



Reporting Multi-Drug Resistant Organisms (MDROs) Frequently Asked Questions (FAQs)

These FAQs assist compliance with the Los Angeles County Department of Public Health (LAC DPH) Health Officer Order for reporting multi-drug resistant organisms (MDROs).

*Updated instructions and FAQs for novel MDRO reporting can be found at:
<http://publichealth.lacounty.gov/acd/Diseases/NMDRO.htm>*

*Updated instructions and FAQs for CRE reporting can be found at:
<http://www.publichealth.lacounty.gov/acd/Diseases/CRE.htm>*

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If you have other questions about reporting, or need additional guidance or resources, please contact the Healthcare Outreach Unit (HOU) of the Acute Communicable Disease Program (ACDC) at 213-240-7941 or hai@ph.lacounty.gov.

General Information

What are “novel MDROs”?

LACDPH defines an MDRO as “novel” if it is considered to be rare or emerging in LA County. Local epidemiology may change over time, as will the list of MDROs that are considered to be novel.

LA County currently includes the following as novel MDROs (NMDROs):

- Rare carbapenemase-producing organisms (CPO), including:
 - Carbapenemase-producing *Enterobacterales*, other than KPC-producers
 - Carbapenemase-producing *Pseudomonas aeruginosa*
 - Carbapenemase-producing *Acinetobacter* spp.
- *mcr*-producing organisms
- Pan-resistant organisms
- Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- *Candida auris*

Why were novel MDROs made reportable?

These organisms pose an urgent public health threat because they are difficult to treat and may spread rapidly. With your help to detect and report NMDROs, LACDPH will coordinate a response effort to contain their spread. You can learn more about the threat of antibiotic resistance here:

<http://publichealth.lacounty.gov/acd/AntibioticResistance.htm>

We also recommend you review the 2019 CDC Antibiotic Resistant Threats Report to gain a better understanding of the scope of this problem: <https://www.cdc.gov/drugresistance/biggest-threats.html>

Are these the same as the organisms listed on the “[Novel MDROs in LA County](#)” reporting guide?

For the most part, yes. In addition to what is outlined in our required reporting instructions, we request that if you identify the following, you report by phone to ACDC within one working day:

- Carbapenemase-positive, carbapenem-resistant *Enterobacterales* that are also resistant to ceftazidime/avibactam and/or meropenem/vaborbactam
- Carbapenemase-positive, carbapenem-resistant *Acinetobacter* spp. that are also resistant to cefepime and/or ceftazidime
- *mcr*-producing organisms
- Suspect *C. auris* (persons with epidemiologic linkage to a confirmed or presumptive *C. auris* case)

What does LACDPH plan to do with novel MDRO information?

Upon receipt of a suspect/confirmed case, LACDPH will:

- Conduct initial assessment of affected facility to ensure patient is on appropriate level of precautions
- Determine patient status and risk for transmission
- Identify if transmission to others may have occurred
- Educate facility staff on how to prevent transmission
- Ensure communication of patient infection/colonization status between healthcare facilities

We will use surveillance and response data to monitor trends, develop guidance and interventions for healthcare facilities, and identify and respond to outbreaks.

Why were CRE made reportable?

CRE are a growing public health problem. From 2010-2012, when CR *Klebsiella pneumoniae* (a species of CRE) was reportable, over 2,000 cases were reported to LACDPH. Since then, reliable epidemiological and clinical information regarding CRE has not been readily available. Thus, LACDPH has increased its efforts to track and respond to CRE within Los Angeles County (LAC) in order to prevent its spread.

What does LACDPH plan to do with CRE information?

LACDPH has used CRE reports to monitor trends, develop guidance and interventions for healthcare facilities, and identify and respond to outbreaks.

Who is required to report CRE and novel MDROs?

Acute care hospitals (ACHs), skilled nursing facilities (SNFs), and laboratories are the settings mandated to report CRE. Other healthcare facility types are not required to report.

What is required to be reported?

