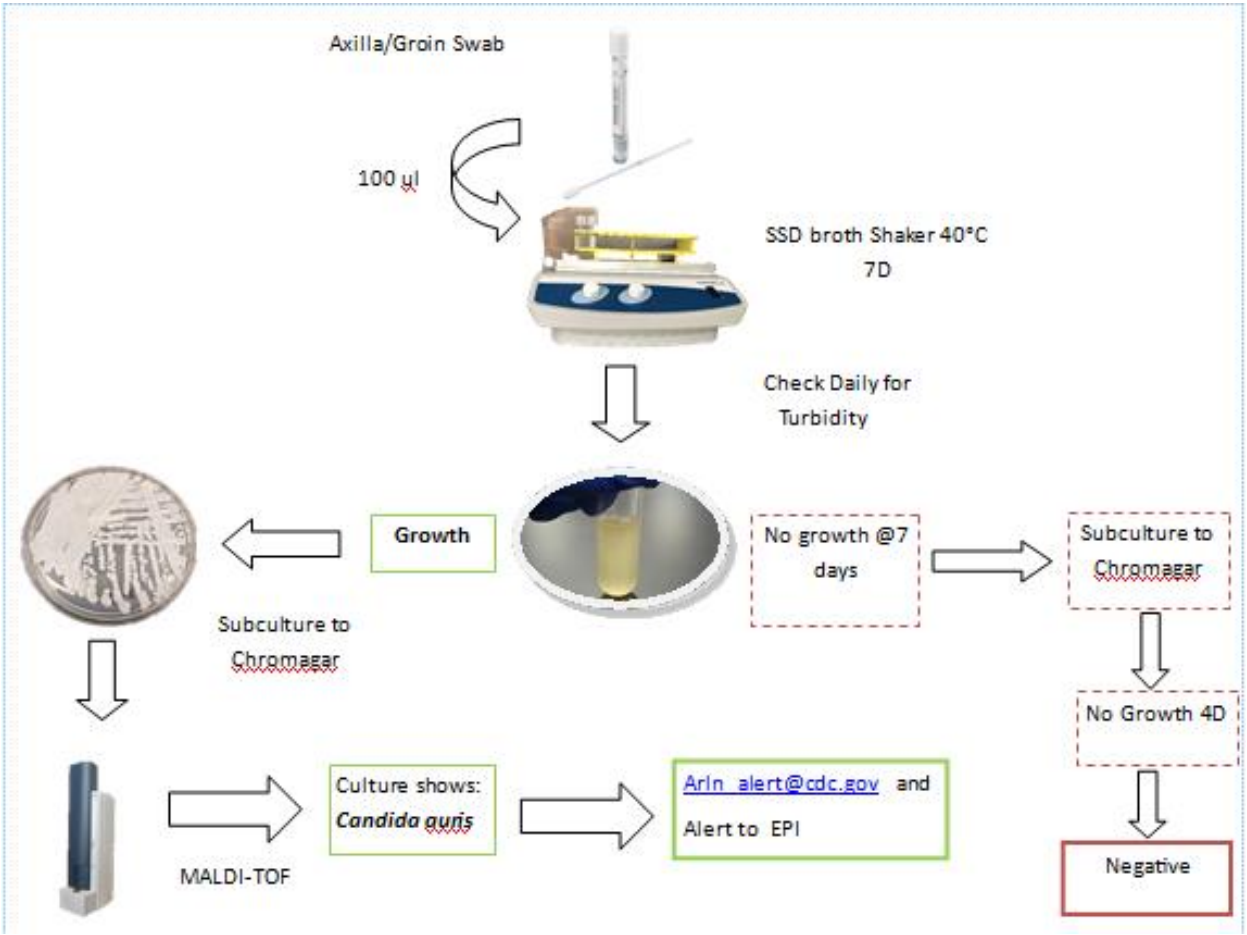
- Screen patients with CPO's on clinical culture with history of healthcare abroad
- Identifying yeast from urine
  - Screen with Candida Chromagar
  - MALDI-TOF

- Periodic PPS in LTACHs and vSNFs in areas bordering high prevalence areas
- Admission screen on patients coming from LTAC's in high prevalence areas.



