Michigan Department of Health and Human Services
Healthcare-Associated Infections (HAI) Section
CPO Case Reporting and Investigation Guidance

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Purpose

Carbapenemase-Producing Organisms (CPO) are a significant public health concern and contribute to the growing problem of antibiotic resistance. CPO include any Enterobacterales, *Pseudomonas aeruginosa*, or *Acinetobacter* species, and are a group of multidrug-resistant pathogens that are classified as an urgent public health threat by the Centers for Disease Control and Prevention.

Carbapenem antibiotics (doripenem, ertapenem, imipenem, meropenem and sulopenem,) are active against many different groups of bacteria and are usually reserved for severe infections. Certain organisms have developed a mechanism to resist the effects of carbapenem antibiotics which limits options for treating infections caused by these organisms.

The mechanism of resistance can be varied; for public health surveillance, the focus is on carbapenemases, which are enzymes produced by bacteria. Carbapenemases are beta-lactamase enzymes that inactivate carbapenems and other beta-lactam antibiotics. Resistance due to carbapenemase genes transmitted on mobile genetic elements (plasmids) enable transfer across bacterial species and are primarily responsible for the spread of carbapenemase-producing organisms.

Therefore, CPO reporting is crucially important for identifying and limiting the spread. MDHHS continues to work with clinical laboratories to report CPOs electronically to the Michigan Disease Surveillance System (MDSS). However, in the interim, most CPO case reports may be entered manually by laboratory, infection prevention staff, or local health department (LHD) staff. The following guide provides additional information for reporting and public health follow-up of CPO cases in MDSS.

Laboratory Reporting Criteria

1. Laboratories must report all isolates or specimens of Carbapenamase-producing Organisms (CPO): Any **Enterobacterales** (Table 1), ***Pseudomonas aeruginosa, Acinetobacter* spp**., or culture-independent test with any of the following positive laboratory evidence:
    a. **Phenotypic test** (refer to Table 2) result for carbapenemase production
        i. Isolates positive for phenotypic carbapenemase production but negative by molecular tests for known carbapenemase genes should still be reported and submitted.

> ⓘ *Phenotypic tests look for the physical characteristics of an organism. For CPO surveillance, this means looking for production of a carbapenemase enzyme that breaks down carbapenem antibiotics conferring resistance to carbapenem antibiotics.*

    b. **Molecular test** (refer to Table 3) result detecting a carbapenemase gene with or without organism identification.
        i. Common carbapenemase genes include blaKPC, blaNDM, blaVIM, blaIMP, blaOXA-48-like, but other genes may include but are not limited to blaSIM, blaGIM, blaSPM, other blaOXA, genes.

> ⓘ *Molecular tests for CPO identify the specific carbapenemase gene that encodes for a carbapenemase enzyme that determines the organism's mechanism of resistance. These tests will only detect gene targets available on the specified panel/probe of the assay.*

    c. Detection of carbapenemase gene by next generation sequencing (NGS)

2. If no phenotypic or molecular testing is performed, report any CPO isolate that meets the susceptibility **MIC breakpoint criteria** (refer to Table 4).

> ⓘ *The MIC breakpoints detect carbapenem resistance and may indicate a potential CPO case when other more specific tests for carbapenemases are not available.*

3. **Culture-independent diagnostic testing (CIDT)** methods use molecular technology to detect specific gene targets in a panel.
    a. CIDT lab reports may identify resistance genes that are not specific to an organism. (LHDs: Please reach out to the HAI section for consultation and assistance with following up on further lab testing.)

4. Laboratories must **submit all CPO isolates** to the MDHHS Bureau of Laboratories (BOL) Lansing laboratory for antimicrobial resistance confirmation (**ARC**) testing.

5. If laboratories are unable to detect CPOs (i.e., cannot test for carbapenemase production or carbapenemase genes) and only perform susceptibility testing, submit isolates of any Enterobacterales, *Pseudomonas aeruginosa*, or *Acinetobacter* spp. **isolate demonstrating resistance profiles defined below in** Table 4 (Resistance Profile Isolate Submission Criteria) to the MDHHS BOL Lansing laboratory for further testing.
    a. Clinical laboratories should follow Standards Institute (CLSI) guidance (M100) regarding which antimicrobials should be tested for each organism and minimum inhibitory concentration (MIC) breakpoints for each antimicrobial tested.

6. If a CPO is detected via a molecular test directly from a clinical specimen, perform a culture to obtain the bacterial isolate and perform subsequent testing to determine carbapenemase production or carbapenemase gene, and antibiotic susceptibility profile when possible, and submit isolate.

Table 1. Enterobacterales Order, all genera (common genera are bolded)

Citrobacter	*Alterococus*	*Dickeya*	*Mangrovibacter*	*Rahnella*
Enterobacter	*Arsenophonus*	*Edwardsiella*	*Metakosakonia*	*Raoultella*
Escherichia	*Averyella*	*Enterobacillus*	*Mixta*	*Rosenbergiella*
Hafnia	*Biostraticola*	*Erwinia*	*Moellerello*	*Rouxiella*
Klebsiella	*Brenneria*	*Ewingella*	*Obesumbacterium*	*Saccharobacter*
Morganella	*Buchnera*	*Franconibacter*	*Pantoea*	*Samsonia*
Proteus	*Budvicia*	*Gibbsiella*	*Pectobacterium*	*Scandinavium*
Providencia	*Buttiauxella*	*Izhakiella*	*Phaseolibacter*	*Shimwellia*
Salmonella	*Calymmatobacterium*	*Kluyvera*	*Phytobacter*	*Siccibacter*
Serratia	*Candidatus*	*Leclercia*	*Phlomoacter*	*Sodalis*
Shigella	*Cedecea*	*Lelliottia*	*Photorhabdus*	*Superficieibacter*
Yersinia	*Chania*	*Leminorella*	*Plesiomonas*	*Tatumella*
	Cosenzaea	*Limnobaculum*	*Pluralibacter*	*Trolbulsiella*
	Cronobacter	*Lonsdalea*	*Pragia*	*Wiggleworthia*
			Pseudoescherichia	*Xenorhabdus*
			Pseudocitrobacter	*Yokenella*

Table 2. Phenotypic tests for carbapenemase production (Pos/Neg) include, but not limited to:

Modified Carbapenem Inactivation Method (mCIM)	EDTA-Modified Carbapenem Inactivation Method (eCIM)
Metallo-β-lactamase testing (e.g., E-test)	Carbapenem Inactivation Method (CIM)
Carba NP	Immunochromatography tests (ICT)

Table 3. Molecular tests for specific type of carbapenemase* (resistance mechanism)

Cepheid Xpert Carba-R®	FilmArray™ pneumonia panel
Nanosphere Verigene BC-GN®	BD MAX™ Check-Points
EPlex® BCID GN Panel	Streck ARM-D®
Validated, laboratory developed NAAT (e.g., PCR)	FilmArray™ BCID
NG-Test® CARBA 5**	

* Common carbapenemases include KPC, NDM, VIM, OXA-48, and IMP, but other examples of carbapenemases include but are not limited to SIM, GIM, SPM, other OXA genes or novel carbapenemase genes.

** NG CARBA 5 is technically a phenotypic lateral flow test but does allow for the qualitative detection and differentiation of the big five common carbapenemase enzyme types (KPC, NDM, VIM, OXA-48, IMP) produced by *Enterobacterales* and *P. aeruginosa*, and therefore is included here.

Table 4. Resistance Profile Isolate Submission Criteria

Organism	Submit any isolate with a minimum inhibitory concentration (MIC)* breakpoint of the following:
Carbapenem-resistant **Enterobacterales (CRE)**	• ≥4 µg/mL for doripenem, or imipenem, or meropenem **OR** • ≥2 µg/mL for ertapenem Note: *Morganella, Proteus,* and *Providencia* spp. may have intrinsic resistance to imipenem. Only those isolates that are resistant to one or more carbapenems other than imipenem should be submitted.
Carbapenem-resistant ***Pseudomonas aeruginosa*** **(CRPA)**	• ≥8 µg/mL to doripenem, or imipenem, or meropenem **AND** • ≥16 µg/mL to cefepime or ceftazidime
Carbapenem-resistant ***Acinetobacter*** **spp**.	• ≥8 µg/mL for doripenem, or imipenem, or meropenem
Any of the above	Any isolate that is non-susceptible to all antibiotics tested

*When reporting isolates, include the MIC numeric criteria (e.g., ≥4 mcg/ml), not just the interpretation alone (i.e., “Resistant”, “Susceptible”, “Intermediate”)

Infection Prevention Reporting

1. Following identification of a confirmed CPO, ensure appropriate healthcare infection control measures are promptly implemented to contain further spread.
2. Report cases to the local health department jurisdiction in which the patient resides- county of residence.
3. Report all cases that meet Laboratory Reporting Criteria or healthcare records containing a diagnosis of Carbapenamase-producing Organisms (CPO).
4. Entering Case Information into MDSS
    a. Healthcare providers reporting cases (e.g., hospital infection prevention) may consider completing the case detail form when reporting the case into MDSS.
    b. Sections to complete include: Patient Demographics, Laboratory, and Clinical Information to determine patient epidemiological information.
    c. Documentation of healthcare exposures and international travel is significantly important if available.