Reporting of CRE in LAC will follow the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) Multidrug-Resistant Organism (MDRO) and *Clostridium difficile* Infection (CDI) [Module](#): report all first CRE-positive tests per patient, per calendar month, per location, regardless of specimen source or organism, that were collected on or after January 1st, 2017. SNFs are to follow the same surveillance rule above and report to the LACDPH Morbidity Unit via fax beginning February 28, 2017; include the lab report with susceptibility results and completed CRE Case Report Form when reporting, unless enrolled in NHSN. Note only clinical specimens are to be reported; do not report tests related to active surveillance or admission screening.

In addition, effective November 11, 2019, [Title 17 LAC DPH Laboratory Reportable Disease list](#) was updated to include carbapenemase producing CRE (CP-CRE). Laboratory reporting of CP-CRE will be done in ELR and follow the CDC case definition with no clinical criteria included. Laboratories that do not perform carbapenemase testing should report all CRE as “CP-CRE Unknown”. Antimicrobial susceptibility testing results (MIC values and interpretation) should accompany all reports.

Should we report results from specimens collected for non-clinical purposes, such as surveillance cultures?

For CRE: No. Only results from clinical specimens should be reported. Tests to detect the presence of CRE in the absence of signs of illness are considered surveillance and are not to be reported.

For all other organisms: Yes, report results from both clinical and surveillance specimens.

Should we report results from specimens collected in outpatient settings?

This varies by type of organism.

For CRE: No. Only results for specimens obtained from inpatients should be reported. Results for specimens collected from the ED should be reported only if the specimen was collected on the same calendar day as patient admission to the inpatient location.

For all other organisms: Yes, report results from both outpatient and inpatient specimens.

Should both community-onset and healthcare-onset cases be reported?

Yes, report results from all positive specimens collected at your healthcare facility, regardless of type of onset. If your facility did not collect nor test the specimen, you are not required to report to LACDPH.

During the same admission, my patient has multiple positive cultures. Do I report them all?

In general, no- report only the first positive specimen per admission. There are two organism-specific additional instructions.

For CRE: Only one CRE report should be made per calendar month, except in the situations described below. Note that reporting is by calendar month so that for a patient with an isolate at the end of one month and a second isolate at the beginning of the next month, both would be reported.

For *C. auris*: Report if/when a person is first colonized but now has a clinical isolate.

What if the patient is discharged before I get the positive lab report? Who is responsible for reporting then—the laboratory or the healthcare facility?

The laboratory that processes the specimen is responsible for reporting the positive result, regardless of when lab testing is completed. If a reference laboratory is used, the laboratory that communicates the final results to the clinician is responsible to report to LACDPH.

In addition, if the patient is discharged to a healthcare facility, confirm your facility provides all final lab reports to the healthcare facility that receives the patient to ensure continuity of care.

If a patient is discharged without MDRO-positive lab results, and is readmitted two weeks later from another healthcare facility (e.g., rehabilitation center, different hospital, etc.) and the patient now is N-MDRO positive, how do I report this?

If the specimen was collected in your healthcare facility, then your facility is responsible for reporting. During our novel MDRO investigation, our staff will inquire about prior healthcare facility stays and follow-up with them as needed to determine where the N-MDRO was likely acquired.

If a healthcare facility reports an NMDRO-positive patient to LACDPH who is later transferred to another facility (i.e. a nursing home or other hospital), does the facility that the patient was transferred to also need to report the same patient?

No, the facility the patient was transferred to (aka the receiving facility) does not need to report the patient.

If a patient already had a positive culture during a previous visit, do I have to report the patient again if they test positive for the same NMDRO on another admission?

Yes. Report the first positive culture for each separate patient admission. Thus, if a patient has two separate facility admissions and has a positive culture in each admission (from specimens collected within your facility), both events should be reported.

[Organism-Specific Information](#)

[Carbapenem-Resistant Enterobacterales \(CRE\)](#)

When should CRE be reported?

CRE events should be reported within 7 days of final laboratory identification. If you are unable to meet the reporting time frame for any reason, an exemption can be granted. Email hai@ph.lacounty.gov to request a reporting time frame exemption.

What is the CRE surveillance definition?