Candida auris colonization testing

August 2018: *C. auris* Culture



Candida auris colonization

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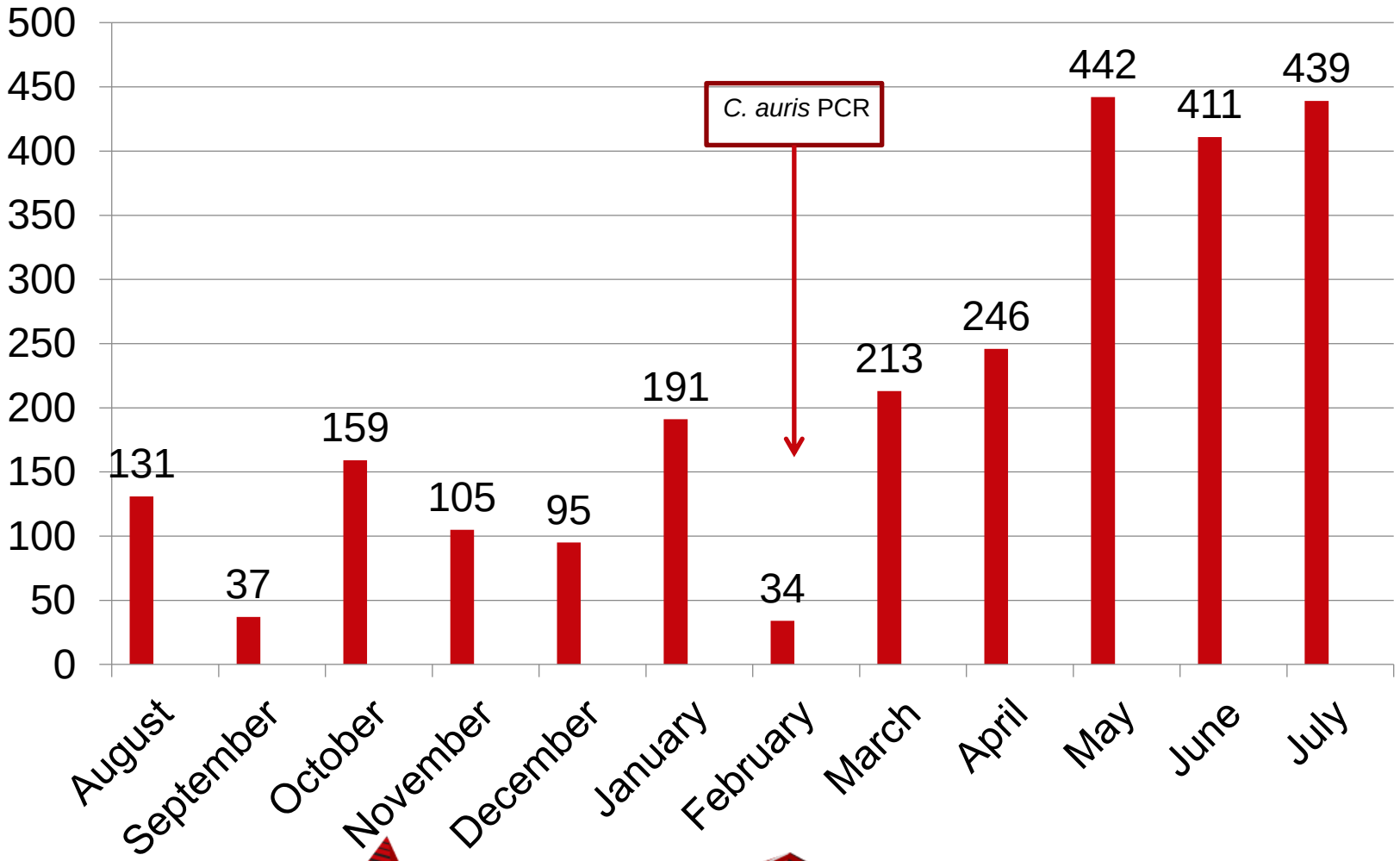
MYCOLOGY

Development and Validation of a Real-Time PCR Assay for Rapid Detection of *Candida auris* from Surveillance Samples

