

Carbapenemase-Producing Carbapenem Resistant *Enterobacteriaceae* (CP-CRE) Statewide Reporting Webinar

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The SHARP Unit

- HAI Coordinator / CRE Prevention Coordinator / SHARP Unit Manager
 - **Brenda Brennan**
- Infection Prevention Consultant
 - **Noreen Mollon**
- Antimicrobial Resistance Epidemiologist
 - **Sara McNamara**
- Health Educator
 - **Chardé Fisher**
- NHSN Epidemiologist
 - **Elli Ray**
- Antimicrobial Stewardship Coordinator
 - **Anne Haddad**



Carbapenem-resistant *Enterobacteriaceae*

- ***Enterobacteriaceae*** – enteric organisms, gram negative bacilli
- **Carbapenems** – class of broad-spectrum, β -lactam antibiotics
 - Agents of last resort – one of the few remaining effective therapies
 - Only 4 carbapenems: Doripenem, Ertapenem, Imipenem, and Meropenem
- **Infections** - responsible for urinary tract infections, bacteremia, pneumonia, wound infections

Mechanisms of Carbapenem Resistance

1. Carbapenemases
2. Acquired resistance
3. Naturally imipenem-resistant *Enterobacteriaceae*

Not all CRE are carbapenemase producers...

CRE and Novel Resistance Activity

- **Carbapenemases:**

- *Klebsiella pneumoniae* carbapenemase (KPC)
- New Delhi metallo- β -lactamase (NDM)
- Verona integron encoded metallo- β -lactamase (VIM)
- Imipenemase metallo- β -lactamase (IMP)
- Oxacillinase-48 (OXA-48)

- **Other resistance elements:**

- Mobile colistin resistance (mcr)

Public Health Threat of CRE Infections

- **Treatment options are more limited**
 - New antibiotics have been slow to develop and come to market
 - Although several new agents are now/soon to be available
 - Pan-resistant strains identified
- **CRE infections associated with high mortality rates**
- **Resistance is highly transmissible**
 - Between organisms – plasmids
 - Between patients – hands, healthcare workers
- **Potential for spread into the community**
 - *E. coli* a common cause of community infection

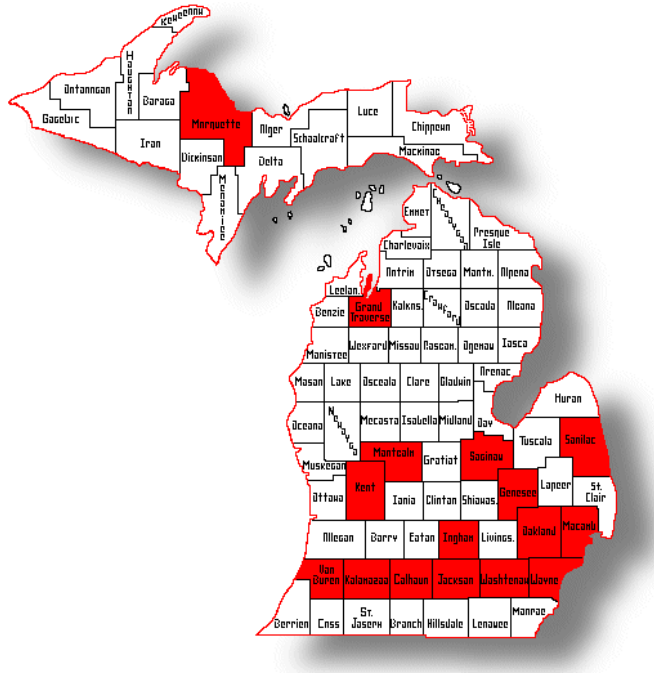
**Carbapenem-resistant *Enterobacteriaceae* (CRE)
Surveillance and Prevention Initiative**