Local Health Departments

1. Electronic Carbapenamase-producing Organism (CPO) reports in MDSS
    a. Review laboratory information and available case information for evidence of Laboratory Reporting Criteria for CPO
2. Manual CPO reporting in MDSS
    a. Create cases from reports with healthcare records containing evidence of Laboratory Reporting Criteria for CPO.
3. For cases that are carbapenem-resistant according to MIC results only, and the resistance mechanism is unknown:
    a. If you are not aware of the reporting laboratory's routine process for sending isolates according to the reporting criteria, contact the laboratory to ensure submission of the isolate to the Bureau of Laboratories (BOL) for further testing. i.e., phenotype and molecular tests for carbapenemases.

    b. If the reporting laboratory has only reported interpretations for carbapenem susceptibility testing (i.e., "Resistant") without also including the MIC values, contact the laboratory to obtain a copy of the unsuppressed laboratory report.

    c. Please complete the Demographics and Laboratory Testing sections of the case detail form.

    d. Completion of other epidemiological information in the case detail form is optional until further testing results are available to confirm the case.

4. Determine case status/classification, case type, case count, and proceed with case investigation for **confirmed** cases.

Case Status/Classification

1. LHD investigators should use the CDC/CSTE CPO Case Definition to classify cases reported to the MDSS: Carbapenemase Producing Organisms (CPO)| CDC , and CSTE position statement.

2. **Confirmed**
    a. Any **Enterobacterales** (Table 1), ***Pseudomonas aeruginosa,*** or ***Acinetobacter* spp**. specimen that meets one of the following laboratory types of evidence:
        - Positive phenotypic test (Table 2) result for carbapenemase production, *OR*
        - Positive molecular test (Table 3) result detecting a carbapenemase gene with or without organism identification, *OR*
        - Detection of a carbapenemase gene by next generation sequencing (NGS)

3. There are **no** Probable or Suspect case classifications for CPO.

4. **Not a Case**
        - Organism does not meet the case definition for a CPO
        - All carbapenems are susceptible (MIC doesn't match laboratory criteria, Table 4) and no phenotypic and molecular tests were performed
        - Negative for phenotypic and molecular tests, if conducted, **regardless of MIC criteria**.

5. For additional local guidance, refer to **Appendix A: MDSS Reporting and Case Status/Classification Flowchart**

Clinical vs. Screening Case Type

1. Clinical – A clinical case is a person with a CPO identified from a clinical specimen collected **for the purpose of diagnosing or treating disease during the normal course of care.**
    - The most common examples of clinical specimens are blood, wound, urine, sputum, and tissue.
    - A CPO identified in a non-invasive site (e.g., urine) could be an indication of colonization and not true infection, however, when collected during the normal course of care it would be counted as a clinical case.

2. Screening – A screening case is a person with a CPO identified in a swab collected **for the purpose of screening** regardless of the site of collection, however the most common site for CPO screening is a rectal swab.
    - These specimens are collected for the purpose of surveillance and not to identify the source of infection.

- Screening test swabs are generally only tested for the molecular resistance mechanism – genes and may not identify the organism. PCR is the preferred method for colonization screening.
- Screening is generally used for
  - Admission screening to units or facilities
  - Discharge screening
  - Point Prevalence Survey (PPS) screening
  - Screening of high-risk/epi-linked healthcare contacts to known cases (e.g., roommate or other contact identified during containment response)

Case Counting and De-duplication

1. Case Counting – **As of January 2023**, **an individual should only be counted as a CPO case once in a lifetime for the same organism and carbapenemase combination**.
   a. A specific organism/carbapenemase combination in a person should be counted as a separate case from other organism/carbapenemase combinations in the same person (e.g., KPC+ *K. pneumoniae* vs. NDM+ *E. coli*).
      - A specific organism/carbapenemase combination can include a carbapenemase gene(s) without an organism detected (e.g., NDM+ no organism vs. NDM+ *E. coli*).

   b. A person is counted as a case when a CPO is identified for the first time in a specimen, whether that be a screening or clinical specimen. If the person later has another positive specimen of the same type (i.e., both screening specimens or both clinical specimens), they are not counted again.
      - However, if a person was identified as a **screening case first and later developed clinical infection, the individual would be counted twice**: once as a screening case and once as a clinical case. **This is the only scenario that the same organism/carbapenemase combination can be counted twice for the same person.**

   c. Multiple screening positives or multiple clinical positives from the same patient, even if years apart, are not counted again if they are the same organism/carbapenemase combination. Only the first instance per patient (for an organism/carbapenemase combination) is counted. **A patient who is colonized or infected with a CPO is considered to be colonized indefinitely.**

2. Deduplication - All of a patient's CPO-related labs entered into MDSS can be merged into the same CPO case for a specific organism/carbapenemase combination and case type (clinical vs. screening), as appropriate, or individual cases could be closed out as "Superceded."

3. For additional details and example scenarios, refer to **Appendix B: Case Reporting and De-duplication of Investigation Status**

Case Investigation

1. Investigate all cases that fully meet the CPO case definition (**Confirmed cases**). Use the Case Detail Form in MDSS for documenting epidemiological information for CPO Cases:
    a. Complete the entire **case detail form** as best as possible for all CPO cases, certain targeted CPO resistance mechanisms, including **NDM-1, OXA-48, VIM, IMP or a novel mechanism, should be given higher investigation priority**.
    e. **KPC** carbapenemase cases: complete the Laboratory section of the case detail form to determine case classification. For the Clinical Information section, consider your jurisdiction's KPC prevalence to determine additional follow-up. Consult with the HAI section for current recommendations.

2. LHDs should first consider contacting the healthcare provider/hospital infection preventionist of the reporting facility to complete the CLINICAL INFORMATION section of MDSS.
    a. **Admission and discharge dates** from 90 days prior to date of specimen collection to present
        i. Please include the original admission date as well if it was prior to 90 days
    b. Facilities where patients were **admitted from** and **discharged to** (if applicable)
    c. **Room numbers and units** where the patient stayed for each admission from 90 days to present
    d. If **any roommates**, their names, DOB, and overlapping date range with the index patient for each admission from 90 days to present
    e. Any **indwelling devices/lines/tubes/drains** in place – within 2 days of collection
    f. **Services Received**: wound care, RT, PT, imaging, phlebotomy
    g. Recent **surgical procedures** for each admission from 90 days to present
    h. Did the patient receive **dialysis** at an inpatient facility or at an outside center?
        i. If yes, where with contact information added
    i. Were any **isolation precautions in place** throughout the patient's stay? If so, which type, and the date range precautions were in effect.
    j. Does this patient have a **recent travel history** (State or World) listed in the EMR?

> *Note: Clinical information from 90 days prior to specimen collection is best practice to fully evaluate response efforts, and minimum of 30 days prior to specimen collection is necessary.*

3. Upload supporting medical records to the Notes tab if available.

    a. Sometimes, requesting the following medical documents can assist in completing case investigations:
        i. History and Physical

ii. Face-sheet/Demographics to verify jurisdiction

iii. Discharge Summary

iv. Bed History/Trace

v. Roommates (name, DOB, date range)

b. When medical records do not include all case information, following up with a call to the Infection Preventionist will provide results.

4. CPO have multiple lab components reported over time, and laboratory results electronically sent to MDSS may be staggered over a period of days (See Appendix C, Lab Reports Tab section for example).
5. For additional information on documenting details of the case investigation, see **Appendix C: MDSS Case Report Documentation**
6. The **Appendix E: MDRO Containment Case Investigation Form** for **acute care** and **outpatient** settings is a tool that can be adapted to assist with collecting case information.