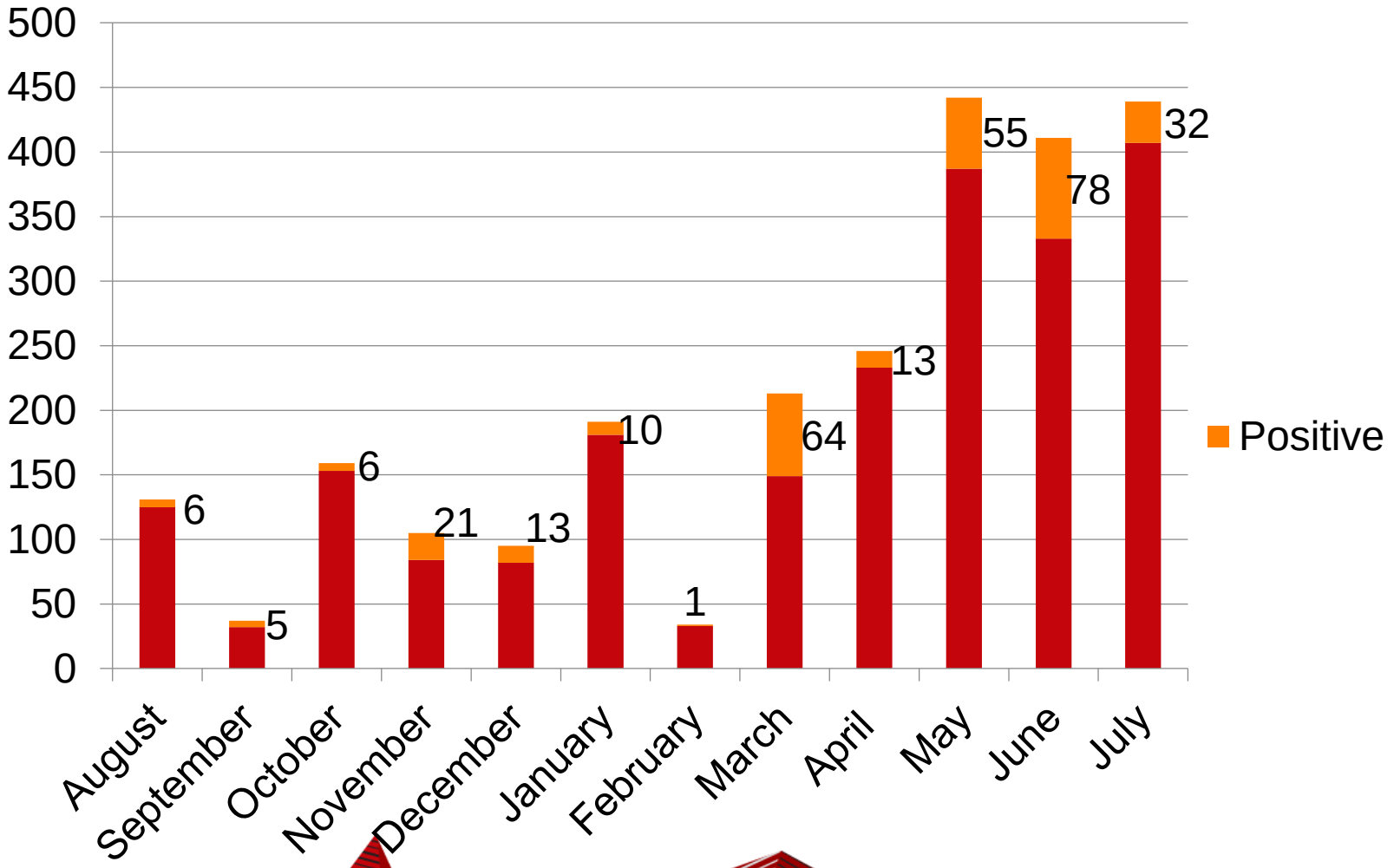
L. Leach,[a] Y. Zhu,[a] S. Chaturvedi[a,b]

[a]Mycology Laboratory, Wadsworth Center, New York State Department of Health, Albany, New York, USA
[b]Department of Biomedical Sciences, School of Public Health, University at Albany, Albany, New York, USA