LACDPH will follow the CDC NHSN MDRO and CDI Module CRE surveillance definition, which define CRE as any *Escherichia coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter spp.* demonstrating carbapenem resistance by one or more of the following methods:

1. Resistant to imipenem, meropenem, doripenem, or ertapenem by standard susceptibility testing methods (i.e., minimum inhibitory concentrations of ≥ 4 mcg/mL for doripenem, imipenem and meropenem or ≥ 2 mcg/mL for ertapenem) **OR**
2. Production of a carbapenemase (e.g., KPC, NDM, VIM, IMP, OXA-48) demonstrated using a recognized test (e.g., polymerase chain reaction (PCR), metallo- β -lactamase test, modified-Hodge test, Carba-NP).

Note that reporting is required if either criteria 1 or 2 above is met. Facilities cannot choose to apply only one of the criteria above, though we realize not all clinical microbiology laboratories are capable of testing or routinely test for carbapenemases.

What if an isolate meets the susceptibility criterion, but carbapenemase testing is negative?

If an isolate meets either of the two surveillance criteria, it should be reported.

During the same month, my patient is found to have CRE *E. coli* and, on a later date, CRE *Klebsiella*. Do I report both?

Yes, you would report both. While the NHSN definition indicates one CRE positive isolate per patient, per month, per location are to be reported, if the organisms are different during the same calendar month each separate organism would be reported. Duplicate CRE *E. coli* would not have been reportable, except as described in the next question.

During the same month, my patient is found to be CRE-positive in one body site and is later found to be CRE-positive in another body site. Do I report both?

The second isolate should be reported only if the second specimen is a blood specimen. If the second specimen within a calendar month is not a blood specimen, you would not report the second isolate.

What if the patient is discharged before I get the positive CRE culture report? Who is responsible for reporting then—the laboratory or the healthcare facility?

The facility that orders and obtains the specimen is responsible for reporting the CRE case, regardless of when susceptibility reports arrive.

If a patient is discharged without CRE-positive lab results, and is readmitted two weeks later from another healthcare facility (e.g., rehabilitation center, different hospital, etc.) with CRE, how do I report this?

If the CRE-positive specimen was collected in your healthcare facility, then your facility is responsible for reporting. However, you can indicate either in NHSN or in the CRE Case Report Form that the patient was discharged within the past 4 weeks from another healthcare facility (and include the facility name).

If a healthcare facility reports a CRE-positive patient to LACDPH who is later transferred to another facility (i.e. a nursing home or other hospital), does the facility that the patient was transferred to also need to report the same patient?

No, the facility the patient was transferred to does not need to report the patient. This facility would only report CRE if a specimen for that patient was collected while they were admitted to their facility. LACDPH recommends notifying the facility to which the patient was transferred that they are CRE positive.

If a patient already had a CRE-positive culture during a previous visit, do I have to report the patient again if they test CRE-positive on another admission?

Yes. Report the first CRE- positive culture for each separate patient admission. Thus, if a patient has two separate facility admissions and has a positive CRE culture in each admission (from specimens collected within your facility), both events should be reported.

What is a carbapenemase, and is a carbapenemase-producing (CP)-CRE different than a CRE?

Carbapenemases are enzymes that render the carbapenem class of antibiotics (doripenem, ertapenem, imipenem, and meropenem) ineffective. The genes encoding carbapenemase enzymes are commonly found on mobile gene elements (plasmids) that can transfer between bacteria; thus, Enterobacteriales isolates that produce carbapenemases, (i.e. CP-CRE), are a greater public health threat than non-CP-CRE. The most common carbapenemase genes are KPC, OXA, NDM, VIM and IMP.

How are carbapenemases detected?

Either genotypic or phenotypic methods are used to identify carbapenemases. Genotypic methods detect the presence of carbapenemase genes usually by use of a polymerase chain reaction (PCR) assay. Phenotypic methods detect the presence or absence of carbapenemase enzymes, but do not identify the specific genes responsible for enzyme production. Phenotypic methods include the modified carbapenem inactivation method (mCIM), Carba NP or one of several commercial methods. The modified Hodge test had been used in the past but is no longer considered a reliable method.

What if my laboratory does not perform carbapenemase testing?