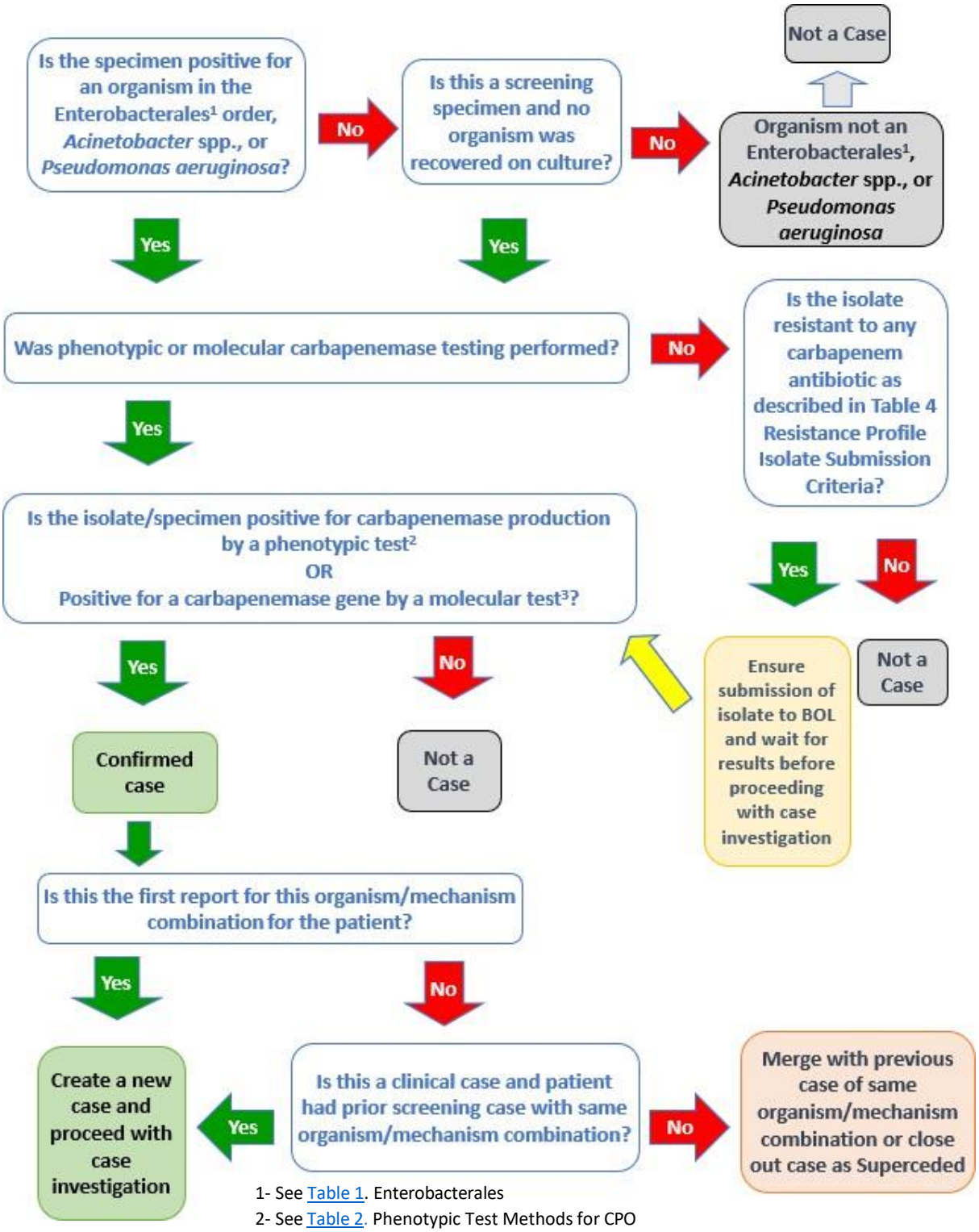
Infection Prevention and Control (IPC) Recommendations

1. LHDs may reach out to associated healthcare facilities identified during case investigation to provide IPC recommendations described in **Appendix D: MDRO IPC Recommendations**
2. MDHHS HAI Section is available for consultation.
3. The HAI Section will be monitoring cases to provide follow-up and **facility-specific screening recommendations,** as well as coordinate with the laboratory on a case-by-case basis.

    a. **When involved**, MDHHS HAI Section will document case progression through the **NOTES** tab of MDSS.

Questions regarding case investigation can be directed to MDHHS-HAI@michigan.gov

Appendix A: MDSS Reporting and Case Status/Classification Flowchart



1- See Table 1. Enterobacterales
2- See Table 2. Phenotypic Test Methods for CPO
3- See Table 3. Molecular Test Methods for CPO

Appendix B: Case Reporting and De-duplication of Investigation Status

A person who is colonized or infected with a carbapenemase-producing organism (CPO) is considered to be colonized indefinitely. A specific organism/carbapenemase combination in a person should be evaluated and counted as a separate case from other organism/carbapenemase combinations in the same person (e.g., KPC+ *K. pneumoniae* vs. NDM+ *E. coli*). A specific organism/carbapenemase combination can include a carbapenemase gene(s) without an organism detected (e.g., NDM+ no organism vs. NDM+ *E. coli*). Any following reports of the same organism and resistance mechanism would be merged with previous cases. For more information, see updated CSTE position statement.

How to Report and Count Cases of CPO

- Evaluate each CPO organism/mechanism combination separately for each person.
- A person is counted as a case when a CPO is identified for the first time in a specimen, whether that be a screening or clinical specimen.
- If the person first had a positive screening specimen and later has another positive screening specimen, they are not counted again as a screening case.
    - However, if that person with a screening case first, later developed a positive clinical specimen, the individual would be counted twice: once as a screening case and once as a clinical case. **This is the only scenario that the same organism/carbapenemase combination can be counted twice for the same person.**
    - If that person later has additional positive screening or clinical specimens, they are not counted again (only counted twice).
- If the person first had a positive clinical specimen and later has another positive clinical or screening specimen, they are not counted again (only counted once).

Multiple screening positives or multiple clinical positives from the same patient as described above, even if years apart, are not counted again if they are the same organism/carbapenemase combination as the initial screening or clinical case, respectively (only the first instance is counted per lifetime). Below are examples of determining case investigation status for counting cases and scenarios of how to count unique clinical or screening cases.

Scenario #1 - If a person is first classified as a clinical case, and later screening reports the same organism/carbapenemase combination, they are counted only once.

Example: Patient A has a sputum culture that is positive for VIM *Pseudomonas aeruginosa*. Later, Patient A is included in a CPO screening Point Prevalence Survey (PPS) and their rectal swab is VIM positive by PCR. *P. aeruginosa* is eventually cultured from the same rectal swab

specimen. Patient A would be counted only once, as a clinical VIM+ *P. aeruginosa* case for the initial sputum culture, even if future results are positive for the same organism/carbapenemase combination from a different specimen source.

Laboratory Results	*Interpretation* →	*Action*
Sputum culture 1/12/2023 VIM+ *Pseudomonas aeruginosa*	New CPO case for Patient A, case #1	Report as a clinical case Organism: *P. aeruginosa* Gene: VIM
Rectal swab 2/13/2023 VIM+ by PCR VIM+ *P. aeruginosa* by subsequent culture	Positive screening for same organism/carbapenemase as case #1, initial clinical case. Not a new case for Patient A.	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded

Scenario #2 - A person first classified as a screening case can be later counted as a clinical case with the same organism/carbapenemase combination. **This is the only scenario that the same organism/carbapenemase combination can be counted twice for the same person**.

Example: A rectal swab from Patient A results in OXA-23+ *Acinetobacter baumannii* (CRAB). Patient A is later at a hospital where a sputum specimen tests positive for OXA-23 CRAB. Patient A would be reported as an OXA-23+ CRAB screening and later clinical case.

Laboratory Results	*Interpretation* →	*Action*
Rectal swab 1/10/2023 OXA-23+ *A. baumannii*	New CPO case #1	Report as Screening Case Organism: *A. baumannii* Gene: OXA-23
Sputum culture 3/12/2023 OXA-23+ *A. baumannii*	Positive clinical specimen for same organism/carbapenemase as case #1. New CPO case #2	Report as a Clinical Case Organism: *E. coli* Gene: KPC

Scenario #3 - A person with a known carbapenemase but unknown organism should be counted once for that carbapenemase screening when new screening reports a previously detected mechanism.