Candida auris colonization
Total specimens: 2503



Candida auris colonization 2018-2019



Targeted Surveillance

Targeted Surveillance

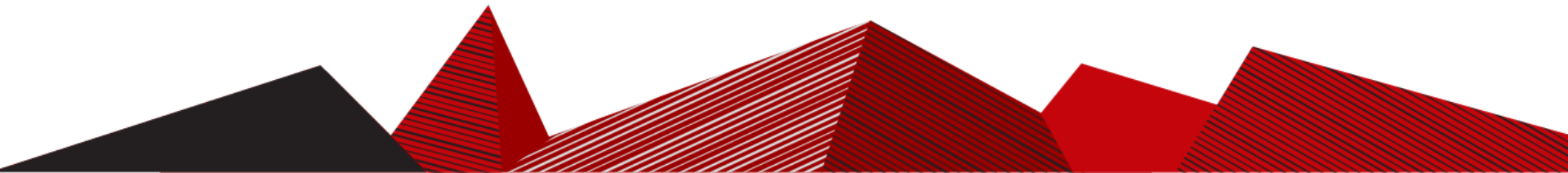
Purpose

- Establish a network of clinical labs that will allow for ongoing evaluation of AR questions through isolate submission and lab data
- Evaluate emerging AR threats
- Partner with 7-15 sites within the region to solicit isolates

Carbapenem-resistant *Acinetobacter baumannii*

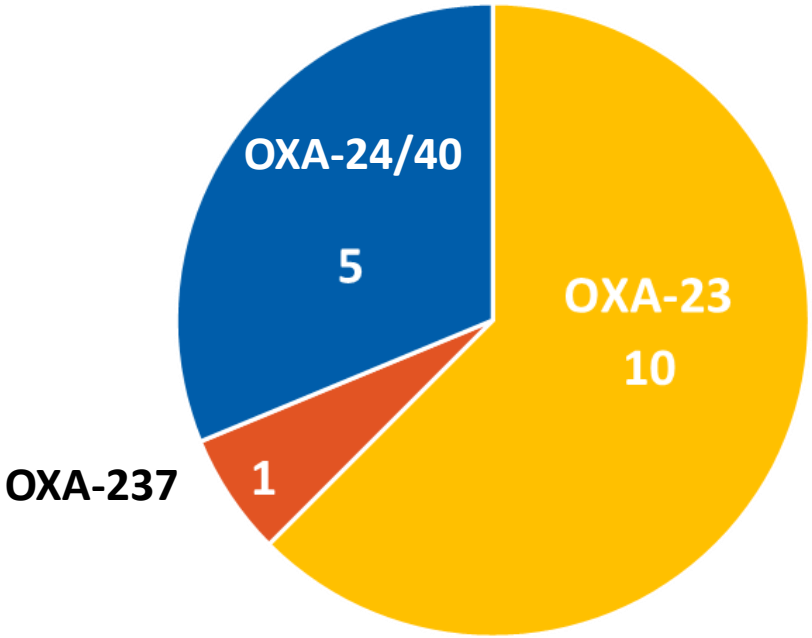
Acinetobacter baumannii

- Carbapenem resistant strains may possess carbapenemases
  - OXA-23 like, OXA-24/40 like and OXA-58 like resistance genes
  - Plasmid-mediated and chromasomal
- Causes a variety of infections including bloodstream, respiratory and wound infections
  - Infections are relatively rare but highly resistant strains are common
  - High attributable mortality
  - Cause of hospital associated outbreaks (multiple facilities)
- Environmental pathogen
  - Resists desiccation
  - Contaminates medical equipment and environmental surfaces