CRE Surveillance and Prevention Initiative

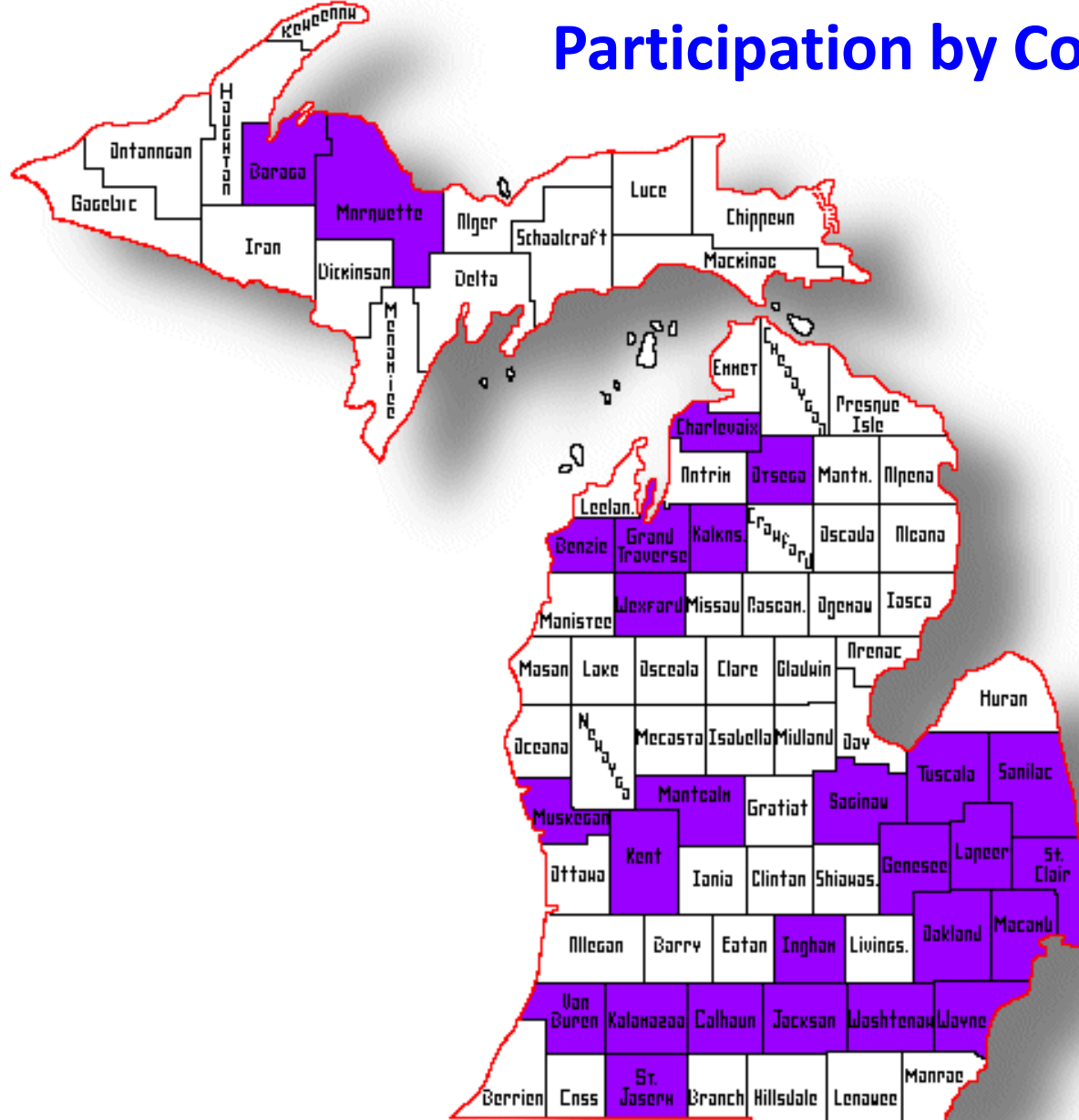
Voluntary Participation

	Baseline Period	Intervention Period	Acute Care	LTAC	LTC/SNF	Total
Phase 1	Sept 2012-Feb 2013	Mar 2013- Aug 2014	17	4	0	21
Phase 2	Mar 2014-Aug 2014	Sept 2014-Feb 2016	7	2	0	9
Phase 3	Sept 2015-Feb 2016	Mar 2016-Aug 2017	4	4	2	10
New facilities	Sept 2017-Feb 2018	Mar 2018-Aug 2019	14	7	0	21
Combined Cohort	Sept 2017-Feb 2018	Mar 2018-Aug 2019	42	17	2	61

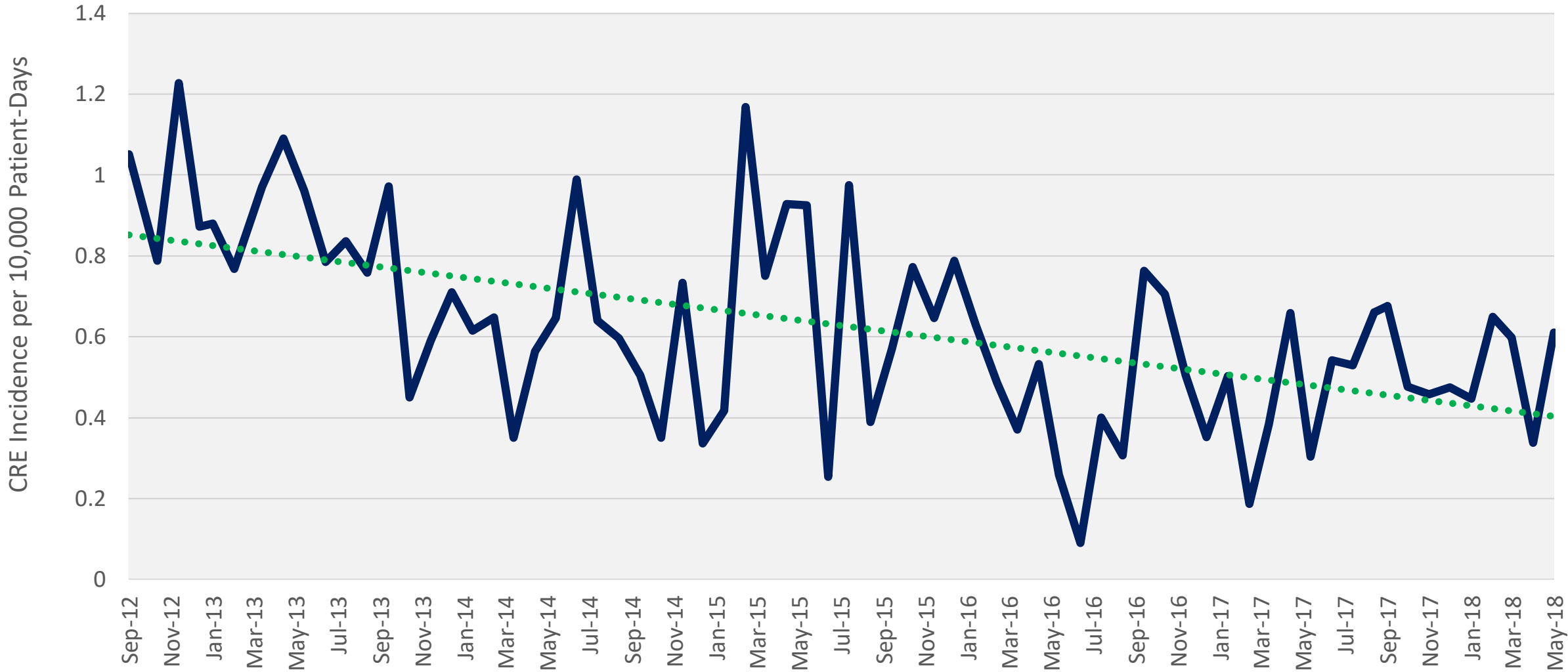
CRE Surveillance and Prevention Initiative Participation by County, Sept 2018



