Test Definition: OVSRP

OXA-48 and VIM Surveillance PCR

Overview

Useful For

Identifying carriers of Gram-negative bacilli harboring OXA-48-like (oxacillin-hydrolyzing beta-lactamase) or VIM (Verona integron-encoded metallo-beta-lactamase) genes

Highlights

Detects OXA-48-like beta-lactamase and VIM metallo-beta-lactamase DNA (associated with antimicrobial resistance) in perirectal/rectal/perianal/anal swabs or fecal specimens.

Method Name

Real-Time Polymerase Chain Reaction (PCR) Using LightCycler and Fluorescent Resonance Energy Transfer (FRET)

NY State Available

Yes

Specimen

Specimen Type

Varies

Advisory Information

This assay is for surveillance testing on perirectal/rectal/perianal/anal swabs or fecal specimens only. If testing isolates from culture, request OXVRP / OXA-48-like (*bla*OXA-48-like) and VIM (*bla*VIM) in Gram-Negative Bacilli, Molecular Detection, PCR.

Other mechanisms of carbapenem resistance, including other carbapenemase-types, porin mutations, or hyper-expression of drug efflux pumps may result in carbapenem resistance. These are not detected by this assay. If testing for *Klebsiella pneumoniae* carbapenemase (KPC) or New Delhi metallo-beta-lactamase (NDM) is desired, order KNSRP / KPC (blaKPC) and NDM (blaNDM) Surveillance, PCR, Varies.

Additional Testing Requirements

If testing for *Klebsiella pneumoniae* carbapenemase (KPC) or New Delhi metallo-beta-lactamase (NDM) is also needed; also order KNSRP / KPC (*bla*KPC) and NDM (*bla*NDM) Surveillance, PCR, Varies.

Necessary Information

Specimen source is required.

Specimen Required

The high sensitivity of amplification by PCR requires the specimen to be processed in an environment in which contamination of the specimen by oxacillin-hydrolyzing beta-lactamase (OXA-48-like) or Verona integron-encoded metallo-beta-lactamase (VIM) DNA is unlikely.

Submit only 1 of the following specimens:

Supplies:

-Culturette (BBL Culture Swab) (T092)

-C and S Vial (T058)

Preferred:

Specimen Type: Perianal, perirectal, rectal, anal

Collection Container/Tube: Culture transport swab (Dacron or rayon swab with aluminum or plastic shaft with either Stuart or Amies liquid medium)

Acceptable:

Supplies: Cary-Blair or Para-Pak C and S Vial (T058)

Specimen Type: Preserved feces

Container/Tube: Commercially available transport system specific for recovery of enteric pathogens from fecal specimens (15 mL of non-nutritive transport medium containing phenol red as a pH indicator, either Cary-Blair or Para-Pak C and S)

Specimen Volume: Representative portion of feces

Collection Instructions: Collect fresh fecal specimen and submit 1 gram or 5 mL in container with transport medium.

Forms

If not ordering electronically, complete, print, and send a Microbiology Test Request (T244) with the specimen.

Reject Due To

Swab	E-swab, calcium alginate swab, cotton-tipped swab, swab sent in gel transport medium, swab sent in viral or universal transport medium

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Varies	Refrigerated (preferred)	7 days	
	Frozen	7 days	

Clinical and Interpretive

Clinical Information

In the United States, *Klebsiella pneumoniae* carbapenemase (KPC) is the most common carbapenemase, followed by New Delhi metallo-beta-lactamase (NDM). OXA-48-like and VIM carbapenemases predominate in other parts of the globe, but do occur in the United States. The genes *bla*OXA-48-like and *bla*VIM encode OXA-48-like and VIM enzyme production, respectively. PCR is a sensitive, specific, and rapid means of identifying these genes.

This test detects the genes encoding OXA-48-like (oxacillin-hydrolyzing beta-lactamase) and VIM (Verona integron-

encoded metallo-beta-lactamase) types of beta-lactamases in feces and perirectal/rectal/perianal/anal swabs. It can be used as a tool to find colonized patients. The Centers for Disease Control and Prevention recommends surveillance to detect unrecognized colonized patients who may be a potential source for transmission of carbapenemase-producing Gram-negative bacilli under certain circumstances. Such surveillance may be focused in certain high-risk settings or patient groups (eg, ICUs, long-term care facilities, patients transferred from areas or facilities with a high prevalence of the relevant type of resistance) or may be directed by infection prevention and control to investigate an outbreak.

