Public Health Collaborative Efforts in Preventing Spread of CRE in MN

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Emergence of Carbapenem-resistant Enterobacteriaceae (CRE) in Minnesota

- February 2009: MDH identified an isolate with Klebsiella pneumoniae carbapenemase (KPC)

- Alert sent to labs and healthcare facilities
  - Labs asked to submit carbapenem-resistant Enterobacteriaceae (CRE) isolates to the MDH Public Health Lab (PHL) for additional testing
  - MDH PHL did MHT if not done, and if MHT positive, PCR for \( bla_{KPC} \)

- Initiated statewide, passive CRE surveillance
  - Infection preventionists encouraged to contact MDH to report cases
Approach to Active CRE Surveillance

- Establish active, population-based laboratory surveillance for CRE and CR-Acinetobacter (CRA)
  - June 2010 Supplement Clinical Laboratory System Institute (CLSI) breakpoints
  - Multi-state Gram-negative Surveillance Initiative (MuGSI) through CDC Emerging Infections Program
- CRE and CRA reportable in Hennepin and Ramsey Counties
  - MN State Rule 4605.7046
  - Population: 1,662,490
  - Includes Minneapolis and St. Paul
- Develop infection prevention and control materials for healthcare personnel
MDH CRE Active Surveillance in Hennepin and Ramsey Counties

• Rationale for our approach
  – MN early in the emergence of CRE
  – MN’s two most populous counties
  – Lack of a standardized surveillance definition
  – Frequent patient movement across the continuum of care; potential for transmission
  – Healthcare-associated outbreaks
    • Documented success of infection prevention and control measures in preventing spread
Lab Survey Summer 2010

• 6-question phone survey to identify lab methods of determining resistance phenotypes, ability to query IT systems, and CLSI standards used by participating microbiology labs

• Catchment Area
  – Hennepin and Ramsey Counties
  – Labs identified for all clinics, long-term care facilities and hospitals in catchment area
    • Almost all clinics and hospitals utilize one of 14 labs (10 hosp, 3 ref, and 1 clinic lab)

• Survey
  – 12 labs surveyed (1 ref. and 1 hosp. lab did not participate)
Summary of Survey Results

• Methods of determining resistance phenotypes (CRE)
  – 67% screen using automated system + MHT
  – No labs perform PCR for $bla_{KPC}$

• Ability to query
  – Labs could query IT systems by species, S-I-R, flagged organisms, or MIC, but ability to query the LIS was limited by resources
  – Labs most comfortable with software systems for their automated instruments

• CLSI standards
  – No labs using new carbapenem breakpoints (June 2010 CLSI)
Lessons Learned

• Most labs lacked the resources to query their LIS
• Screening and confirmatory testing was not standardized between laboratories
• Automated systems and susceptibility cards varied between laboratories
• Labs had not instituted breakpoint changes
• Reporting of CR organisms was not standardized between laboratories
  – Only 8% and 58% of laboratories reported results to MDH epidemiology and PHL respectively
30-day Pilot Study

- **Preparation for 30-day Pilot**
  - 6 teleconferences and several individual calls with participating labs
  - Automated system representatives visited labs to set up queries based on June 2010 carbapenem breakpoints for Enterobacteriaceae

- **November 2010**
  - Query automated susceptibility system for total Enterobacteriaceae identified during 30-day period
    - Denominator for percent resistant
  - Submit CRE isolates weekly
    - With antimicrobial susceptibility test results (print-out from automated system/additional testing)
30-day Pilot Study Protocol

• Catchment area
  – Hennepin and Ramsey Counties
  – 10 hosp, 1 ref, 1 clinic lab (2 ref labs did not participate)

• Organisms
  – CRE: Enterobacteriaceae
    • Using 2010 CLSI Breakpoints: NS (I or R) to imipenem, meropenem (MIC $\geq$ 2 mcg/ml); R to ertapenem (MIC $\geq$ 1 mcg/ml)
  – Carbapenem-resistant *Acinetobacter*
    • R to imipenem or meropenem (MIC $\geq$ 16 mcg/ml)

• Cases
  – Non-duplicate isolate from any source (sterile/non-sterile) for each specified phenotype/patient for a 30-day period
Challenges and Solutions

• Denominator data: difficult for facilities without specific Vitek or Microscan software to pull de-duplicated denominator data
  – MDH staff went to two labs that did not have software to count/de-duplicate the denominators, micro-supervisor did it at another lab

• County of residence not readily available to clinical labs
  – MDH staff reviewed charts for cases to obtain county; for denominator data not able to obtain and therefore determining proportion resistant based on lab location
Challenges and Solutions (cont.)