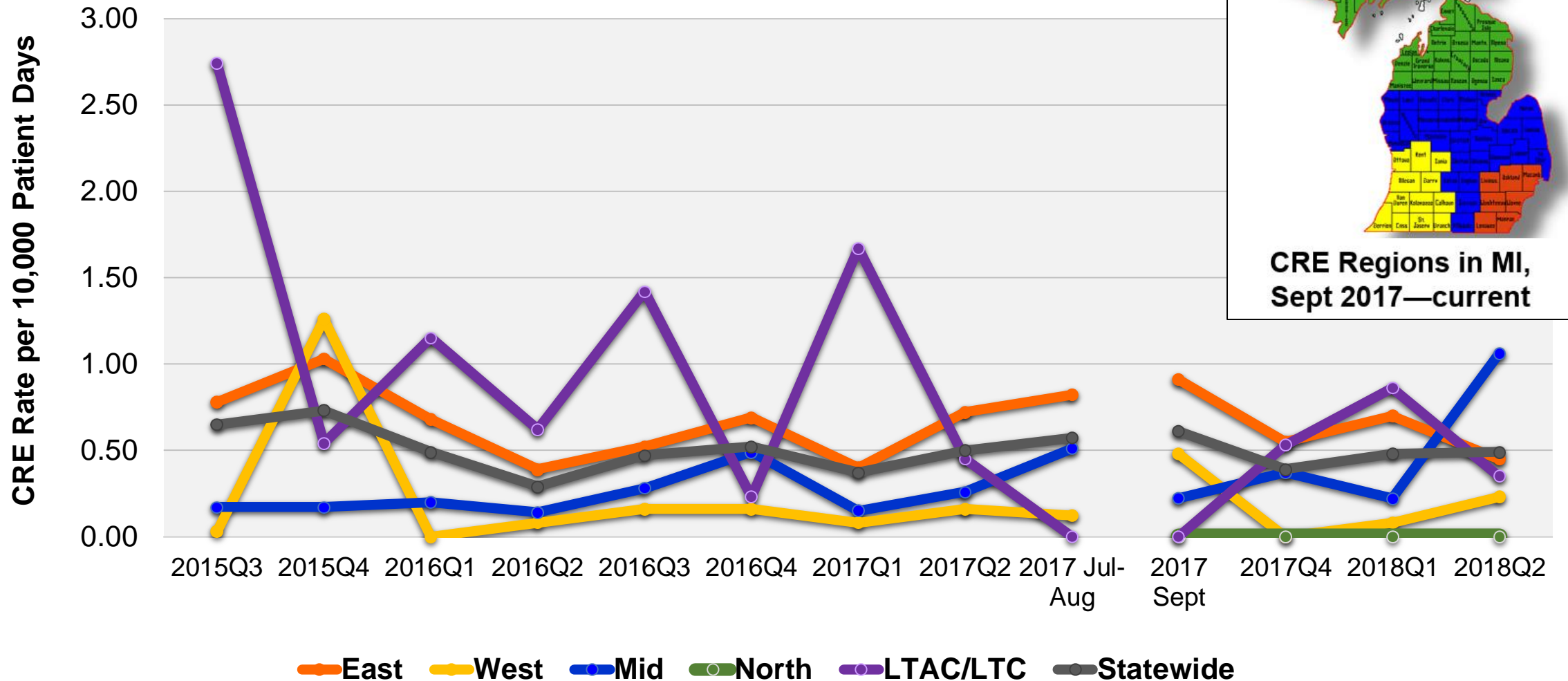
Participation by County,
2012-2017



Overall CRE Incidence



Regional CRE Incidence Rates



Regional CRE Incidence Rates

Region	Number of Facilities	2018 Q2		
		Number of CRE Cases	Total Patient Days	Overall Rate
East	19	17	380,099	0.45
West	7	3	128,213	0.23
Mid	9	14	132,127	1.06
North	7	0	43,235	0.00
LTAC/LTC	19	2	57,431	0.35
Statewide	61	36	741,105	0.49

Prevention Measures Implemented

Category	Specific Measure
Procedure Changes	<ul style="list-style-type: none"> • Screening and presumptive isolation of all patients admitted from an LTAC • PICU CHG Bath Audits • Development of practitioner-specific reports to describe infectious diseases specialist approvals of carbapenem use • In-house laboratory will be performing phenotypic testing to confirm carbapenamase production • Flagging of CRE patient in our IC surveillance system (RL systems) so that they can be isolated more quickly on subsequent admissions • Daily CHG bathing of all ICU patients • Terminal Clean/Bed exchange for patient who has occupied a room for greater than 45 days • Prompt discontinuance of unnecessary invasive devices • CHG bathing in confirmed CRE cases for 3 days • Sending CRE isolates to MDHHS BOL for lab confirmation
Education	<ul style="list-style-type: none"> • Improved physician education on prevention and control of MDRO organisms, infection, and colonization • MDRO Component in 2013 Annual CHM Infection Prevention (IP) Nursing Intranet Learning (NL) Competency, Education • Hand Hygiene Impact on MDRO/CRE • Educating new/transitioning staff in the proper process of CHG bathing of patients in ICU • Educational pamphlet will be developed to educate patients and visitors about CRE • Educate patient care services (RNs, and PCAs) about preventing transmission of CRE, compliance with signage and supplies for Contact Precautions while screening patients for CRE or for a patient that is positive for CRE • Education to raise awareness of the resistance mechanisms of emerging pathogens • Present MDRO (including CRE) education for Medical Residents and reach other healthcare personnel (RNs, support services, MDs, etc.) using forums such as unit huddle
Compliance	Evaluating compliance with isolation practices (i.e., posting of proper signage, availability of gloves, masks, and gowns as well as proper use of these supplies) for all patients that are in isolation
Communication	Rapid communication between lab, IP and ID physicians, inter-facility communication, Inter-facility communication for CRE positive patients: When a CRE is identified, communication will occur to any outside transferring facility by communication transfer form and/or phone communication
Pilot project	Project using Dazo fluorescent marking gel to objectively measure thoroughness of disinfection cleaning on critical surfaces

CRE Infections Prevented

2012-current

Initiative Phase	All Facilities	Acute Care	LTAC/LTC
Phase 1 Facilities	280	235	45
Phase 2 Facilities	68	50	18
Phase 3 Facilities	14	0	14
Combined Cohort (Mar 2018 - current)	3	4	-1
Total Initiative	365	289	76

CP-CRE Reporting

CRE Surveillance & Prevention Initiative vs. CP-CRE Reporting

- **CRE Surveillance and Prevention Initiative**
 - *Klebsiella pneumoniae* and *Escherichia coli* that are resistant to ANY carbapenem
 - Voluntary - reported through the CRE S&PI only
 - 61 facilities
- **New Communicable Disease Reporting for CP-CRE**
 - *Klebsiella spp.*, *Enterobacter spp.*, *Escherichia coli* positive for carbapenemase production by a phenotypic test or positive for carbapenem resistance mechanism (KPC, NDM, VIM, OXA-48, IMP or other carbapenemase gene) and those resistant to ANY carbapenem
 - Mandatory - reported through ELR or manual entry into MDSS
 - Statewide

CP-CRE Reporting Requirements

- Laboratories, infection prevention and Local Health Departments are required to report all cases of **CP-CRE** according to the following criterion for *Klebsiella spp.*, *E. coli*, or *Enterobacter spp.*:
 - Healthcare record contains a diagnosis of Carbapenemase-producing Carbapenem-resistant Enterobacteriaceae (CP-CRE), KPC, NDM, OXA-48, IMP or VIM or other novel carbapenemase
 - Any isolate of *Klebsiella spp.*, *E. coli*, or *Enterobacter spp.* demonstrating carbapenemase production by a **phenotypic test** (e.g., Carba NP, CIM, mCIM)
 - Any isolate of *Klebsiella spp.*, *E. coli*, or *Enterobacter spp.* with a known carbapenemase resistance mechanism (e.g., KPC, NDM, OXA-48, IMP, VIM, or other carbapenemase gene) by a recognized **molecular test** (e.g., PCR, Expert Carba-R)