Example: Patient A's rectal swab tests positive for NDM from a PPS, but no organism was ultimately cultured from the swab. Patient A later has a urine specimen that tests positive for NDM+ *E. coli*. Another screening test shows positive for NDM. Patient A would be counted twice: once as an NDM+ screening case and once as a clinical NDM+ *E. coli* case.

Laboratory Results	*Interpretation* →	*Action*
Rectal swab 5/1/2023 NDM+ (*no organism recovered)*	New CPO case #1	Report as a Screening Case Organism: *Other, no organism identified* Gene: NDM
Urine culture 6/1/2023 NDM+ *Escherichia coli*	Positive clinical specimen for same carbapenemase, new organism. New CPO case #2	Report as a Clinical Case Organism: *E. coli* Gene: NDM
Rectal swab 9/10/2023 NDM+ (*no organism recovered)*	Positive screening for same organism/carbapenemase as case #1. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded

Scenario #4

A person with multiple screening and clinical results for a previously detected organism/carbapenemase combination is counted once for each case type.

Laboratory Results	*Interpretation* →	*Action*
Rectal swab 1/10/2023 KPC+ (*no organism recovered)*	New CPO case #1	Report as a Screening Case Organism: *Other, no organism identified* Gene: KPC
Blood culture 2/12/2023 KPC+ *Klebsiella pneumonia*	Positive clinical specimen, organism identified. New CPO case #2	Report as a Clinical Case Organism: *K. pneumonia* Gene: KPC

Rectal swab 3/10/2023 KPC+ (*no organism recovered)*	Positive screening for same carbapenemase as case #1. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded
Blood culture 3/12/2023 KPC+ *Klebsiella pneumonia*	Positive clinical specimen for same organism/carbapenemase as case #2. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #2 or close out as Superceded

Scenario #5

A person with multiple screening and clinical results for a new organism/carbapenemase combination is counted for each new occurrence.

Laboratory Results	*Interpretation* →	*Action*
Rectal swab 1/10/2023 KPC+ (*no organism recovered)*	Positive screening specimen New CPO case #1	Report as a Screening Case Organism: *Other, no organism identified* Gene: KPC
Sputum culture 2/12/2023 KPC+ *Citrobacter freundii*	Positive clinical specimen, organism identified. New CPO case #2	Report as a Clinical Case Organism: *C. freundii* Gene: KPC
Rectal swab 3/10/2023 VIM+ (*no organism recovered)*	Positive screening for new carbapenemase. New CPO case#3	Report as a Screening Case Organism: *Other, no organism identified* Gene: VIM
Blood culture 4/12/2023 KPC+ *Klebsiella oxytoca*	Positive clinical specimen for new organism/carbapenemase. New CPO case #4	Report as a Clinical Case Organism: *K. oxytoca* Gene: KPC

Scenario #6

A person with multiple organism/carbapenemases combinations identified is counted for each unique occurrence.

Laboratory Results	*Interpretation* →	*Action*
Blood culture 1/10/2023 KPC+ *Enterobacter cloacae*	Positive clinical specimen for Patient A New CPO case #1	Report as a clinical case Organism: *E. cloacae* Gene: KPC
Sputum culture 2/10/2023 VIM+ *Klebsiella aerogenes*	Positive clinical specimen for new organism/carbapenemase. New CPO case #2	Report as a clinical case Organism: *K. aerogenes* Gene: VIM
Blood culture 3/12/2023 KPC+ NDM+ *Enterobacter cloacae*	Positive clinical specimen for new carbapenemase. New CPO case #3	Report as a clinical case Organism: *E. cloacae* Gene: KPC and NDM
Urine culture 6/12/2023 KPC+ *Enterobacter cloacae*	Positive clinical specimen for same organism/carbapenemase as case #1. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded

Scenario #7

A person with more than one carbapenemase identified in the same isolate is counted once for each organism/carbapenemase combination.

Laboratory Results	*Interpretation* →	*Action*
Blood culture 3/10/2023 NDM+ OXA-48+ *Escherichia coli*	Positive clinical specimen for Patient A New CPO case #1	Report as a clinical case Organism: *E. coli* Gene: NDM and OXA-48

Respiratory culture 6/10/2023 NDM+ *E. coli*	Positive clinical specimen for new carbapenemase. New CPO case #2	Report as a clinical case Organism: *E. coli* Gene: NDM
Sputum culture 3/12/2023 NDM+ OXA-48+ *E. coli*	Positive clinical specimen for same organism/carbapenemase as case #1. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded

Scenario #8

A person with phenotypic test positive with and without genotypic testing/carbapenemase results.

Laboratory Results	*Interpretation* →	*Action*
Urine culture 3/10/2023 mCIM+ *Citrobacter koseri*	Positive clinical specimen for Patient A New CPO case #1	Report as a clinical case Organism: *C. koseri* Phenotype: mCIM, positive Gene: Not Tested
Urine culture 4/15/2023 mCIM+ NDM+ *Citrobacter koseri*	Positive clinical specimen for Patient A New CPO case #2	Report as a clinical case Organism: *C. koseri* Phenotype: mCIM, positive Gene: NDM+
Blood culture 8/10/2023 mCIM+ NDM+ *Citrobacter koseri*	Positive clinical specimen for same organism/carbapenemase as case #2. Not a new case	Enter new lab info in the Lab Reports tab and Merge with case #2 or close out as Superceded

Scenario #9

A person with phenotypic test positive, without genotypic testing/carbapenemase results.

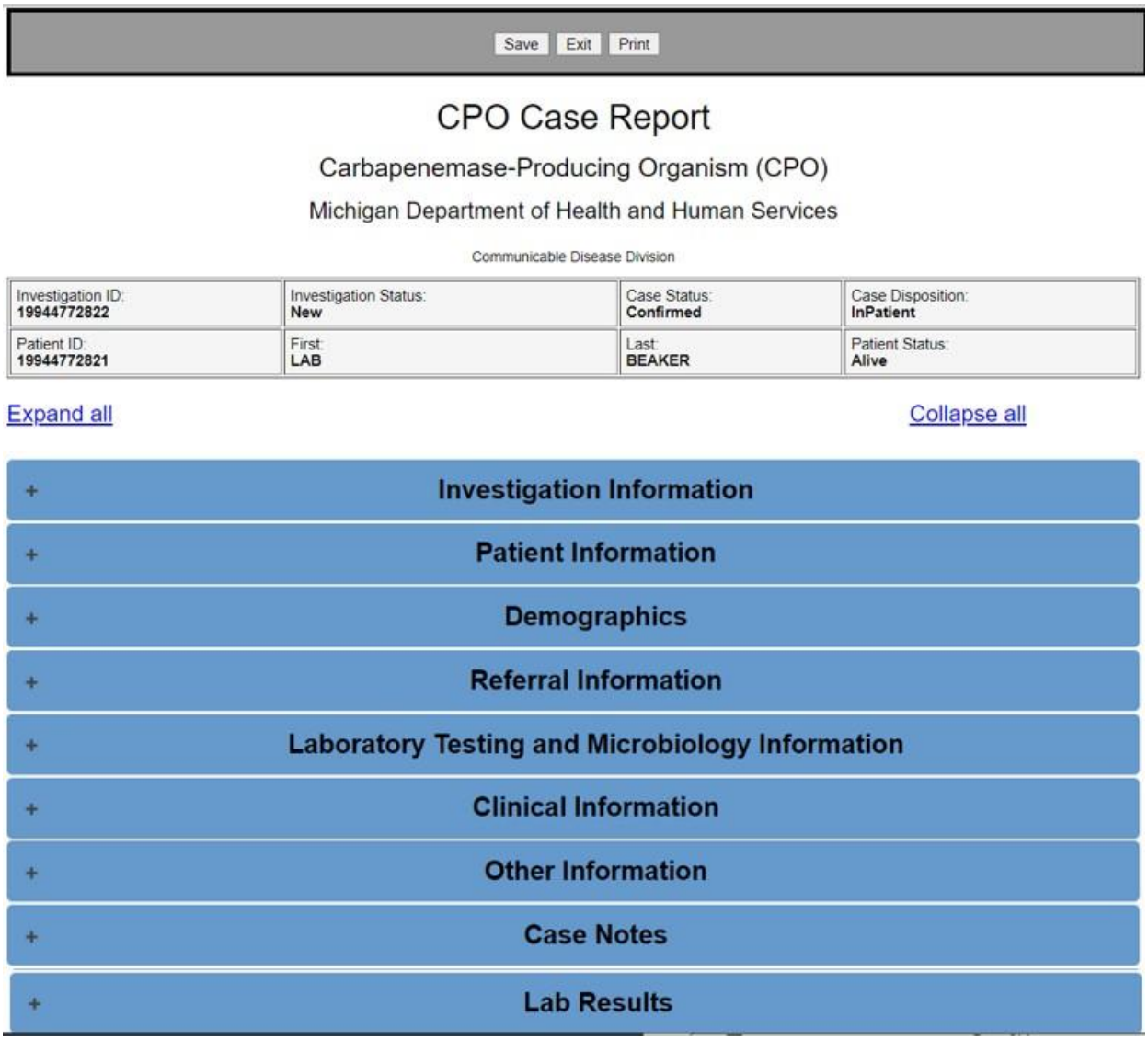
Laboratory Results	*Interpretation* →	*Action*
Wound culture 3/10/2023 mCIM+ *E. coli*	Positive clinical specimen for Patient A New CPO case #1	Report as a clinical case Organism: *E. coli* Gene: Not tested
Blood culture 8/10/2023 mCIM+ *E. coli*	Positive clinical specimen for same organism as case #1. Not a new case.	Enter new lab info in the Lab Reports tab and Merge with case #1 or close out as Superceded