• None of the labs using new CLSI breakpoints, some automated instruments’ cards did not go down low enough in dilution
  – Special queries were created when possible

• Large reference labs were too busy to spend time problem solving for the pilot
  – MDH worked with reference laboratory contacts to establish reporting protocol
30-day Pilot Results

- **62 Isolates**
  - **60 (97%) CRE**
  - **2 (3%) CRA**
  - **43 (72%) NS to imi/mero**
  - **17 (28%) R to ertapenem only**
  - **4 (9%) NS when tested by broth microdilution at MDH (and were 3GC R)**
  - **3 KPC+ (K. pneumoniae)**
  - **All S to imipenem or meropenem**
30-day Pilot Lessons Learned

- Telephone survey was vital to rolling-out surveillance
- Work with the labs as partners- they want to participate but have little time or resources
  - Dedicated lab liason at the PHL who knew the lab supervisors and the field representatives and was available to organize project and problem solve
- 30-day surveillance:
  - New definition of CRE- incorporate 3rd generation cephalosporin resistance
  - Trial period before initiation of surveillance very useful
  - About half of CRE reported from acute care; however 33% from ER/outpatient and 20% from LTACH/LTCF
Instituting Prospective Laboratory-Based Surveillance

- Important to include lab and IP staff
- Important for them to develop seamless communication to share and understand methods, results and implications for patient management
- Important for each to understand perspectives of the other
- MDH facilitated conference calls and meetings with both
MN Surveillance for CRE, CRA

**CRE:** NS to imipenem, meropenem or doripenem
AND R to 3rd generation cephalosporins

Emphasis on:

*Klebsiella* spp.
*E. coli*
*Enterobacter* spp.

**CRA:** R to imipenem or meropenem
CRE and CRA Surveillance

- **Labs:**
  - Identify isolates through microtesting and automated system queries
  - Submit isolates and susceptibilities

- **MDH:**
  - Confirm cases (organism, susceptibilities, residency, source)
  - Complete case report form
  - Submit subset of isolates to CDC (as part of Emerging Infections Program)
Laboratory Isolate Submission

Setting up the Surveillance

• Slow start
  – 2 labs with old Vitek just getting on board with Observa (information management system) in Jan 2012 and March 2012

• Weekly (Monday) email
  – Sent to lab contacts
  – Reminds them to run the query
  – Reply back “nothing this week” or fax report if patients identified
  – Send isolate with susceptibility report and MDH CRE form
Lessons Learned

• Keep submission criteria simple
  – Ask labs to send in isolates from all sources
  – Don’t worry about duplicate isolates – can be sorted out at PHL

• Have found isolates from one patient being submitted from multiple labs
Instituting Prospective Laboratory-Based Surveillance - IP issues

• Specific communications with infection prevention and control groups regarding CRE
  – Recommendations for active surveillance
  – Recommendations for infection prevention interventions
  • In their facility

• Patient movement between healthcare settings
  – Hospitals, ambulatory care, long-term care (LTC), long-term acute care (LTAC)
  – Lack of inter-facility communication
MDH Recommendations for the Management of CRE in Healthcare Facilities

CRE Task Force

• Guide development of infection prevention and control recommendations
  
  Phase 1: Acute care & long-term acute care hospitals
  
  Phase 2: Long-term care facilities
  
  Phase 3: Ambulatory and home care

• Members include IPs and Infectious Disease physicians
MDH CRE Resources

- Recommendations for the Management of CRE in Acute Care and Long-Term Acute Care Hospitals, and In Long-Term Care
  - CRE-specific recommendations
    - Laboratory detection
    - Active surveillance testing
    - Admission screening for high risk patients
    - Contact precautions
    - Inter- and intra-facility communication
    - Antimicrobial stewardship
- Infection Prevention and Control Fact Sheet
- Inter-facility Transfer Form
- MDH CRE Patient Education Pamphlet
MDH Communication with Surveillance Partners

• MDH CRE website

• Present at local conferences and Association for Professionals in Infection Control (APIC) meetings
  – CRE basics
  – MN data from passive surveillance (2009-2010)

• Provide case-by-case consultation to Infection Preventionists (IPs) and clinical laboratory personnel
  – Interpretation of results (e.g., KPC vs. CRE)
  – Facilitated chart reviews
Minnesota Guide to a Comprehensive Antimicrobial Stewardship Program

• New! September 2012

www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/index.html
Prospective Laboratory-Based Surveillance-

- Active laboratory-based surveillance in Hennepin and Ramsey Counties began January 2011
- “Passive” surveillance ongoing state-wide
MN CRE Surveillance, 2011

• 23 KPC + isolates
  – *E. cloacae* (12)
  – *K. pneumoniae* (10)
  – *C. freundii* (1)

• 20 KPC - isolates
  – *E. cloacae* (11)
  – *E. coli* (4)
    • NDM-1 positive (1)
  – *C. freundii* (3)
  – *K. pneumoniae* (1)
    • NDM-1 positive (1)
  – *E. aerogenes* (1)
Conclusions

- **Population-based laboratory surveillance can be done!**
  - Resource intensive and requires close collaboration with public health lab, local clinical labs and IP community

- **Challenges include two different carbapenem breakpoint standards**
  - CLSI June 2010 vs. automated susceptibility system standards (regulated by U.S. Food and Drug Administration [FDA])
  - Most labs waiting for FDA to update cards

- **Lab liaison essential for establishing surveillance**

- **Success result of prior relationships with labs and IPs**

- **Great interest from microbiology supervisors, IPs and clinicians**
Prevent a Post-Antibiotic Era
MDH Resources

• CRE website
  http://www.health.state.mn.us/divs/idepc/dtopics/cre/index.html

• Recommendations for the Management of CRE in Acute and Long-term Acute Care Hospitals
  http://www.health.state.mn.us/divs/idepc/dtopics/cre/rebs.html

• CRE Laboratory Testing and Protocols
  http://www.health.state.mn.us/divs/idepc/dtopics/cre/lab.html
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