Carbapenemase-producing *Acinetobacter baumannii*

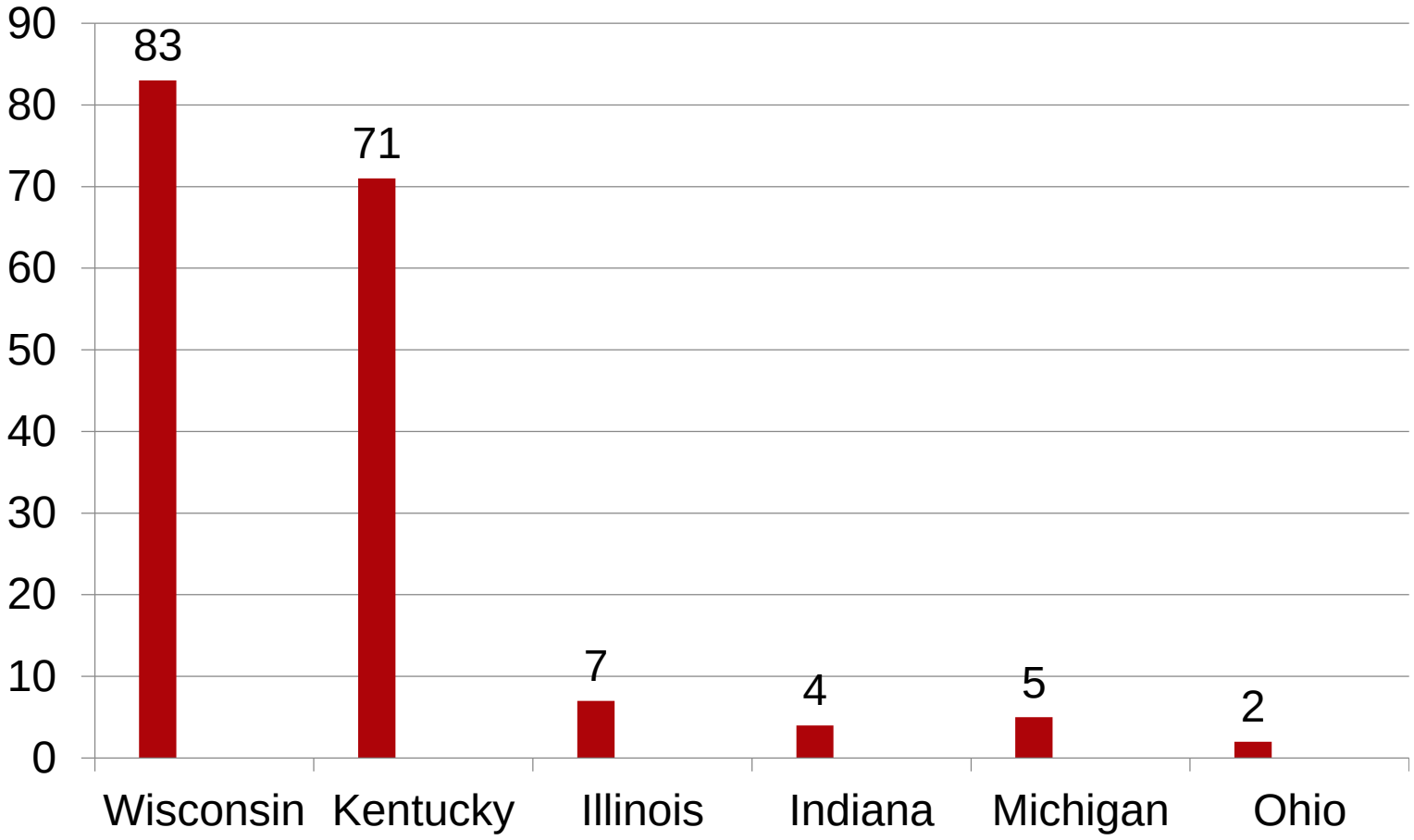
All CRAB Outbreaks Reported During 2018-2019 had Carbapenemases Associated, N=16