Carbapenemase testing is not required of clinical laboratories at this time. However, because LA County has a high prevalence of CRE, we suggest that clinical laboratories consider implementation of a method to test for carbapenemase production in isolates of carbapenem-resistant Enterobacteriales encountered in all healthcare facilities. One approach would be to use the modified carbapenem inactivation method (mCIM) (more information can be found at <http://tinyurl.com/y4yz8jal>).

USING NHSN TO SUBMIT CASE INFORMATION

When should facilities use the National Healthcare Safety Network (NHSN) to submit cases?

All LAC ACHs are required to use NHSN to submit CRE-positive results. All SNFs that are enrolled in NHSN are also required to submit CRE results via NHSN. If a SNF is not currently enrolled in NHSN, they may fax reports to the LACDPH Morbidity Unit at (888) 397-3778 and include the laboratory report with susceptibility results and the CRE Case Report Form. For SNFs interested in enrolling in NHSN please contact us at hai@ph.lacounty.gov and we can provide guidance as you complete the enrollment process.

What if I need to report for more than one facility?

Please report cases under the appropriate facility name/ID in NHSN.

Can I enter information into NHSN about a patient who was found to be CRE-positive even if the culture was collected before January 1st, 2017?

For CRE cultures collected prior to January 1, 2017, reporting via NHSN is optional and at the discretion of the reporting facility. For SNFs not reporting in NHSN the start date is February 28, 2017.

What if I had zero CRE cases in any given month/year?

You must indicate in your NHSN monthly summary data entry that you did not have any CRE-positive cultures for any given month of the reporting period.

For more information and/or scenarios pertaining to reporting CRE in the NHSN LabID Module, visit:

ACHs: <https://www.cdc.gov/nhsn/acute-care-hospital/cdiff-mrsa/>

LTACHs: <https://www.cdc.gov/nhsn/ltach/cdiff-mrsa/index.html>

SNFs: <https://www.cdc.gov/nhsn/ltc/cdiff-mrsa/index.html>

Carbapenemase-Producing Organisms (CPOs)

What are carbapenemases and *mcr*?

Carbapenemases are enzymes that make an organism resistant to carbapenems and other β -lactam antibiotics. The *mcr* gene can make bacteria resistant to colistin. Carbapenemase genes (i.e., KPC, NDM, OXA, VIM, and IMP) and *mcr* are typically encoded on mobile elements called plasmids that can spread very easily between different kinds of bacteria.

You can learn more about carbapenemases at: <http://publichealth.lacounty.gov/acd/Diseases/CPO.htm>
mcr is currently not reportable, as very few clinical laboratories perform testing for this.

What are “rare carbapenemase-producing organisms”?

These are carbapenemase-producing organisms (CPOs) that are not commonly identified in LA County. Our LA County CRE surveillance has found that KPC gene is frequently identified in CRE; however, it is rarely detected amongst *Acinetobacter* and *Pseudomonas*. Thus, non-KPC-positive CRE and all CP-*Acinetobacter* and CP-*Pseudomonas* are still considered to be rare. However, local epidemiology may shift over time, as will this definition.

Why is resistance to ceftazidime-avibactam and meropenem-vaborbactam highlighted for “suspect” rare CP-CRE?

These new agents have been FDA-approved to treat organisms with limited treatment options, including carbapenemase-producing organisms. Thus, if an isolate is resistant to one or more of these agents, it is likely that the organism is producing a rare or novel resistance mechanism. This list may be updated over time.

Why is resistance to ceftazidime and/or cefepime highlighted for “suspect” CP-*P. aeruginosa*?

Recent data suggests that using ceftazidime/cefepime resistance as a proxy for CP-*P. aeruginosa* would enable DPH to better identify CRPA that are most likely to be CP-CRPA. Use of these criteria is 90% sensitive and 51% specific for identifying CRPA that are positive for carbapenemase.

Vancomycin-Resistant *S. aureus* (VRSA)

Why is it unnecessary to report vancomycin- intermediate *Staphylococcus aureus* (VISA) with a vancomycin MIC of 4 μ g/ml?

