Michigan Department of Community Health Laboratory
Confirmatory Testing for Carbapenem-Resistant Enterobacteriaceae (CRE)

Overview
Clinical Laboratory:
1. Detect possible carbapenem resistance in isolates of Enterobacteriaceae, using current recommendations from CLSI to the extent possible. (See below for specific guidance)
2. Send suspect isolates to MDCH laboratory in Lansing for confirmation (when a particular resistance mechanism is confirmed in your facility, it may not be necessary to send all subsequent isolates)

MDCH:
1. Confirm organism is Enterobacteriaceae (Gram stain, identification, pure culture)
2. Perform MIC testing for seven (7) antimicrobial agents using the CLSI reference microbroth dilution method, and interpret using newest CLSI breakpoints (2012): imipenem, meropenem, ertapenem, doripenem (carbapenems), ceftriaxone, cefoxitin, and aztreonam
3. Perform Modified Hodge Test (using meropenem disk) if any carbapenem = I or R
4. If isolate is carbapenem I or R, 3rd generation cephalosporin R, Modified Hodge Test positive: perform PCR testing for KPC gene (blaKPC) and NDM-1 gene (blaNDM-1)
5. Report to submitter
6. Share results with state Healthcare-Associated Infections (HAI) coordinator (Jennie Finks) and SHARP* Unit in MDCH Bureau of Epidemiology
*Surveillance for Healthcare-Associated and Resistant Pathogens

Criteria for Isolates if laboratory is using “older” (2010) CLSI breakpoints:
1. Look at instrument results for Enterobacteriaceae isolates (no Pseudomonas, no Acinetobacter).
2. If carbapenem I or R, submit to MDCH lab for CRE confirmatory testing
3. If carbapenem = S, look at numerical MIC value(s):
   - MIC = 2 or = 4 (imipenem, meropenem)
   - MIC = 1 or = 2 (ertapenem)
     (if dilutions on your MIC panel are low enough)
     **AND**
     Resistant to all 3rd gen. cephalosporins tested: cefoperazone, cefotaxime, ceftazidime, ceftizoxime, ceftriaxone

   **Do not submit, probably not CRE**

Criteria for Isolates if laboratory is using “newer” (2012) CLSI breakpoints:
Send any carbapenem I or R isolates to MDCH (when a particular resistance mechanism is confirmed in your facility, it may not be necessary to send all subsequent isolates)

**Run Modified Hodge Test (MHT)**

**Submit Modified Hodge Test positive to MDCH lab for CRE confirmation**

**If your laboratory is not doing the MHT, we encourage you to do so.**
Michigan Department of Community Health Laboratory
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What to Submit?

1. Pure culture of any species of *Enterobacteriaceae* that fits criteria above
   - *E. coli*
   - *Serratia*
   - *Klebsiella*
   - *Proteus*
   - *Enterobacter*
   - *Providencia*
   - *Citrobacter*
   - *Morganella*
   - **NOT** *Pseudomonas*
   - **NOT** *Acinetobacter*

   *Please email or call Marty Boehme if you’re not sure: boehmem@michigan.gov 517-335-9654*

2. Include copy of your instrument (Vitek, Microscan) printout and MHT results

How to Submit?

1. Agar slants only, no agar plates will be accepted
2. Please include copy of your ID and AST results (e.g., printout from automated instrument)
3. Also include MHT result, if performed
4. Enter “CRE Confirmation” in Other _______ on MDCH requisition (Form DCH0583):

5. Follow regulations for shipping Infectious Substances, category B (UN 3373) and transport to Lansing laboratory (hospital courier, US Mail, or FedEx)

   Shipping address:
   Michigan Department of Community Health
   Bureau of Laboratories
   3350 North Martin Luther King Jr. Blvd.
   Building 44 Room 155
   P.O. Box 30035
   Lansing, Michigan 48909