Appendix C: MDSS Case Report Documentation

Data fields in MDSS are important to generating quality data reports for describing the epidemiology of the condition and for guiding appropriate infection prevention and control responses to a newly detected case or outbreak. Some highlighted sections below from the case report form explain details of documenting information in MDSS for completeness.

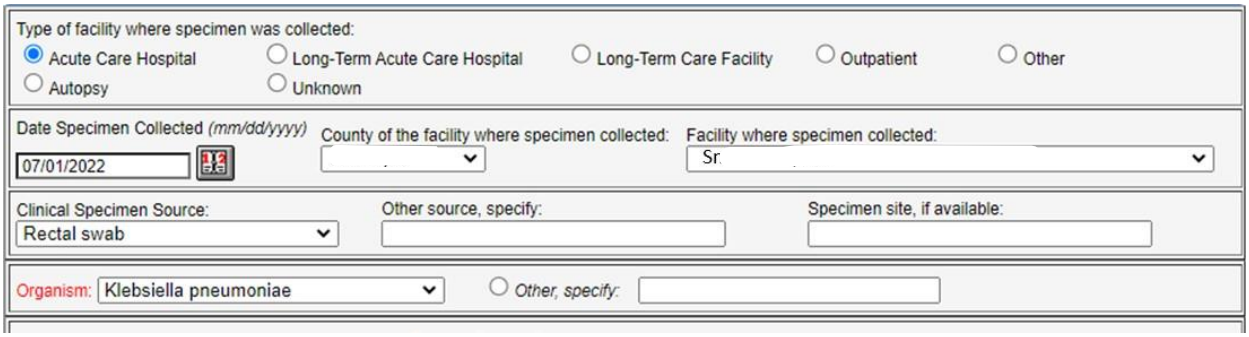
MDSS All Sections

Complete the entire case detail form as best as possible, **especially for certain targeted CPO resistance mechanisms, including NDM-1, OXA-48, VIM, IMP, or any novel carbapenemases**.

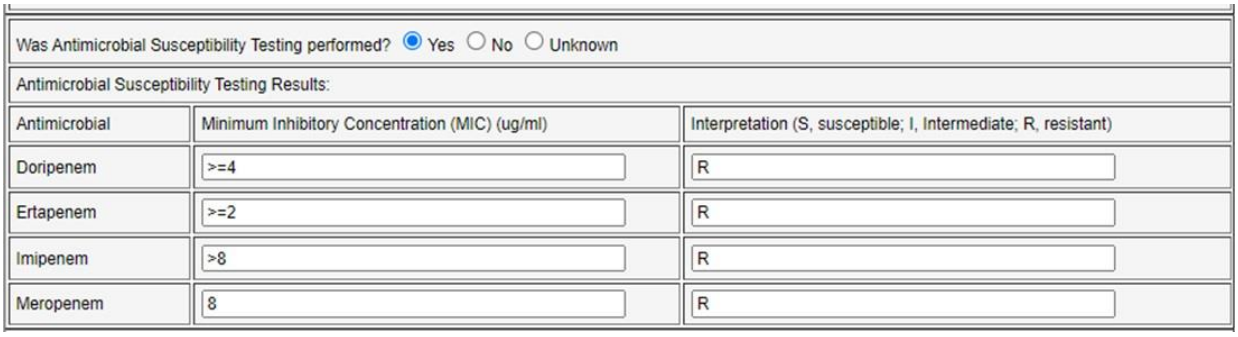


Laboratory Testing and Microbiology Information section

- Please complete all fields in this section with available information for facility, specimen, and organism.

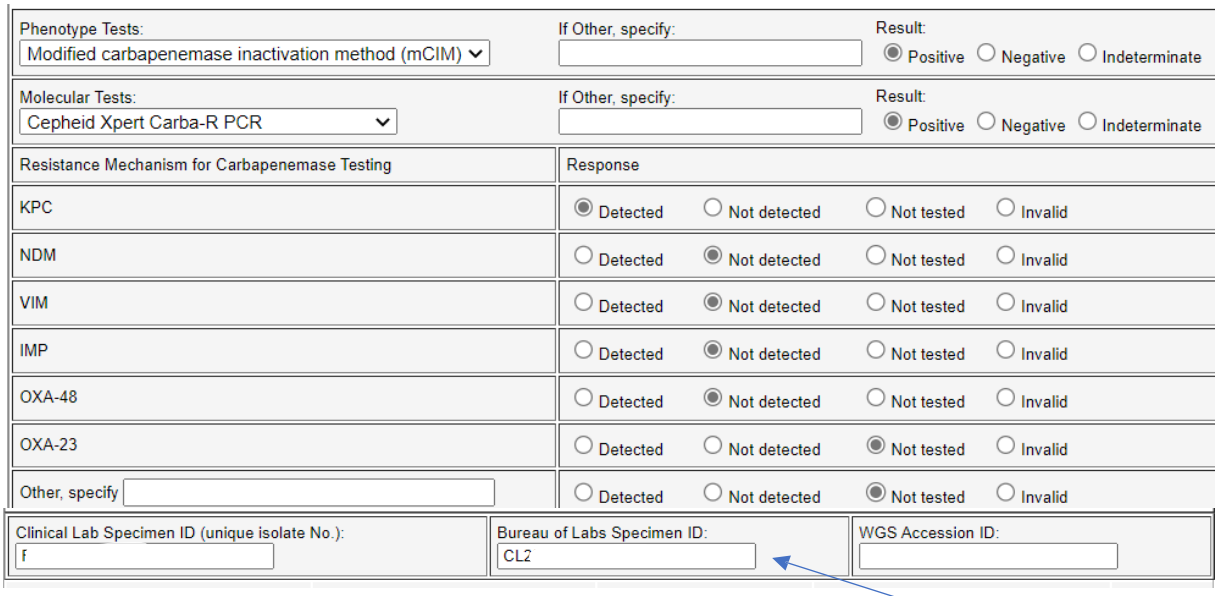


- If Antimicrobial Susceptibility Testing (AST) was performed, include AST results in the lab reports tab or upload report to notes tab.
- Entering AST information is optional:
  - Enter results as numeric values for MIC susceptibility test results
  - Enter interpretations: “R”, “S”, “I”