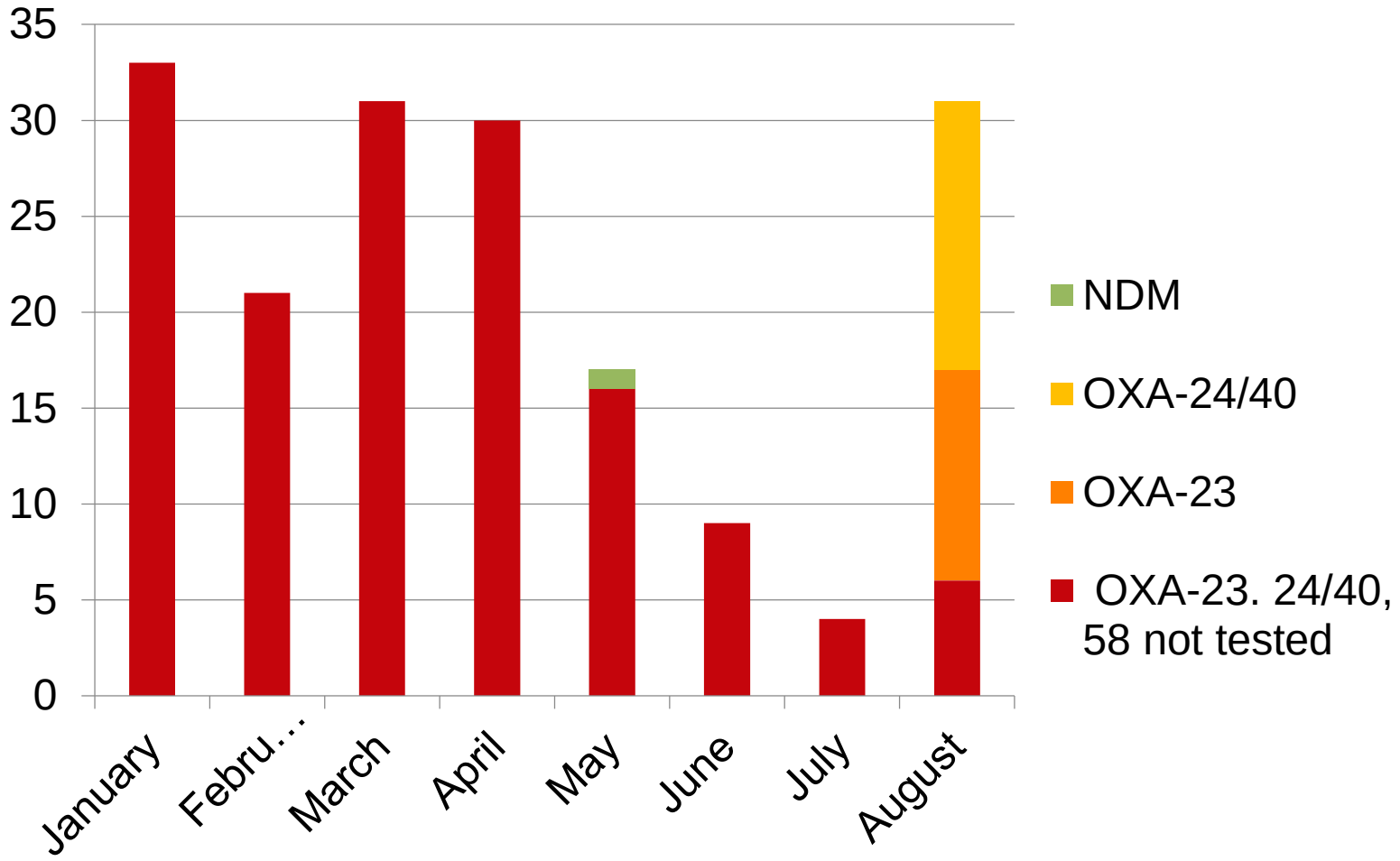
Testing at WSLH

- Isolate submission requested from SE Wisconsin facilities*
- Partner with select facilities in each state
- Identification by MALDI-TOF
- AST
- PCR for detection of carbapenemase
  - KPC
  - NDM
  - VIM
  - IMP
  - OXA-48
  - OXA-23, 24/40 and 58 (new August 2019)

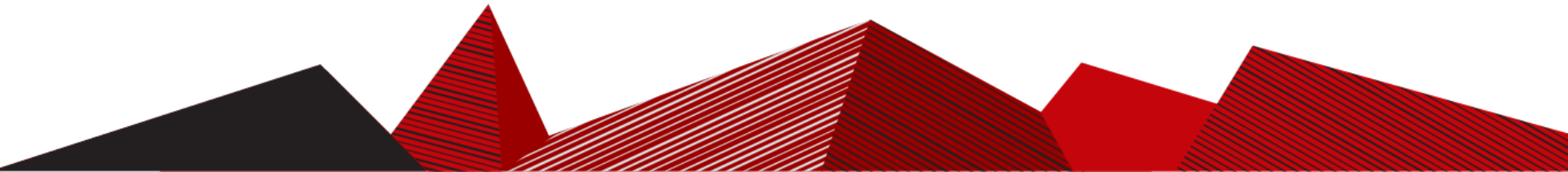
Carbapenem-resistant *Acinetobacter baumannii* January-August 2019