CP-CRE Reporting Requirements

- If laboratories are unable to detect CP-CRE, (*i.e.*, cannot test for carbapenemase production (phenotypic) or resistance mechanism (molecular test):
 - Report any isolate of *Klebsiella spp.*, *E. coli*, or *Enterobacter spp.* with a minimum inhibitory concentration (MIC) of any of the following:
 - ≥ 4 mcg/ml for Meropenem
 - ≥ 4 mcg/ml Imipenem
 - ≥ 4 mcg/ml Doripenem
 - ≥ 2 mcg/ml for Ertapenem

Carbapenemase and Resistance Mechanism Testing

- Laboratories are *strongly encouraged to submit CRE isolates* to the MDHHS Bureau of Laboratories
 - Confirm organism identification
 - Perform mCIM testing
 - Perform PCR testing for KPC, NDM, OXA-48, IMP, VIM
 - If mCIM or PCR are positive, antimicrobial susceptibility testing (AST) will be performed

MDHHS Bureau of Laboratories Report

1) Confirm ID

2) mCIM



Positive
(either)



Confirm AST (Case)

3) PCR

Negative
(both)



Testing complete (Not a Case)

MDHHS Bureau of Laboratories Report

Antimicrobial Resistance Confirmation (ARC)

Gram Stain

Gram negative bacilli

Culture Results

Confirmed as *Klebsiella pneumoniae*

Identification Performed by MALDI-TOF.

Antimicrobial Susceptibility Results

	Klebsiella pneumoniae	
	MIC - Interpretation	
Amikacin	<=4	S
Aztreonam	>16	R
Cefepime	4	SDD
Cefotaxime	32	R
Ceftazidime	>16	R

Modified Carbapenem Inactivation Method

Positive

Phenotypic test

Modified Carbapenem Inactivation Method (mCIM) screen positive - this isolate demonstrates carbapenemase production. The clinical efficacy of the carbapenems has not been established for treating infections caused by Enterobacteriaceae and Pseudomonas aeruginosa that test carbapenem susceptible but demonstrate carbapenemase production in vitro. ISOLATES THAT ARE mCIM POSITIVE SHOULD BE CONSIDERED RESISTANT TO ALL CARBAPENEMS REGARDLESS OF MIC. MIC REPORTED FOR EPIDEMIOLOGIC PURPOSES ONLY.

PCR Result

KPC (bla-KPC) gene DNA Detected

Molecular test

NDM-1 (bla-NDM-1) gene DNA Not Detected

OXA-48 (bla-OXA-48 like) gene DNA Not Detected

VIM (bla-VIM) gene DNA Not Detected

KPC, NDM, OXA-48, and VIM are the most common carbapenemases in the United States, however there are other less common carbapenemases and other mechanisms of carbapenemase resistance not detected by this PCR assay.

IMP PCR Result

IMP (bla-IMP) gene DNA Not Detected

Tips on How to Report Cases into MDSS

MDSS Reporting

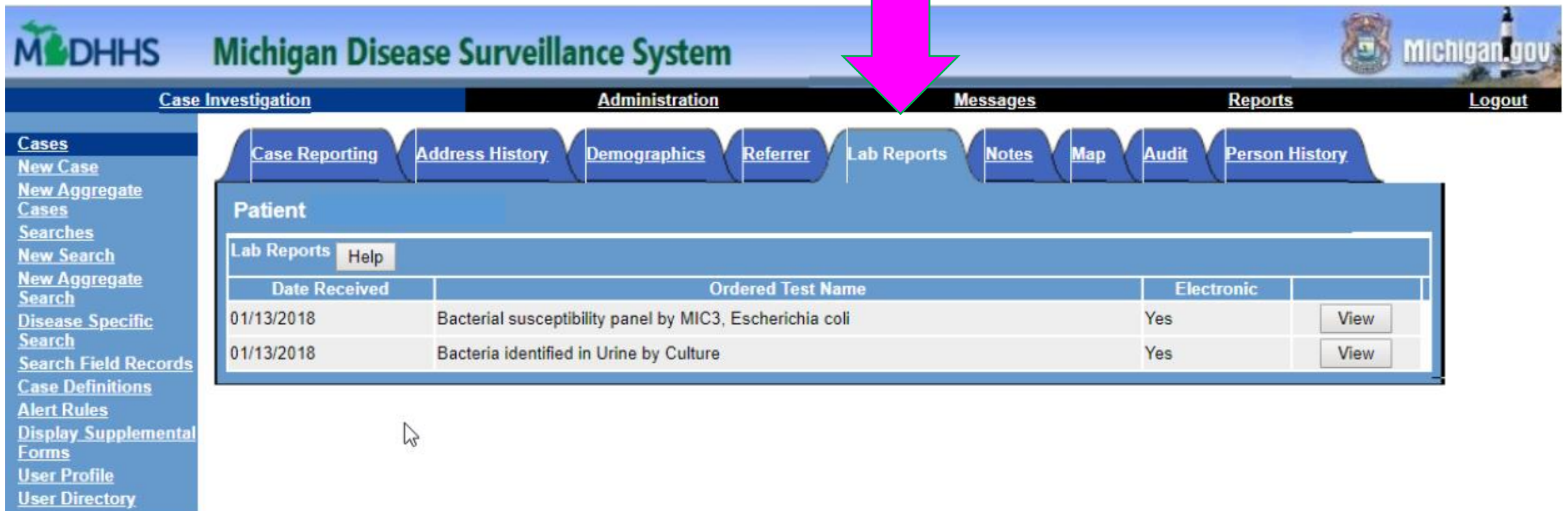
- **CP-CRE cases should be reported using the Michigan Disease Surveillance System (MDSS)**
 - Web-based communicable disease reporting system for the state of Michigan
 - Cases can be reported by:
 - Electronic laboratory report (ELR)
 - Manual case entry
 - Reporting and ELR Guidance available at www.michigan.gov/hai

Electronic Laboratory Reporting (ELR)

- **BOL is now reporting all carbapenemase and resistance mechanism testing into MDSS!**
 - Both positive and negative results are now reported into MDSS
 - *Klebsiella* spp., *E. coli*, or *Enterobacter* spp., only
 - Populate into Lab Reports tab for culture results, mCIM, PCRs, and AST
 - Allows local health departments to know if a case is Confirmed or Not a Case

Electronic Laboratory Reporting (ELR)

- ELRs will populate into the Lab Reports tab – positive and negative results



The screenshot displays the Michigan Disease Surveillance System (MDHHS) interface. The top navigation bar includes 'Case Investigation', 'Administration', 'Messages', 'Reports', and 'Logout'. A pink arrow points to the 'Lab Reports' tab, which is currently selected. The 'Lab Reports' tab shows a table of patient lab results.