VISA isolates demonstrating vancomycin MICs of 4 μ g/ml may represent testing variation. However, VISA strains with a vancomycin MIC of 8 μ g/ml and vancomycin-resistant *S. aureus* (VRSA; MICs >8 μ g/ml) are of concern and should be reported to public health. Please also refer to the Clinical and Laboratory Standards Institute (CLSI) website <https://clsi.org/standards/> for the most up-to-date testing standards.

Candida auris (*C. auris*)

What is the difference between a clinical case versus a colonized case?

A clinical case is someone who is positive for *C. auris* in a clinical body site (i.e., urine, blood, wound), where the specimen was collected as part of routine clinical care.

A colonized case is someone who is positive for *C. auris* on an external body site (i.e., skin, axilla), where the specimen was collected for the purpose of screening for *C. auris* colonization.

What is the difference between presumptive versus confirmed versus suspect *C. auris*?

A *C. auris* result is presumptive because it was tested using a yeast identification method that is not able to detect *C. auris* and thus may have been misidentified; and either the isolate/specimen is no longer available for further testing or it has not undergone further testing to confirm whether it is *C. auris*.

A *C. auris* result is confirmed when *C. auris* is detected from any body site using either culture or culture-independent diagnostic test (CIDT) (i.e., PCR).

A suspect *C. auris* case is a person with epidemiologic linkage to a *C. auris* case, but has no confirmed laboratory evidence. The person may have presumptive laboratory evidence.

How will I know when to report presumptive versus confirmed *C. auris*?

Infection prevention and laboratory staff should work together to determine when to report. Review [CDC recommendations](#) to learn more about which methods provide definitive versus presumptive species identification.

For example, if your lab uses Vitek 2 YST, then your 'presumptive' *C. auris* organisms will be *C. haemulonii* and *C. duobushaemulonii*.

If my laboratory can reliably detect *C. auris*, do we need to report presumptive organisms?

No. If, per [CDC recommendations](#), your yeast ID method can detect *C. auris*, then you do not need to report presumptive organisms.

How can I be sure my lab can reliably detect *C. auris*?

LACDPH has outlined testing recommendations for laboratorians in our *C. auris* FAQs document, accessible here: http://publichealth.lacounty.gov/acd/docs/C.auris_FAQs.pdf

Laboratory Information

When should CP-CRE be reported?

CP-CRE events should be reported within 1 day of final laboratory identification.

What is the laboratory CRE surveillance definition?

CDPH will follow the [CDC case definition](#) for Carbapenemase Producing Carbapenem-Resistant Enterobacterales (CP-CRE) defined as *E. coli*, *Klebsiella* spp., or *Enterobacter* spp. from any isolate that is:

1. Positive for known carbapenemase resistance mechanism (e.g., KPC, NDM, VIM, IMP, OXA-48) demonstrated by a recognized test (e.g., PCR, Xpert Carba-R); **OR**
2. Positive on a phenotypic test for carbapenemase production (e.g., metallo- β -lactamase test, modified Hodge test, Carba NP, Carbapenem Inactivation Method [CIM], or modified CIM).

Does the laboratory have to report cases to LACDPH?

Yes. Laboratories that perform carbapenemase testing should submit data via ELR (Electronic Laboratory Reporting) and report any *Enterobacter spp.*, *E. coli*, or *Klebsiella spp.* where the isolate is:

1. Positive for carbapenemase production by a phenotypic method **OR**
2. Positive for a known carbapenemase resistance mechanism (KPC, NDM, IMP, VIM, OXA-48, novel carbapenemase) by a recognized molecular test (see below)

Laboratories who do not perform carbapenemase testing should report all CR organisms listed above as “CP-CRE Unknown”.

Laboratories who do not utilize ELR should fax a final lab report (including all AST) with a completed CMR to LAC DPH Morbidity Unit at (888) 397-3778.

How do I know if a CRE isolate is CP if my laboratory does not perform carbapenemase testing?

If an isolate is identified as CRE by standard MIC testing but your lab does not perform carbapenemase testing, you should report the isolate as ‘CP-CRE Unknown’, since CP status is unknown. Fill out a CMR and fax it to Morbidity along with the final AST lab result.