Reference Values

Not applicable

Interpretation

This PCR assay detects and differentiates *bla*OXA-48-like and *bla*VIM in surveillance specimens (perirectal/rectal/perianal/anal swabs or feces). A positive OXA-48-like (oxacillin-hydrolyzing beta-lactamase) and/or VIM (Verona integron-encoded metallo-beta-lactamase) PCR indicates that the patient is colonized by a Gram-negative bacillus (or Gram-negative bacilli) harboring *bla*OXA-48-like and/or *bla*VIM, respectively. A negative result indicates the absence of detectable DNA.

Cautions

False-negative results may occur due to inhibition of PCR, sequence variability underlying primers and probes, or the presence of the *bla*OXA-48-like or *bla*VIM genes in quantities lower than the limit of detection of the assay.

Supportive Data

The assay was validated using 46 Gram-negative bacilli, including 30 carbapenemase-producers (26 OXA/VIM-type, 1 NMC/IMI, 1 NDM-1, and 2 KPC), and 2 Gram-positive organisms. The assay provided 100% sensitivity and specificity for both targets.

The assay detects OXA-48-like and VIM in surveillance perirectal/rectal/perianal/anal swabs and stool with the following limits of detection: OXA-48-like and VIM, 78 and 75 CFU/mL, respectively. A blinded panel of spiked perirectal/rectal/perianal/anal surveillance swabs and stool was assayed. The assay had 100% sensitivity and specificity, for both targets, in all spiked clinical samples.

Clinical Reference

1. Fernandez J, Cunningham SA, Fernandez-Verdugo A, et al: Evaluation of a real-time PCR assay for rectal screening of OXA-48-producing *Enterobacteriaceae* in a general intensive care unit of an endemic hospital. Diagnostic Microbiology and Infectious Disease 2017 July;88(3):252-258 doi.org/10.1016/j.diagmicrobio.2017.04.001

2. Bush K, Fisher JF: Epidemiological expansion, structural studies, and clinical challenges of new beta-lactamases from gram-negative bacteria. Annual Review of Microbiology 2011;65:455-478

3. Poirel L, Potron A, Nordmann P: OXA-48-like carbapenemases: the phantom menace. Journal of Antimicrobial Chemotherapy 2012;67:1597-1606

4. Nordmann P, Naas T, Poirel L: Global spread of carbapenemase-producing *Enterobacteriaceae*. Emerging Infectious Diseases 2011;17:1791-1798

Performance

Method Description

Perirectal, rectal, perianal, and anal swabs are processed in neutralization buffer tubes and organisms are lysed to release their genomic material. Fecal specimens undergo DNA extraction prior to PCR. This assay amplifies and

detects a specific portion of the genes encoding the OXA-48-like (oxacillin-hydrolyzing beta-lactamase) and VIM (Verona integron-encoded metallo-beta-lactamase) enzymes. The LightCycler instrument amplifies and monitors target nucleic acid sequences by fluorescence during PCR cycling. This is an automated PCR system that can rapidly detect amplified product development through stringent air-controlled temperature cycling and capillary cuvettes. The detection of amplified products is based on the fluorescent-resonance energy transfer (FRET) principle. For FRET product detection, hybridization probes with a donor fluorophore, fluorescein, on the 3' end are excited by an external light source, which emits light that is absorbed by secondary hybridization probes with acceptor fluorophores, LC-Red 610 (*bla*OXA-48-like) and LC-Red 670 (*bla*VIM) on the 5' end. The acceptor fluorophore then emits a light of a different wavelength that can be measured with a signal that is proportional to the amount of specific PCR product. The detection process is completed in less than 1 hour using a closed tube system.(Cunningham SA, Noorie T, Meunier D, et al: Rapid and Simultaneous Detection of Genes Encoding Klebsiella pneumoniae Carbapenemase (blaKPC) and New Delhi Metallo-beta-Lactamase (blaNDM) in Gram-Negative Bacilli. J Clin Microbiol 2013;51:1269-1271)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Friday

Analytic Time

1 day

Maximum Laboratory Time

4 days

Specimen Retention Time

3 days if received in a swab transport

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information

87798 x 2

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
OVSRP	OXA-48 and VIM Surveillance PCR	85502-3

Test Definition: OVSRP

OXA-48 and VIM Surveillance PCR

Result ID	Test Result Name	Result LOINC Value
OVSRC	Specimen Source	31208-2
41746	OXA-48-like PCR	85503-1
41747	VIM PCR	85501-5