Date Received	Ordered Test Name	Electronic	
01/13/2018	Bacterial susceptibility panel by MIC3, Escherichia coli	Yes	View
01/13/2018	Bacteria identified in Urine by Culture	Yes	View

ELR Example

MDSS TEST APPLICATION
Michigan Disease Surveillance System

Case Investigation Administration Messages Reports

Case Reporting Address History Demographics Referrer Lab Reports Notes Map Audit Person History

Patient TEST10, CRE

Lab Order Information

Test Name* : PCR Result

Lab Report Date (mm/dd/yyyy) : 03/28/2018

Ordering Provider

First : Last :

Affiliation : MDHHS - QUALITY ASSURANCE SECTION - MARTY Street : 3350 N. MLK JR. BLVD. BLDG 44, RM 158

City : LANSING County : State : Michigan Zip : 48906

Phone number : 517-335-8074 Ext :

Laboratory Information

Lab Name* : MDHHS REGIONAL LAB - LANSING

Street : 3350 N. Martin Luther King Jr. Blvd. Geocode Source :

City : Lansing County : Ingham State : Michigan Zip : 48909

Phone number : 517-335-8063

Specimen Information

Specimen Collection Date (mm/dd/yyyy) : 03/28/2018

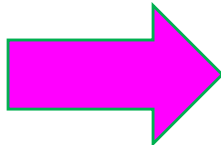
Specimen Source : Specimen Site : Specimen Site Text : Specimen ID : 6148-000040

Results

Reported Test Name : bla(KPC) gene/null

Coded Result :	KPC (bla-KPC) gene DNA Detected
Numeric Result :	
Abnormal Flags/Susceptibility Results:	N

Cancel Help



Manual Case Entry

- Select 'New Case' on the left side menu



The screenshot displays the MDSS Test Application interface. The top navigation bar includes 'Case Investigation', 'Administration', 'Messages', 'Reports', 'OMS', and 'Logout'. The left sidebar menu is expanded, with 'New Case' highlighted in pink and a pink arrow pointing to it. The main content area shows a list of cases with the following table:

Displaying results 1-10 of 112 found
[[< First] 1 2 3 4 5 6 7 8 9 10 11 12 [Next >>] [Last >]]

Case Listings Referral Date Sort Temporary Search Export Help

Include Labs in Export

Investigation Status	Case Status	Investigation ID	Referral Date	Patient Name	Date of Birth	Disease	Investigator	County		
Completed	Not a Case		10/20/2017			CRE		Calhoun	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		Macomb	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View
New	Unknown		10/30/2017			CRE		Kent	Edit	View
New	Unknown		10/30/2017			CRE		St Clair	Edit	View

[[< First] 1 2 3 4 5 6 7 8 9 10 11 12 [Next >>] [Last >]]

Manual Case Entry

- Select 'CP-CRE' from the Reportable Condition drop-down menu

MDHHS Michigan Disease Surveillance System

Case Investigation Administration Messages Reports Logout

Cases
New Case
Searches
New Search
New Aggregate Search
Disease Specific Search
Search Field Records
Case Definitions
Alert Rules
Display Supplemental Forms
User Profile
User Directory

Investigation Information

Reportable Condition*: CP-CRE Detail Case Status*: - SELECT -

State Prison Case

Patient Information

Patient Status*: Alive Patient Status Date* (mm/dd/yyyy): 07/31/2018 Case Disposition*: - SELECT -

First*: Last*: Middle:

Street:

City: County: State: Zip:

Home Phone (###-###-####): Other Phone (###-###-####):

Onset Date (mm/dd/yyyy): Referral Date (mm/dd/yyyy):

Diagnosis Date (mm/dd/yyyy):

*indicates required items

Continue Cancel Help

Manual Case Entry

- Select the 'Detail' button to launch the case investigation form

The screenshot shows the Michigan Disease Surveillance System (MDHHS) interface. The main header includes the MDHHS logo and the text "Michigan Disease Surveillance System". The navigation bar contains tabs for "Case Investigation", "Administration", "Messages", "Reports", and "Logout". The left sidebar lists various menu items such as "Cases", "New Case", "New Aggregate Cases", "Searches", "New Search", "New Aggregate Search", "Disease Specific Search", "Search Field Records", "Case Definitions", "Alert Rules", "Display Supplemental Forms", "User Profile", and "User Directory".

The main content area is titled "Investigation Information" and contains the following fields:

- Reportable Condition*:** A dropdown menu with "CP-CRE" selected. A pink box highlights the "Detail" button next to this dropdown.
- Case Status*:** A dropdown menu with "- SELECT -" selected.
- State Prison Case

The "Patient Information" section includes:

- Patient Status*:** A dropdown menu with "Alive" selected.
- Patient Status Date* (mm/dd/yyyy):** A text input field with "07/31/2018" entered.
- Case Disposition*:** A dropdown menu with "- SELECT -" selected.
- First*:** A text input field.
- Last*:** A text input field.
- Middle:** A text input field.
- Street:** A text input field.
- City:** A text input field.
- County:** A dropdown menu.
- State:** A dropdown menu.
- Zip:** A text input field.
- Home Phone (###-###-####):** A text input field with "Ext." and another text input field.
- Other Phone (###-###-####):** A text input field with "Ext." and another text input field.
- Onset Date (mm/dd/yyyy):** A text input field.
- Referral Date (mm/dd/yyyy):** A text input field.
- Diagnosis Date (mm/dd/yyyy):** A text input field.

At the bottom of the form, there is a note: "*indicates required items". Below the form are three buttons: "Continue", "Cancel", and "Help".