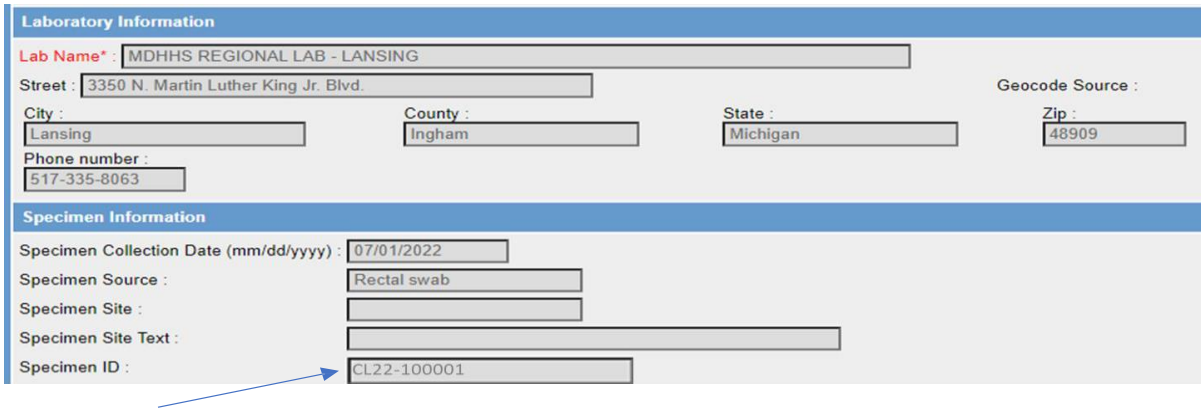


- **Phenotype Tests**
  - Select the test method and result: Positive, Negative, etc.
  - Select “Not Tested” if test was not available/performed
  - Note: MDHHS BOL performs the “Modified carbapenemase inactivation method (mCIM)”
- **Molecular Tests**
  - Select the test method and result: Positive, Negative, etc.
  - Enter response for each resistance mechanism if tested, i.e., “Detected”, “Not detected”, etc.
  - **MDHHS BOL** usually uses the “NG CARBA 5” lateral flow immunoassay method for KPC, NDM, OXA-48, VIM, and the “CDC Carbapenemase gene PCR” for IMP, OXA- 23,24/40,58
  - The **NG CARBA 5 Lateral Flow Immunoassay** is technically a phenotypic test, but the carbapenemase enzyme can be documented in this section by selecting from the dropdown list for NG CARBA 5 or type in “ If Other, specify” field, and select

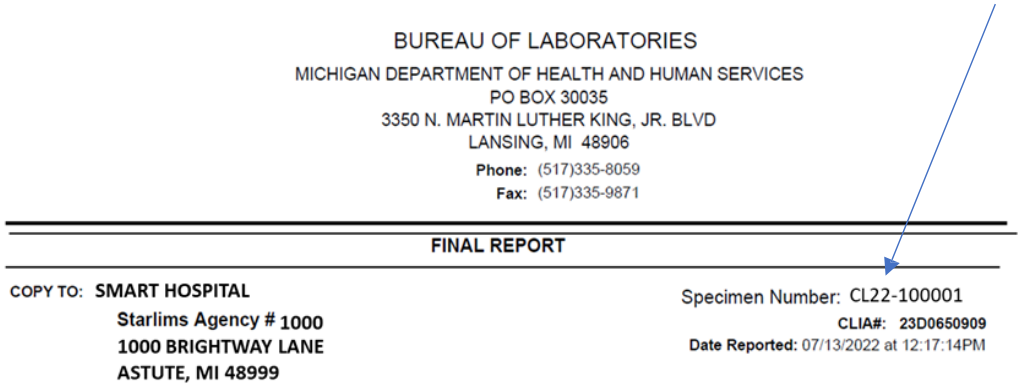
the detected carbapenemase resistance mechanism.



- BOL specimen IDs should be included in the "Bureau of Labs Specimen ID" field
- The MDSS **Lab Reports tab** has information for the Specimen ID from the lab that performed the test: Clinical Lab or BOL



- BOL specimen ID can also be found on the top right area of the BOL report form



Lab Reports Tab

- Components of CPO lab results may be received over multiple days despite the same collection date. E.g., specimen collected on 11/15/23; on 11/20/23 received blood culture result, on 12/01/23 received PCR result, and on 12/05/23 received mCIM result.

Lab Reports Help

Date Received	Collection Date	Test Name (* Case Associated)	Result	Electronic	
12/05/2023	11/15/2023	Carbapenem resistance genes *	KPC (bla-KPC) gene DNA Detected	Yes	View
12/05/2023	11/15/2023	Culture Results *	Klebsiella variicola	Yes	View
12/05/2023	11/15/2023	Antimicrobial Susceptibility Results *	> 2	Yes	View
12/05/2023	11/15/2023	Modified Carbapenem Inactivation Method *	Positive	Yes	View
12/05/2023	11/15/2023	PCR Result *	KPC (bla-KPC) gene DNA Detected	Yes	View
12/05/2023	11/15/2023	IMP PCR Result *	IMP (bla-IMP) gene DNA Not Detected	Yes	View
12/01/2023	11/15/2023	PCR Result *	KPC (bla-KPC) gene DNA Detected	Yes	View
12/01/2023	11/15/2023	Culture Results *	Klebsiella variicola	Yes	View
12/01/2023	11/15/2023	Antimicrobial Susceptibility Results *	> 2	Yes	View
11/21/2023	11/15/2023	Blood Culture *	Klebsiella variicola, Carbapenem resistant	Yes	View
11/20/2023	11/15/2023	Blood Culture *	Klebsiella variicola, Carbapenem resistant	Yes	View
11/20/2023	11/15/2023	Urine Culture *	Klebsiella variicola, Carbapenem resistant	Yes	View

- Example of Carba 5 Lateral Flow Immunoassay test result detecting KPC carbapenemase enzyme.

Lab Reports Help

Date Received	Collection Date	Test Name (* Case Associated)	Result	Electronic	
06/09/2025	05/25/2025	Carba 5 Lateral Flow Immunoassay *	IMP enzyme NEGATIVE	Yes	View
06/09/2025	05/25/2025	Carbapenem resistance genes *	KPC enzyme POSITIVE	Yes	View
06/09/2025	05/25/2025	Culture Results *	Klebsiella pneumoniae	Yes	View
06/09/2025	05/25/2025	Modified Carbapenem Inactivation Method *	Positive	Yes	View
06/05/2025	05/25/2025	Culture Results *	Klebsiella pneumoniae	Yes	View

- Example of a MDHHS BOL electronic lab report interpretation of **Not a Case**: the mCIM is negative and the "Carbapenem resistance genes" result only indicates the organism and not a gene that would be detected.

Lab Reports Help

Date Received	Collection Date	Test Name (* Case Associated)	Result	Electronic	
08/11/2021	07/22/2021	Culture Results	Enterobacter cloacae complex	Yes	View
08/11/2021	07/22/2021	Modified Carbapenem Inactivation Method	Negative	Yes	View
08/11/2021	07/22/2021	Carbapenem resistance genes	Enterobacter cloacae complex	Yes	View

Appendix D: MDRO IPC Recommendations

Transmission-based Precautions

ACH/LTACH: Place the patient in a single-patient room on **Contact Precautions** for the duration of their admission.

LTC/SNF: Place the resident on **Enhanced Barrier Precautions** for the duration of their admission, unless contact precautions are otherwise indicated.

Enhanced Barrier Precautions (michigan.gov)

Communications

Communicate the patient's **MDRO status and required infection prevention precautions** to the accepting healthcare facility if the patient is transferred to another level of care (either higher or lower level of care).

Communicate the patient's status to the health department upon transfer to another inpatient healthcare facility.

Candida-auris-Interfacility-Transfer.pdf (michigan.gov)
Healthcare facility Transfer Form Comprehensive
Inter-Facility Infection Control Transfer Form for States
Establishing HAI Prevention Collaboratives (cdc.gov)

Medical Record Flag

ACH/LTACH: Flag the **patient's chart** for Contact Precautions for any future admissions.

LTC/SNF: Flag the **resident's chart** for Enhanced Barrier Precautions or Contact Precautions, when otherwise indicated, for any future admissions.

For high-risk contacts that have been discharged, healthcare facilities should consider flagging charts to facilitate admission screening if these individuals are readmitted to the facility in the next six months.

Laboratory Surveillance

Conduct **prospective surveillance** of your microbiology laboratory results over the next 3 months to identify any organisms with similar resistance patterns.

For a new detection in a facility (i.e., first *C. auris* or first NDM), conduct **retrospective surveillance** of your microbiology laboratory results over the past 6 months to identify any organisms with similar resistance patterns, if possible.

Disinfectant, Education, and Monitoring

Provide **education** to frontline HCP and conduct ongoing **adherence monitoring** of infection control practices, including:

- Hand hygiene
- Glove and gown use
- Indwelling device care
- Environmental cleaning and disinfection

- ✓ Ensure availability of alcohol-based hand rub inside and outside the patient's room
- ✓ Ensure availability of PPE inside and outside the patient's room
- ✓ Consider enhanced cleaning of high-touch surfaces and equipment in the patient's room and the unit at least daily

EPA Registered Disinfectant

Use an Environmental Protection Agency (EPA) registered hospital-grade disinfectant

- Effective against *C. auris*. [EPA List P]

Colonization Screening

Consult with the MDHHS HAI section to assess the need for facility-specific colonization screening or point prevalence survey of the unit(s) the patient [resident] was admitted to.

If indicated, the **MDHHS HAI section will coordinate** the screening process with the LHD, healthcare facility, and public health laboratory.