Carbapenem resistant *Acinetobacter baumannii*



Expanded AST for Hard to Treat Infections



Expanded AST for Hard to Treat Infections

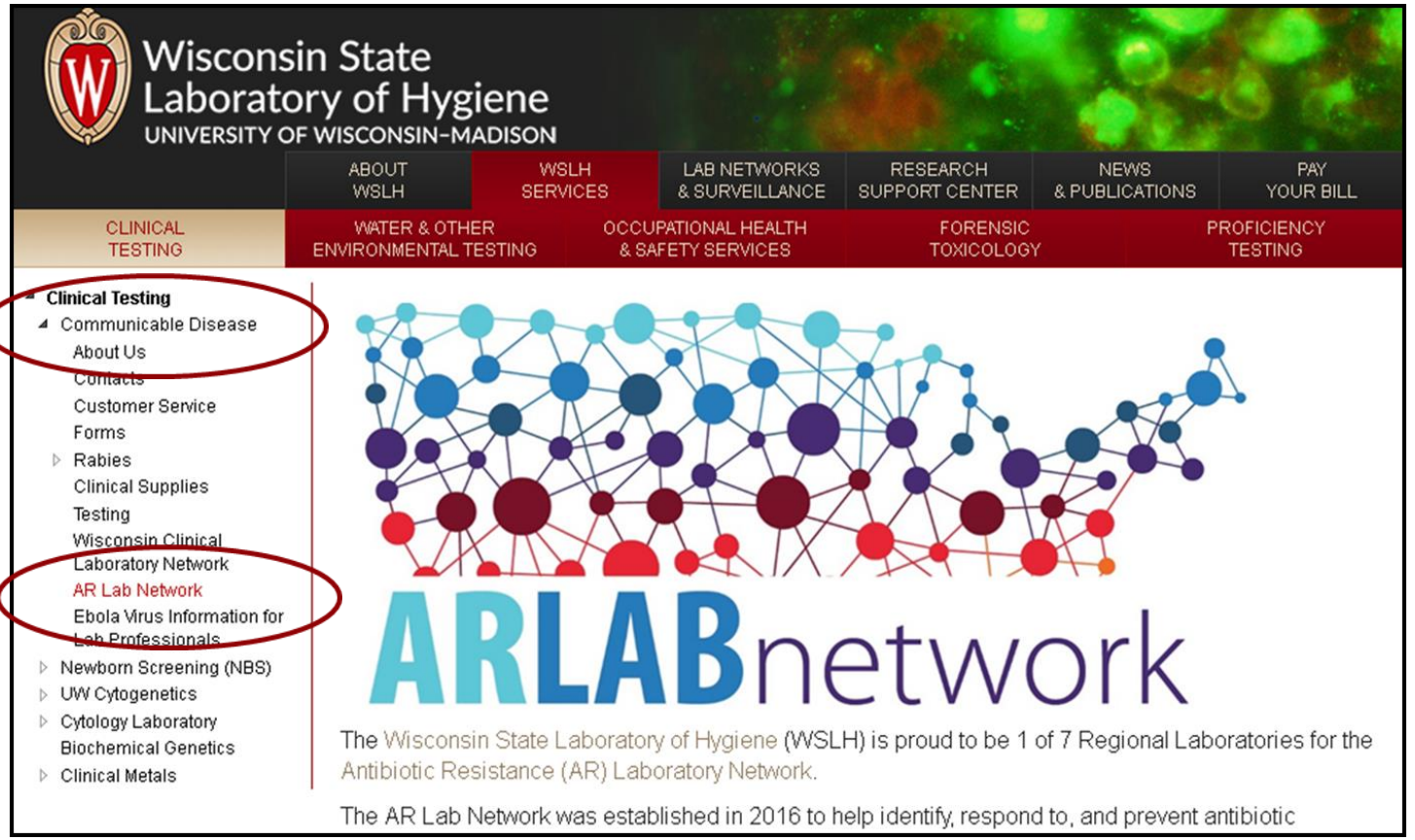
Background

- ~7% of CRE collected from the AR Lab network are NDM+
- Most common type of CP-CRE world wide
- Treatment options are limited
- 2018 Sanford Guide recommends **ceftazadime-avibactam +aztreonam** for treatment of serious infections.
  - Aztreonam-avibactam active against these infections but not yet FDA approved
- There is no way for hospital labs to test for susceptibility to this drug combination