CP-CRE Case Investigation Form

- CRE Investigation Form Sections
 - Patient Information
 - Demographics
 - Laboratory Testing
 - Clinical Information
 - Antimicrobial Therapy

Submit Changes Cancel Changes Print

CRE Investigation Form

Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)
Michigan Department of Health and Human Services
Communicable Disease Division

Investigation Information

Investigation ID	Onset Date <i>mm/dd/yyyy</i>	Diagnosis Date <i>mm/dd/yyyy</i>	Referral Date <i>mm/dd/yyyy</i>	Case Entry Date <i>mm/dd/yyyy</i>	Case Completion Date <i>mm/dd/yyyy</i>
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="04/05/2018"/>	<input type="text"/>

Investigation Status: Case Status: Confirmed Not a Case Probable Suspect Unknown Non-Michigan Case State Prison Case

Patient Status	Patient Status Date <i>mm/dd/yyyy</i>	Case Disposition	Part of an outbreak?	Outbreak Name	Case Updated Date <i>mm/dd/yyyy</i>
<input type="text"/>	<input type="text" value="04/05/2018"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="04/05/2018"/>

Facility where specimen collected: Participate in the CRE Surveillance and Prevention Initiative: Yes No

Patient Information

Patient ID	First	Last	Middle
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Street Address:

City	County	State	Zip
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Home Phone ### ### ####	Ext.	Other Phone ### ### ####	Ext.
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Parent/Guardian (required if under 18)

First	Last	Middle
<input type="text"/>	<input type="text"/>	<input type="text"/>

Demographics

CP-CRE Laboratory Testing

- **Laboratory Testing information is required to determine case classification**
 - Enter lab data into Case Detail Form (instead of Lab Reports tab) for manual case entry
- Date collected
- Specimen source
- Organism
- **MIC (need actual value)**
- Carbapenemase testing
- Resistance mechanism testing

Laboratory Testing and Microbiology Information		
Date Specimen Collected (mm/dd/yyyy)	Specimen Type: <input type="radio"/> Clinical Culture <input type="radio"/> Surveillance Culture	
Specimen Source: <input type="checkbox"/> Blood <input type="checkbox"/> Respiratory/Spitum <input type="checkbox"/> Urine <input type="checkbox"/> Wound, skin, or soft tissue <input type="checkbox"/> Rectal or perianal <input type="checkbox"/> Other, specify _____		
Organism: <input type="checkbox"/> <i>Klebsiella</i> species, specify _____ <input type="checkbox"/> <i>Escherichia coli</i> <input type="checkbox"/> <i>Enterobacter</i> species, specify _____ <input type="checkbox"/> Other, specify _____		
Date Antimicrobial Testing Results Reported (mm/dd/yyyy)		
Antimicrobial Susceptibility Testing Results (fill only those that were reported):		
Antimicrobial	Minimum Inhibitory Concentration (MIC) (actual)	Interpretation (S, susceptible; I, intermediate; R, resistant)
Imipenem		
Meropenem		
Doripenem		
Ertapenem		
Amikacin		
Tobramycin		
Gentamicin		
Tigecycline		
Colistin		
Phenotypic Carbapenemase Production Testing		
Test Method:	If other, specify:	Result: <input type="radio"/> Positive <input type="radio"/> Negative <input type="radio"/> Indeterminate
Resistance Mechanism for Carbapenemase Testing: (e.g., PCR or other molecular genetic test)		
Resistance Mechanism	Response	
KPC	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	
NDM	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	
OXA-48	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	
VIM	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	
IMP	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	
Other, specify _____	<input type="radio"/> Detected <input type="radio"/> Not Detected <input type="radio"/> Not Tested <input type="radio"/> Invalid	

CP-CRE Clinical Information

- **Clinical Information**

- **Healthcare exposures**

- **Travel**

- Particularly important for any confirmed NDM, OXA-48, IMP, or VIM cases

Clinical Information	
Date of Patient Admission or Presentation (mm/dd/yyyy) <input type="text"/>	Date Patient was placed in Contact Precautions/Isolation (if an inpatient) (mm/dd/yyyy) <input type="text"/>
Patient Admitted/Presented From: <input type="radio"/> Long-Term Care/Skilled Nursing Facility <input type="radio"/> Outside Acute Care Hospital <input type="radio"/> Home <input type="radio"/> Long-Term Acute Care Hospital <input type="radio"/> Unknown <input type="radio"/> Other, specify <input type="text"/>	
Date of Patient Discharge (mm/dd/yyyy) <input type="text"/>	Was information on CRE status shared with transferring agency and admitting facility: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
Patient Discharged to: <input type="radio"/> Long-Term Care/Skilled Nursing Facility <input type="radio"/> Outside Acute Care Hospital <input type="radio"/> Home <input type="radio"/> Long-Term Acute Care Hospital <input type="radio"/> Unknown <input type="radio"/> Other, specify <input type="text"/>	
Has Patient previously been hospitalized in an Acute Care Hospital in the last 90 days: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown If Yes, please indicate the facility name and dates of stay (if known) Facility: <input type="text"/> Dates: (mm/dd/yyyy) From <input type="text"/> To <input type="text"/>	
Has Patient been admitted to a Long-Term Acute Care Hospital in the last 90 days: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown If Yes, please indicate the facility name and dates of stay (if known) Facility: <input type="text"/> Dates: (mm/dd/yyyy) From <input type="text"/> To <input type="text"/>	
Has Patient been admitted to a Long-Term Care Facility (e.g., nursing home, SNF) in the last 90 days: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown If Yes, please indicate the facility name and dates of stay (if known) Facility: <input type="text"/> Dates: (mm/dd/yyyy) From <input type="text"/> To <input type="text"/>	
Indwelling Devices (in place within 2 calendar days of specimen collection):	
Central Venous Line: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown	Mechanical Ventilation: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
Urinary Catheter: <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown	Wound VAC (vacuum-assisted closure): <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown

Case Classification

CONFIRMED CP-CRE

- *Klebsiella spp., E. coli, Enterobacter spp.*
 - Positive **phenotypic test** OR
 - Positive **carbapenem resistance mechanism**