Epi-linked patient contacts who are at high-risk for acquiring an MDRO are generally recommended for screening, which may include: roommates, those who share a bathroom, are bedbound or require high levels of assistance with ADLs, those with open wounds or indwelling devices, or on antibiotics, and who overlapped with the index patient/resident on the same unit.

MDHHS Screening Guidance:
Candida-auris-Screening-Guidance_81123.pdf (michigan.gov)

Appendix E: MDRO Containment Case Investigation Form

PATIENT INFORMATION			
Patient Name			
DOB			
MDSS ID		**Local Health Department**	
Case Type	☐Screening/Colonization ☐Clinical	***If Clinical, was patient previously counted as a Screening case?*** ☐ No ☐Yes, **Previous Screening MDSS ID#:**	
LABORATORY TESTING and MICROBIOLOGY INFORMATION			
Date SHARP Notified	Click or tap to enter a date.	**Reason for Culture/Test**	☐ Admit ☐ Discharge ☐ PPS ☐Clinical/diagnosis ☐Other:
Facility Type (where specimen/ patient was at time of collection)		**Inpatient**: ☐ACH ☐ LTAC ☐NH ☐AL/AFC/LTC **Outpatient:** ☐ ED ☐ Office/clinic	
Specimen Collection Date	Click or tap to enter a date.	**Facility where specimen collected** (not the testing lab)	
Clinical Lab Specimen ID		**Bureau of Labs Specimen ID** (or other Public Health Lab, e.g., WI)	
Specimen Source	☐ Axilla/groin ☐ Urine ☐ Blood ☐ Sputum ☐ Wound ☐Aspirate: ☐ Rectal/perianal/stool ☐Other:		
Organism Identified	☐ Candida auris ☐ Other:		
Resistance Mechanism	☐ KPC ☐ NDM ☐ VIM ☐ IMP ☐ OXA-48 ☐ OXA-23 ☐ OXA-24/40 ☐ OXA-58 ☐ VISA ☐ VRSA ☐ mCIM+/PCR- ☐ Pan-nonsusceptible/ Pan-resistant ☐ Other:		
CLINICAL INFORMATION			
Healthcare exposure in last 60 days ☐ None	**Inpatient:** ☐ACH ☐ LTAC ☐NH ☐AL/AFC/LTC		
	Outpatient: ☐ ED ☐ Office/clinic ☐ Dialysis		

Facility Information for each INPATIENT EXPOSURE

	Facility 1		Facility 2			Facility 3		
Name								
Address								
Contact Name								
Number								
Email								
Outreach Date			Click or tap to enter a date.			Click or tap to enter a date.		
Outreach Info								
Facility Type	☐ ACH ☐ NH ☐ LTAC ☐ AL/AFC/LTC		☐ ACH ☐ NH ☐ LTAC ☐ AL/AFC/LTC			☐ ACH ☐ NH ☐ LTAC ☐ AL/AFC/LTC		
Admit date	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**
Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:
Admit date	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**
Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:
Admit date	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**	**Admit date**	**DC date**	**Location Notes**
Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:	Click or tap to enter a date.	Click or tap to enter a date.	Admit from: Discharge to:
Bed History								
Roommates								
Precautions								
HPI/Notes								

CLINICAL INFORMATION CONT.			
Indwelling Devices ☐ None	☐ Trach ☐ Vent ☐ Wound Vac ☐ Central Venous Line ☐ Foley ☐ PEG ☐ Other:		
Shared Services/Resources ☐ None	☐Resp Therapy ☐ Inpatient Dialysis ☐Rehab Therapy ☐Mechanical Lift ☐Wound care ☐ Outpatient Dialysis ☐Glucose Monitoring ☐**Other Shared Resources**: ☐**Other Shared Services**:		
Incontinence ☐ None	☐ Urine ☐ Stool		
ADL Assistance ☐ None	☐Minimum ☐ Moderate ☐Max/Bedridden		
Comorbid Conditions ☐ None	☐ Para/hemi/quadri --plegia ☐Diabetes mellitus ☐Cardiovascular Disease ☐Cancer/Malignancy ☐ Chronic Lung Disease ☐ Renal Failure ☐ Immune deficiency ☐ Solid organ transplant ☐Other:		
Dialysis ☐ None	**Inpatient Hemodialysis Location:**		
	Outpatient Hemodialysis Location:		
Surgical Procedures (procedure/date) ☐ None			
MDRO History ☐ None	☐CRAB ☐ CPO ☐ CRPA ☐C.DIFF ☐MRSA ☐ VRE ☐ C. auris ☐Other:		
History of travel in last 12 months? ☐ None	**Country/State:**	**Dates:**	**HC Exposure?** ☐Yes ☐ No
Narrative/HPI			

IPC RECOMMENDATIONS

Transmission-based Precautions

ACH/LTACH: Place the patient in a single-patient room on **Contact Precautions** for the duration of their admission.

LTC/SNF: Place the resident on **Enhanced Barrier Precautions** for the duration of their admission, unless contact precautions are otherwise indicated.

Enhanced Barrier Precautions (michigan.gov)

Communications

Communicate the patient's **MDRO status and required infection prevention precautions** to the accepting healthcare facility if the patient is transferred to another level of care (either higher or lower level of care).

Communicate the patient's status to the health department upon transfer to another inpatient healthcare facility.

Candida-auris-Interfacility-Transfer.pdf (michigan.gov)
Healthcare facility Transfer Form Comprehensive
Inter-Facility Infection Control Transfer Form for States Establishing HAI Prevention Collaboratives (cdc.gov)

Medical Record Flag

ACH/LTACH: Flag the **patient's chart** for Contact Precautions for any future admissions.

LTC/SNF: Flag the **resident's chart** for Enhanced Barrier Precautions or Contact Precautions, when otherwise indicated, for any future admissions.

For high-risk contacts that have been discharged, healthcare facilities should consider flagging charts to facilitate admission screening if these individuals are readmitted to the facility in the next six months.

Laboratory Surveillance

Conduct **prospective surveillance** of your microbiology laboratory results over the next 3 months to identify any organisms with similar resistance patterns.

For a new detection in a facility (i.e., first *C. auris* or first NDM) Conduct **retrospective surveillance** of your microbiology laboratory results over the past 6 months to identify any organisms with similar resistance patterns, if possible.

Disinfectant, Education, and Monitoring

Provide **education** to frontline HCP and conduct ongoing **adherence monitoring** of infection control practices, including:

- Hand hygiene
- Glove and gown use
- Indwelling device care
- Environmental cleaning and disinfection

✓ Ensure availability of alcohol-based hand rub inside and outside the patient's room
✓ Ensure availability of PPE inside and outside the patient's room
✓ Consider enhanced cleaning of high-touch surfaces and equipment in the patient's room and the unit at least daily

EPA Registered Disinfectant
Use an Environmental Protection Agency (EPA) registered hospital-grade disinfectant effective against *C. auris*. [EPA List P]

Colonization Screening

Consult with the MDHHS HAI section to assess the need for facility-specific colonization screening or point prevalence survey of the unit(s) the patient/resident was admitted to.

If indicated, the **MDHHS HAI section will coordinate** the screening process with the LHD, healthcare facility, and public health laboratory.

Epi-linked patient contacts who are at high-risk for acquiring an MDRO are generally recommended for screening, which may include: roommates, those who share a bathroom, are bedbound or require high levels of assistance with ADLs, those with open wounds or indwelling devices, or on antibiotics, and who overlapped with the index patient/resident on the same unit.

MDHHS Screening Guidance: Candida-auris-Screening-Guidance_81123.pdf (michigan.gov)

Facility Information for each OUTPATIENT EXPOSURE			
	Facility 1	**Facility 2**	**Facility 3**
Name			
Address			
Contact Name			
Number			
Email			
Outreach date			
Facility Type	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐ Clinic	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐Clinic	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐Clinic
Encounter date			
Admit from			
Did they know about CP/MDRO?			
CP in use?			
Services provided			
IP r/t services provided			
HPI/Notes			

IPC Recommendations for Outpatient Exposure	
General IPC recommendations ***To be used as talking points and will be adjusted based on the needs/specifics of the facility*** In addition to following Standard Precautions with strict adherence to hand hygiene. . .. • Hand hygiene should be performed using an appropriate agent (e.g., alcohol-based hand sanitizer or hand washing with soap and water). • Ensure availability of alcohol-based hand rub inside and outside the patient's room	**Communications** Communicate the patient's MDRO status and required infection prevention precautions to the accepting healthcare facility if the patient is transferred to another level of care (either higher or lower level of care).