Expanded AST for Hard to Treat Infections

- Closes gap between new drug approval and ability to test
- Answers question: “Will our drugs work?”
- Specialized inkjet printer allows for on-demand reference susceptibility tests of new drugs at AR Lab Network Regional Lab
- Rapid Reporting for tailored patient treatment

Expanded AST for Hard to Treat Infections



http://www.slh.wisc.edu/clinical/diseases/ar-lab-network/

Expanded AST Request

▲ Expanded Drug Testing for Hard-to-Treat Infections

Specimen collection and submission instructions	Isolates submitted on agar slants Include copy of susceptibility results performed in your laboratory
Test Code	**MP00696**
Pre-approval required?	**Yes** Submit completed AR Expanded AST Request Form (Excel file) for approval to: • Email: wiarln@slh.wisc.edu • Fax: 1-844-390-6233
Isolates accepted	Enterobacteriaceae isolates that: • Test non-susceptible to all beta-lactams, including either ceftazidime-avibactam or meropenem-vaborbactam. -OR- • Enterobacteriaceae possessing NDM, VIM, or IMP genes confirmed by a molecular test and are highly resistant to all or the majority of antimicrobial agents already tested.

Expanded AST Request Form

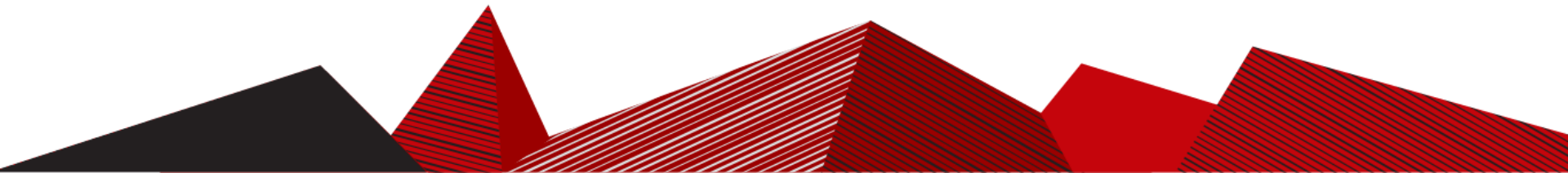
- Contact Information
  - Facility Information
  - Fax Number
  - Contact Name
  - Contact email
- Was ID or IC consulted?
- Organism Information
  - ID
  - Resistance Mechanism detected?
  - Susceptibility to beta-lactams
    ceftazadime-avibactam
    meropenem-vaborbactam

Return to:

wiarln@slh.wisc.edu

FAX to 1-844-390-6233

- Requisition Form
- Fax Agreement Form
- Shipping Instructions
  - Notification of shipment



Expanded AST for Hard to Treat Infections

- Requisition Form
- Fax Agreement Form
- Shipping Instructions

- Notification of Shipment

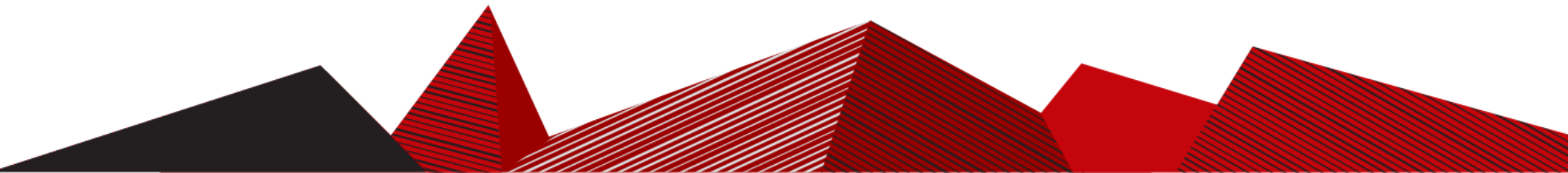
Expanded AST for Hard to Treat Infections

- GNX2F panel to confirm resistance to ensure no FDA approved β-lactam drug is active

- Cepheid CarbaR-confirm presence of an MBL-encoded gene

- AST on digitally dispensed panel
  - Ceftazadime-avibactam
  - Aztreonam
  - Aztreonam-Avibactam
  - Ceftazadime-avibactam+aztreonam

Results in 3 business days



Questions?

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