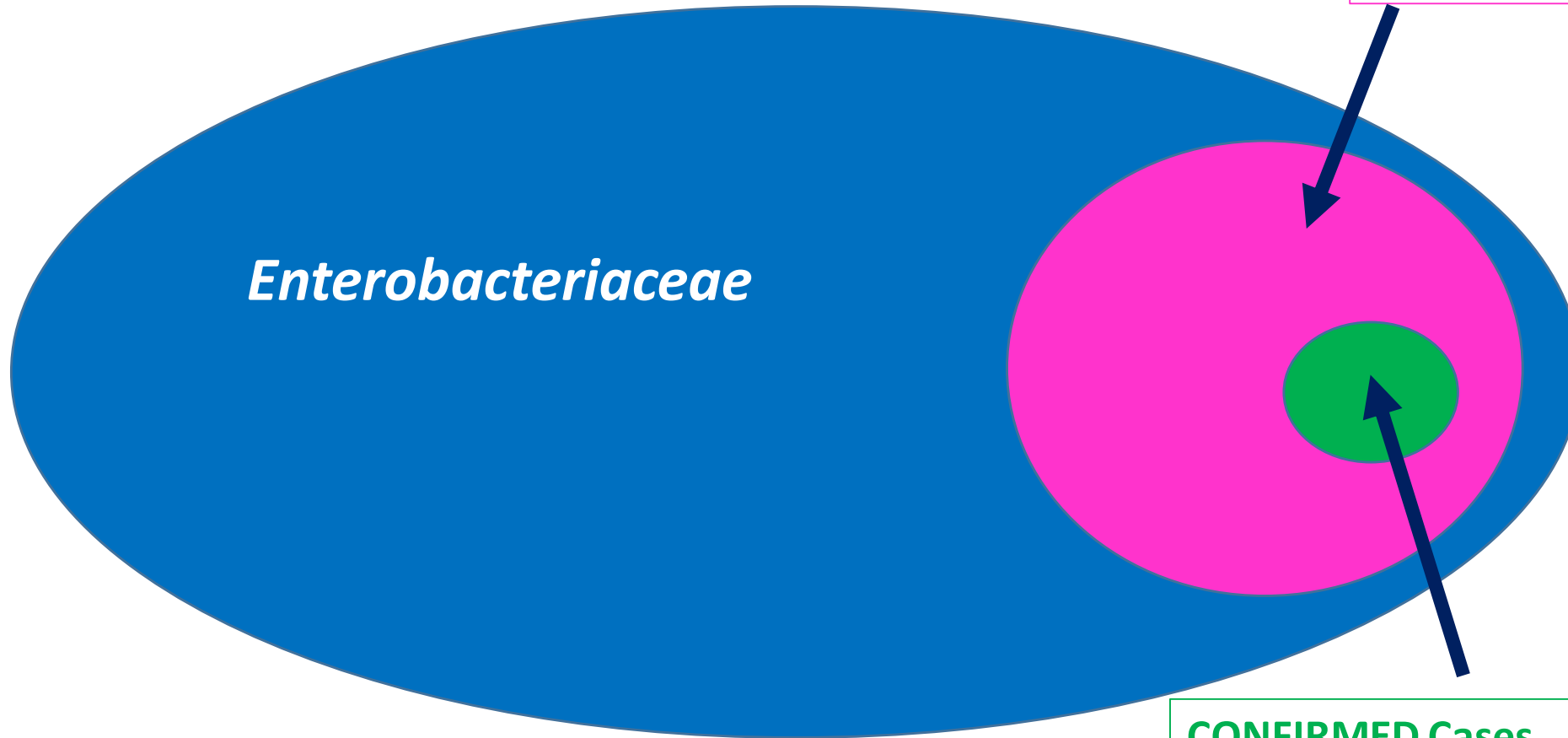
SUSPECT CP-CRE

- *Klebsiella spp., E. coli, Enterobacter spp.*
 - Resistance to at least 1 carbapenem
 - No phenotypic or molecular testing done

NOT a CASE

- BOL report is negative for phenotypic and molecular tests
- All carbapenems are susceptible (MICs don't match case definition)
- Not *Enterobacteriaceae*

Actual CP-CRE Reporting



SUSPECT Cases

- Only MICs known
- Carbapenem Resistance

CONFIRMED Cases

- Phenotypic or molecular mechanism known
- CP-CRE

Case Deduplication

- **Local Health Departments**

- An individual should only be counted once per 12 months for the same organism and resistance mechanism
- When reviewing newly reported cases/lab results:
 - Search to see if the patient has already been reported
 - Confirm whether the organism identification is the same
 - Confirm whether the resistance mechanism present is the same
 - Choose the new detail form when merging cases

Frequently Asked Questions

FAQs on Reporting

- **I can't find results for all of the antimicrobials listed on the case detail form**
 - Just looking for the 4 carbapenems:
 - Doripenem
 - Ertapenem
 - Imipenem
 - Meropenem
- **There are no MICs for the carbapenems, just a letter (S, I, R) or there are no carbapenems reported**
 - Please call the laboratory and get the actual MICs and specifically ask for carbapenem results

FAQs on Reporting

- **A report came in from BOL that was positive for *Citrobacter freundii* KPC. What do I do?**
 - While this is a confirmed KPC CP-CRE it is not a *Klebsiella spp.*, *E coli*, or *Enterobacter spp.* and is not required to be reported
- **A report came in from BOL that was positive for VIM, but it is not a *Klebsiella spp.*, *E coli*, or *Enterobacter spp.* What do I do?**
 - That is a novel resistance case
 - Sara will be contacting you for follow-up
 - Case can be entered as CP-CRE
 - Organism: Other, specify

FAQs on Reporting

- **Repeat cultures – should facilities be sending every isolate regardless of if they sent it in the past?**
 - BOL policy is that if it's the same organism from same patient, same lab, they will only do the repeat ARC testing every 6 months, unless specifically requested by the submitting lab (e.g., if the AST profile looks completely different, or more resistant than previously)
 - If it is a new species in the same patient then they will test
 - If it is the same patient, different lab then they will test
 - *Example:* tests with all the same organism within the 12 month time frame then subsequent cases can be merged, (even though we don't know the mechanism for the later isolates)

FAQs on Reporting

- **Does the Modified Hodge Test (MHT) count as a confirmatory test?**
 - Yes, technically. However...
 - MHT often can produce false positive results for *Enterobacter* spp. (can pick up AmpC production or other mechanisms of resistance other than carbapenemase production) and therefore the positive results are not reliable
 - MHT does better job of detecting true carbapenemase production in *Klebsiella* spp. and *E. coli*, which are usually KPC
 - However it can miss the metallo-B-lactamase carbapenemases like NDM, giving false negative results
 - MHT is no longer being recommended for confirmatory testing, and it has been removed from the CLSI M100 guidelines for clinical laboratories
 - mCIM test is recommended instead

FAQs on Reporting

- **How long do we have to complete the case detail form?**

- As with any CD, please try and get the information as soon as possible
- If anything, verify patient's chart is flagged and they are in contact precautions
- We do have time to investigate, but if a contact investigation is needed, it's easier to test patients still admitted than discharged

- **SUSPECT cases - How much of the form to complete?**

- If you know the facility submits isolates to BOL for testing, you can wait to see the lab result.
- If you know they don't or are unsure, **investigate the case** (demographics, track down the MICs, check healthcare exposures (are they currently admitted and in contact precautions), if LTC/SNF patient – please document current and previous locations in the Notes

FAQs on Reporting

- **Home address is used for hospital/LTC/SNF patients - how do we detect clusters?**
 - Initiative and non-initiative patients can be linked in MDSS
 - If you know the previous hospital/LTC/SNFs location(s), please document in Notes
- **When should we put their home address versus facility address?**
 - If specimen was collected at the LTC/SNF facility – use facility address
 - If they have been a resident in a LTC/SNF within the past 3 months, please indicate the facility address in the Notes