- Ensure availability of PPE inside and outside the patient's room
- Disposable gown and gloves should be used if extensive patient contact is anticipated or contact with infected areas is planned (e.g., debridement or dressing of colonized or infected wound). Gowns and gloves should be removed and disposed of carefully, and hand hygiene should be performed when leaving the patient's room.
- A mask and eye protection or face shield should be worn if performing procedures likely to generate splash or splatter (e.g., wound manipulation, suctioning) of contaminated material (e.g., blood, body fluids, secretions, excretions).
- Ensure any reusable equipment brought into the patient room/care area is properly cleaned and disinfected before use with another patient.
- Consider enhanced cleaning of high-touch surfaces and equipment in the patient's room and the facility at least daily with an appropriate EPA registers hospital-grade disinfectant and cleaner.

    - Meticulous cleaning and disinfection of the room/care area should be performed with an Environmental Protection Agency (EPA)-registered **hospital-grade disinfectant** (CPOs) at the end of each visit.
        - EPA List P = C auris
        - EPA List K = C diff
        - EPA List N = COVID

To the extent possible, the number of persons who care for the MDRO patient should be minimized (e.g., dedicate a single staff person).

Appropriate personnel should be informed about the presence of a patient with a targeted MDRO and the need for special precautions.

DIALYSIS:

- If available, use a separate room that is not in use as a hepatitis B isolation room for patient treatment.
- If a separate room is not available, dialyze the patient at a station with as few adjacent stations as possible (e.g., at the end or corner of the unit) and consider dialyzing the patient on the last shift of the day.
- Gowns/Gloves: Remove gowns and gloves, dispose of them carefully, and perform hand hygiene when leaving the patient's station.
- Properly **clean and disinfect reusable equipment** brought to the dialysis station after each use.

Infection Prevention and Control for Candida auris | Candida auris | Fungal Diseases | CDC

Education and Monitoring

Provide education to frontline HCP and conduct ongoing adherence monitoring of infection control practices, including:

- hand hygiene
- glove and gown use
- indwelling device care
- environmental cleaning and disinfection

**Use an Environmental Protection Agency (EPA)–registered hospital-grade disinfectant effective against *C. auris*. [EPA List P]

Medical Record Flag

Flag the patient's chart for appropriate infection prevention precautions for any future encounters.

Colonization Screening (if applicable)

High-risk patient contacts (will need to be defined on case-by-case basis depending on setting/situation

Laboratory Surveillance (if applicable)

Conduct prospective surveillance of your microbiology laboratory results over the next 3 months to identify any organisms with similar resistance patterns.

Conduct retrospective surveillance of your microbiology laboratory results over the past 6 months to identify any organisms with similar resistance patterns, if possible.

MDRO Case Investigation Form – OUTPATIENT

PATIENT INFORMATION			
Patient Name			
DOB			
MDSS ID		**Local Health Department**	
Case Type	☐Screening/Colonization ☐Clinical	***If Clinical, was patient previously counted as a Screening case?*** ☐ No ☐Yes, **Previous Screening MDSS ID#:**	

LABORATORY TESTING and MICROBIOLOGY INFORMATION			
Date SHARP Notified	Click or tap to enter a date.	**Reason for Culture/Test**	☐ Admit ☐ Discharge ☐ PPS ☐ Clinical/diagnosis ☐Other:
Facility Type (where specimen/ patient was at time of collection)		**Inpatient**: ☐ACH ☐ LTAC ☐NH ☐AL/AFC/LTC **Outpatient:** ☐ ED ☐ Office/clinic	
Specimen Collection Date	Click or tap to enter a date.	**Facility where specimen collected** (not the testing lab)	
Clinical Lab Specimen ID		**Bureau of Labs Specimen ID** (or other Public Health Lab, e.g., WI)	
Specimen Source	☐ Axilla/groin ☐ Urine ☐ Blood ☐ Sputum ☐ Wound ☐Aspirate: ☐ Rectal/perianal/stool ☐Other:		
Organism Identified	☐ Candida auris ☐ Other:		
Resistance Mechanism	☐ KPC ☐ NDM ☐ VIM ☐ IMP ☐ OXA-48 ☐ OXA-23 ☐ OXA-24/40 ☐ OXA-58 ☐ VISA ☐ VRSA ☐ mCIM+/PCR- ☐ Pan-nonsusceptible/ Pan-resistant ☐ Other:		

CLINICAL INFORMATION	
Healthcare exposure in last 30-90 days ☐ None	**Inpatient:** ☐ACH ☐ LTAC ☐NH ☐AL/AFC/LTC
	Outpatient: ☐ ED ☐ Office/clinic ☐ Dialysis ☐ Home health/hospice

Facility Information for each OUTPATIENT EXPOSURE			
	Facility 1	**Facility 2**	**Facility 3**
Name			
Address			
Contact Name			
Number			
Email			
Outreach date			
Facility Type	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐ Clinic	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐Clinic	☐Ambulatory surgery ☐Dialysis ☐Wound Clinic ☐Clinic
Encounter date			
Admit from			
Did they know about CP/MDRO?			
CP in use?			
Services provided			
IP r/t services provided			
HPI/Notes			

General IPC recommendations

To be used as talking points and will be adjusted based on the needs/specifics of the facility

In addition to following Standard Precautions with strict adherence to hand hygiene. . ..

- Hand hygiene should be performed using an appropriate agent (e.g., alcohol-based hand sanitizer or hand washing with soap and water).
- Ensure availability of alcohol-based hand rub inside and outside the patient's room
- Ensure availability of PPE inside and outside the patient's room
- Disposable gown and gloves should be used if extensive patient contact is anticipated or contact with infected areas is planned (e.g., debridement or dressing of colonized or infected wound). Gowns and gloves should be removed and disposed of carefully, and hand hygiene should be performed when leaving the patient's room.
- A mask and eye protection or face shield should be worn if performing procedures likely to generate splash or splatter (e.g., wound manipulation, suctioning) of contaminated material (e.g., blood, body fluids, secretions, excretions).
- Ensure any reusable equipment brought into the patient room/care area is properly cleaned and disinfected before use with another patient.
- Consider enhanced cleaning of high-touch surfaces and equipment in the patient's room and the facility at least daily with an appropriate EPA registers hospital-grade disinfectant and cleaner.

    - Meticulous cleaning and disinfection of the room/care area should be performed with an Environmental Protection Agency (EPA)-registered **hospital-grade disinfectants** (CPOs) at the end of each visit.
        - EPA List P = C auris
        - EPA List K = C diff
        - EPA List N = COVID

To the extent possible, the number of people who care for the MDRO patient should be minimized (e.g., dedicate a single staff person).

Appropriate personnel should be informed about the presence of a patient with a targeted MDRO and the need for special precautions.

Medical Record Flag	**Education and Monitoring**
Flag the patient's chart for appropriate infection prevention precautions for any future encounters.	Provide education to frontline HCP and conduct ongoing adherence monitoring of infection control practices, including: • hand hygiene • glove and gown use • indwelling device care • Environmental cleaning and disinfection

Communications Communicate the patient's MDRO status and required infection prevention precautions to the accepting healthcare facility if the patient is transferred to another level of care (either higher or lower level of care).	**Use an Environmental Protection Agency (EPA)–registered hospital-grade disinfectant effective against *C. auris*. [EPA List P]
Laboratory Surveillance (if applicable) Conduct prospective surveillance of your microbiology laboratory results over the next 3 months to identify any organisms with similar resistance patterns. Conduct retrospective surveillance of your microbiology laboratory results over the past 6 months to identify any organisms with similar resistance patterns, if possible.	**Colonization Screening (if applicable)** High-risk patient contacts (will need to be defined on case-by-case basis depending on setting/situation

DIALYSIS: *** please connect with MDHHS HAI for support from our Dialysis lead*

- If available, use a separate room that is not in use as a hepatitis B isolation room for patient treatment.
- If a separate room is not available, dialyze the patient at a station with as few adjacent stations as possible (e.g., at the end or corner of the unit) and consider dialyzing the patient on the last shift of the day.
- Gowns/Gloves: Remove gowns and gloves, dispose of them carefully, and perform hand hygiene when leaving the patient's station.
- Properly **clean and disinfect reusable equipment** brought to the dialysis station after each use.

Infection Prevention and Control for Candida auris | Candida auris | Fungal Diseases | CDC