For all hospitals and SNFs enrolled in NHSN, all cases must be entered into NHSN. For SNFs not enrolled in NHSN, a CRE Case Report Form must be filled out and submitted along with the laboratory susceptibility report. However, laboratories should ensure that all CRE-positive specimens are being reported to their clinical and infection prevention staff in a timely manner.

What if an isolate meets the susceptibility criterion, but carbapenemase testing is negative?

Carbapenem resistant (CR)-*Acinetobacter* and CR-*Pseudomonas* are not reportable by the laboratory if carbapenemase testing is negative. However, please note that there may be occasional isolates that are carbapenemase positive but susceptible to one or more carbapenems by MIC or disk diffusion testing. Please refer to the CRE Reporting Guidance and FAQs for CRE criteria.

If I do not have an on-site laboratory (i.e., I use a reference laboratory), who is responsible for reporting an NMDRO-positive patient to LACDPH? Should both the lab and my facility report?

Both the facility and laboratory are now responsible for reporting.

CRE identified by standard MIC testing and CP-CRE as outlined in the LAC DPH Health Officer Order should be reported to LAC DPH by providers via NHSN.

CP-CRE or CP-CRE Unknown (if carbapenemase testing is not performed) is a laboratory reportable condition and should be reported via ELR. For laboratories who do not utilize ELR, a CMR and final lab result should be faxed to Morbidity.

The laboratory that reports final results to the clinician is responsible for reporting. In some situations the lab report may be received by LACDPH, but this does not absolve a facility from completing the reporting requirements listed above.

Should I submit isolates to LACDPH PHL?

No. Please only submit isolates if asked by ACDC or PHL staff.

Should I save these isolates?

Yes, please save any suspect or confirmed novel MDRO isolates until you have spoken with LACDPH.

My facility does not do all the testing that is outlined in the new reporting requirements. Is Public Health recommending that clinical labs implement these tests?

No. We are only asking those facilities that currently utilize the phenotypic and/or genotypic tests used to identify CPOs to report these novel MDROs when any criteria are met.

What if we are using a molecular carbapenemase test that does not provide organism identification?

If your instrument identifies NDM, OXA, VIM, or IMP, this is more likely to be an NMDRO and thus should be reported to LACDPH. If your instrument detects KPC, it is less likely to be an NMDRO and thus does not need to be reported. If, however, your lab later identifies the organism and it is not CRE, please report to LACDPH.

Will we receive confirmatory results for suspect cases?

Yes, if confirmatory testing needs to be done via LACDPH or another public health laboratory including CDC, your laboratory will receive a result once testing is completed.

How quickly will we receive confirmatory results for suspect cases?

Depending on the organism, type of resistance and lab testing capacity, results will be reported anywhere within a few days to a few weeks.

[Using LACDPH Case Report Forms](#)

When should laboratories use the CMR form?

Laboratories should complete and submit a CMR form whenever you are reporting any of the NMDROs outside of ELR- generally those that do not have disease-specific case report forms. Please ensure you include the specific disease being reported (see “MDRO Reporting Table” on page 3 of Instructions For Complying With The 2019 MDRO Reporting Requirements), and provide a copy of the final lab report.

Who is responsible for filling out CMR form?

Laboratory staff should complete this form, with the assistance of infection prevention and/or clinical staff as needed.

When should laboratories and healthcare facilities use the *C. auris* Case Report form?

This [form](#) should be used by providers and laboratories when sending any confirmed or presumptive *C. auris* reports to LACDPH. Please ensure you include the final lab report.

Who is responsible for filling out LACDPH Suspect *C. auris* Case Report form?

It depends on what is being reported. If it is a confirmed case, laboratory staff should complete this form, with the assistance of infection prevention and/or clinical staff as needed. If it is a presumptive case, infection prevention staff should complete this form, with the assistance of laboratory staff as needed.

When should facilities use the CRE Case Report Form to submit cases?

SNFs who are not enrolled in NHSN should report CRE with the SNF CRE case report form. Laboratories who do not use ELR should report CRE with the general CMR form. Forms AND a final lab report with AST results should be faxed to LAC DPH Morbidity Unit.