FAQs on Reporting

- ***From the LHD perspective: How do I know which facilities participate in the CRE Surveillance and Prevention Initiative?***
 - Brenda and Sara will be providing the Regional Epidemiologists a list of participating facilities in their jurisdictions/counties to pass along to LHDs
- **Do facilities that participate in the CRE Surveillance and Prevention Initiative report twice?**
 - No
 - Cases that meet the surveillance definition for the initiative are the same as the reporting requirement – no dual reporting
 - Cases are entered into MDSS (unless arrangement with Sara or LTAC)
 - Facilities do report # cases, # of patient-days and # of admissions monthly to Sara

Updated Guidance

- Currently updating the **Interim CP-CRE Case Reporting and Investigation Guidance**
 - Reporting
 - Case Classification
 - Investigation
 - Prevention
- Planning to release **January 2019**

Investigation

- **KPC Endemic vs. Non-Endemic Areas**

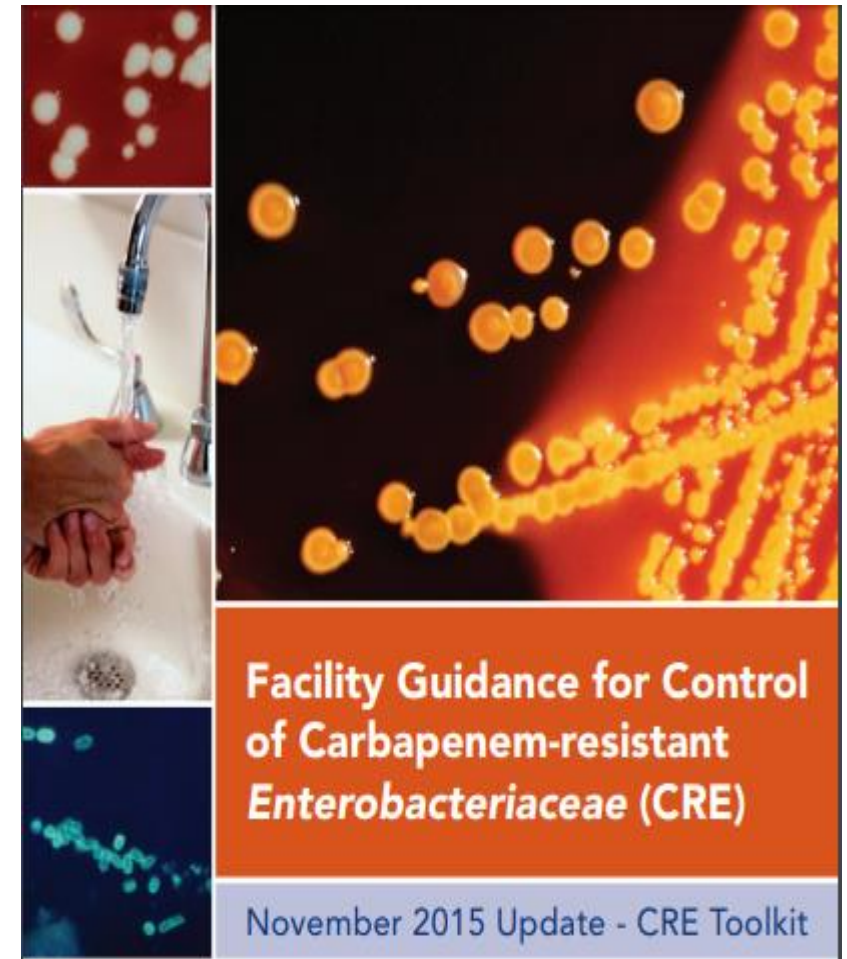
- Patient information, demographics, laboratory data, healthcare exposures, travel
- Information important for prevention purposes
- Revise MDSS form for needed vs. optional data in future?

- **Novel CP-CRE resistance mechanisms, including NDM-1, OXA-48, VIM, and IMP:**


- Please complete the entire case detail form as best as possible
- Documentation of healthcare exposures and international travel is crucially important

CP-CRE Prevention

- Hand Hygiene
- Contact precautions
- Environmental Cleaning
- Use of devices
- Antimicrobial stewardship
- Chlorhexidine bathing
- Laboratory notification
- Inter-facility communication
- Screening contacts of CRE Patients
- Active surveillance testing
- HCP, Patient & Family Education



CRE Brochures



WHAT ARE CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)?

CRE are a family of germs that are hard to treat because they are often resistant to many commonly used antibiotics.

CRE
Carbapenem-Resistant
Enterobacteriaceae

WHAT ARE THE MAIN TYPES OF CRE?

There are three main types of *Enterobacteriaceae* that may be resistant to carbapenems, including *Klebsiella* species, *Enterobacter* species, and *Escherichia coli* (*E. coli*).

HOW DOES CRE SPREAD?

CRE infections happen in healthcare settings like hospitals, clinics, and nursing homes.


How can someone get sick from CRE? A person can become infected if they come in contact with (or touch) the CRE germ.

How does CRE spread? It spreads when someone touches an infected or colonized person's body or body fluids.

Who is at risk for CRE infection? It can be:

- Direct**, by touching wounds or feces (poop); **OR**
- Indirect**, by way of dirty hands or touching dirty objects (like tubes that move liquid from the body or breathing machines).

Who is most at risk for CRE infection? It usually affects people who receive acute or long-term care in places like hospitals, clinics, and nursing homes. People with a weak immune system, or who use an item like tubes or breathing machines going into their body.



WHAT ARE CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE)?

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OUR TIPS FOR HELPING FOR SOMEONE WITH CRE

Wear gloves whenever you are going to touch body fluids or blood.

Wash your hands. It is important to wash your hands after you:

- Touch wounds
- Help the person use the bathroom
- Clean up feces (poop)

Clean surfaces and medical devices that have touched a CRE patient's body or body fluids, with soap and water and then a household disinfectant (bleach).

Wash all used clothes, sheets, and linens using laundry detergent.

CRE
Carbapenem-Resistant
Enterobacteriaceae
Prevention Tips for
Patients and Families

We Need Your Input!

- Questions, comments, suggestions...

Updated Guidance

- **January 2019**
- www.michigan.gov/hai
- www.michigan.gov/cdinfo
- Listserves (Communicable Disease, NHSN Users, clinical micro)

Thank You

Brenda Brennan, MSPH

HAI Coordinator / CRE Prevention Coordinator
SHARP Unit Manager
(517) 284-4945
BrennanB@michigan.gov

Sara McNamara, MPH, MT(ASCP)

Antimicrobial Resistance Epidemiologist
(517) 284-4953
McNamaraS5@michigan.gov

