CRE Update 2013:

CRE Confirmation Testing in Michigan

Marty Boehme, MLS(ASCP)CM
BoehmeM@michigan.gov
517-335-9654

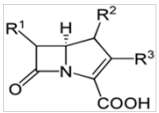
Enterobacteriaceae

- Facultatively anaerobic, gram-negative bacilli
- Enteric organisms (intestinal colonizers)
- Pathogens responsible for
  - Urinary tract infections
  - Bacteremia
  - Pneumonia
  - Meningitis

- Genera: *Klebsiella, Escherichia, Enterobacter, Morganella, Proteus, Citrobacter, Salmonella, Serratia, Shigella*

Carbapenems

- Class of broad-spectrum, β-lactam antibiotics
- Act by inhibiting cell wall synthesis and most effective against gram negative infections
- Examples of carbapenems
  - Ertapenem
  - Doripenem
  - Imipenem
  - Meropenem



- Agents of last resort – one of the few remaining effective therapies
- **CRE are a public health threat**

CRE: Issues with Laboratory Detection

- Bacteria produce enzyme (carbapenemase) – hydrolyzes antibiotics ("super" Beta-lactamase – worse than ESBL)
  - KPC
  - NDM
  - VIM, IMP,…?
- Even though they produce enzyme, they do not always test **resistant** to carbapenems using current FDA interpretive breakpoints and common Antimicrobial Susceptibility Testing (AST) methods. (**Some CRE test as "S"**)
- Sensitivity of detection varies by which carbapenem is tested

CRE: Issues with Laboratory Detection

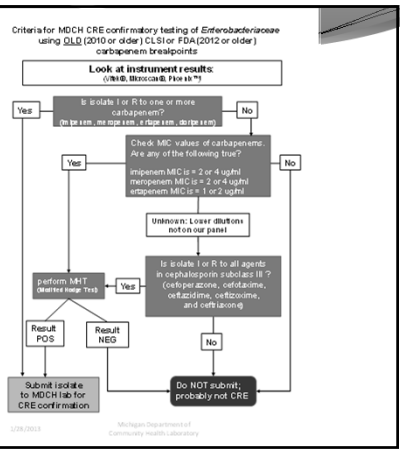
- CLSI* recommends different breakpoints
- Now 2 sets of acceptable breakpoints (CLSI and FDA)
- Same MIC value has different interpretation (S, I or R) depending on which set used
- Laboratories using automated instruments (Microscan, Vitek, Phoenix) for AST must use FDA-cleared breakpoints, unless they do their own validation studies for CLSI bkpts
- Identification of a carbapenemase in isolates that test **susceptible** to carbapenems creates problems in reporting results

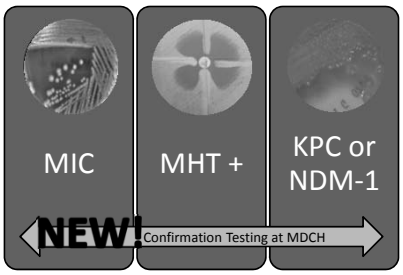
*CLSI = Clinical and Laboratory Standards Institute

MDCH Laboratory CRE Confirmatory Testing

- 9-month grant from CDC/APHL
- Implement reference AST method for "true" MIC value
  - Use newest CLSI MIC breakpoints (2012)
- Implement DNA methods to detect resistance genes
- Compare clinical laboratory results to MDCH results
  - Encourage clinical labs to adopt recommendations
  - Increase confidence in clinical lab results

Specimen Submission Criteria

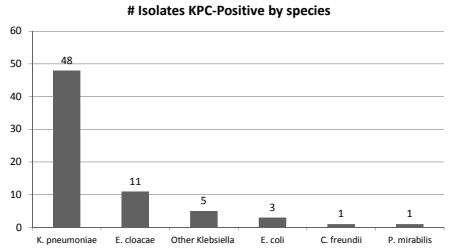




Results to Date 4/30/2013

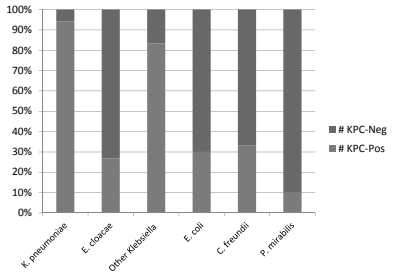
- Number Isolates submitted =**159**
- Tested and reported PCR results on **145**
  - **69 pos for KPC** (neg for NDM-1)
  - **76 neg** (for both KPC and NDM-1)
- **14** did not meet criteria and were not tested by PCR
- Number KPC pos = **69/145** = **47.6%** positivity
- **67** KPC positive were Modified Hodge Test positive at MDCH (67/69 = 97%)
- **0** were NDM-1 positive

KPC positive* species (N=69)



*confirmed by PCR

KPC Positive isolates (% of total tested per species)



Positive Isolates/ No. tested by Region

(submissions from 30 hospitals/health systems)

as of 4/30/2013

Region	Number tested	Number Positive
1	2	1
2N	16	12
2S	53	30
3	22	15
5	21	2
6	7	4
7	5	0
8	16	0

KPC Positive Isolates by Source (N=69)

	Urine	Wound	Resp	Blood
K. pneumoniae	27	12	7	2
K. oxytoca	3	1		
Klebsiella sp.	1			
E. cloacae	8	1	2	
E. coli	1			2
C. freundii			1	
P. mirabilis		1		
Total for source	40	15	10	4

As of 4/30/2013

Sensitivity/Specificity varies depending on carbapenem tested

(calculated using MDCH MIC values and 2012 CLSI MIC breakpoints)

- Sensitivity
  - Ertapenem 100%
  - Imipenem 97%
  - Meropenem 90%
- Specificity
  - Ertapenem 53%
  - Imipenem 68%
  - Meropenem 91%

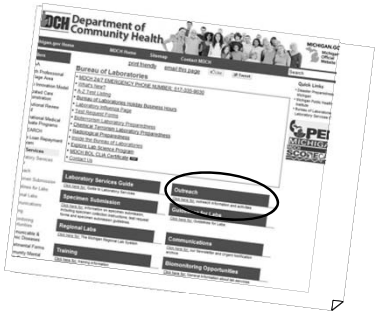
Future Directions

- CRE confirmatory testing cost = $ 92.00 per specimen
  - Does not include fixed costs
- Seeking source of funding for FY-2014
- Publish data
- Share best practices with other states

CRE Surveillance and Prevention Initiative

- MDCH SHARP Unit, coordinated by Brenda Brennan, began a **CRE Surveillance and Prevention Initiative** in September 2012
- Twenty-one facilities (17 acute care and 4 long-term acute care facilities) enrolled into the Initiative.
  - Facilities are distributed across the state, with the greatest concentration in SE and West Michigan
- Facilities voluntarily report cases of CRE (per MDCH surveillance definition)
- **The overall goal of the initiative is to build a regional, public health model to reduce the spread of CRE in Michigan**

Questions?

Archived CRE Webinar from April 2013 is available at **www.michigan.gov/mdchlab**

Click on "Outreach"