MAYO CLINIC LABORATORIES

Test Definition: FLUMS

Influenza A/B and RSV, PCR, Misc

Overview

Useful For

Rapid and accurate detection of influenza A, influenza B, and respiratory syncytial virus in a single test

This test **should not be performed** unless the patient meets clinical and epidemiologic criteria for testing.

Method Name

Multiplex Real-Time Polymerase Chain Reaction (RT-PCR)

NY State Available

No

Specimen

Specimen Type

Varies

Necessary Information

Specimen source is required.

Specimen Required

Submit only 1 of the following specimens:

Preferred:

Specimen Type: Nasal or nasopharyngeal aspirate

Container/Tube: Sterile container

Specimen Volume: 0.5 mL

Specimen Type: Throat, nasal, or nasal mid-turbinate swab

Supplies: Culturette (BBL Culture Swab) (T092)

Container/Tube: Sterile container with viral transport media

Collection Instructions:

1. Collect specimen by swabbing back and forth over mucosa surface to maximize recovery of cells.

2. Swab must be placed in viral transport media (for example, M4-RT, M4, or M5 media); BBL Culture Swab container includes a stabilizing media.

Acceptable:

Specimen Type: Nasopharyngeal washing

Container/Tube: Sterile container

Specimen Volume: 0.5 mL

Specimen Type: Bronchial washing or bronchoalveolar lavage fluid

Container/Tube: Sterile container

Specimen Volume: 0.5 mL

Forms

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

Reject Due To

E-swab, calcium alginate-tipped swab, wood swab, dry swab, or transport swab containing gel	Reject

Specimen Minimum Volume

0.3 mL

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Influenza, otherwise known as the "flu," is an acute, contagious respiratory illness caused by influenza A, B, and C viruses. Of these, only influenza A and B are thought to cause significant disease, with infections due to influenza B usually being milder than infections with influenza A. Influenza A viruses are further categorized into subtypes based on the 2 major surface protein antigens: hemagglutinin (H) and neuraminidase (N).

Common symptoms of influenza infection include fever, chills, sore throat, muscle pains, severe headache, weakness, fatigue, and a nonproductive cough. Certain patients, including infants, older individuals, patients who are immunocompromised, and those with impaired lung function, are at risk for serious complications. In the United States, influenza results in approximately 36,000 deaths and more than 200,000 hospitalizations each year.(1)

In the northern hemisphere, annual epidemics of influenza typically occur during the fall or winter months. However, the peak of influenza activity can occur as late as April or May, and the timing and duration of flu seasons vary. In 2009 to 2010, a novel influenza virus (called 2009 H1N1, previously "swine" flu) appeared in Mexico and quickly spread worldwide, causing the first influenza pandemic in more than 40 years. The resultant influenza season had an atypical distribution, with illness occurring during normally low-incidence months. Following a pandemic, disease incidence usually returns to the typical seasonal distribution within 1 to 2 years.(1)

Influenza infection may be treated with supportive therapy, as well as antiviral drugs such as the neuraminidase inhibitors, oseltamivir (TAMIFLU) and zanamivir (RELENZA). These drugs are most effective when given within the first 48 hours of infection, so prompt diagnosis and treatment are essential for proper management.

Respiratory syncytial virus (RSV) is a respiratory virus that also infects the respiratory system and can cause an influenza-like illness. Most otherwise healthy people recover from RSV infection in 1 to 2 weeks. However, infection can be severe in infants, young children, and older adults. RSV is the most common cause of bronchiolitis (inflammation of the small airways in the lung) and pneumonia in children under 1 year of age in the United States, and is more frequently being recognized as an important cause of respiratory illness in older adults.(2)

RSV and influenza virus RNA can be detected by polymerase chain reaction (PCR) in respiratory secretions, including upper and lower respiratory specimens. Nasopharyngeal swabs or aspirates are the preferred specimen types for detection of RNA from influenza A, influenza B, and RSV. Nasal swabs have also been shown to provide equivalent yield to nasopharyngeal specimens for molecular detection of influenza A and B RNA, but not RSV RNA.(3,4) Tracheal aspirates are generally not acceptable for testing due to the viscous nature of these specimens.

Reference Values

Negative

Interpretation

A positive test result indicates that the patient is presumptively infected with the indicated virus. The test does not indicate the stage of infection. Rarely, more than 1 virus may be detected from the same patient specimen. Laboratory test results should always be considered in the context of clinical observations and epidemiologic data in making a final diagnosis.

A negative test result suggests that the patient is not infected with influenza A, influenza B, or respiratory syncytial virus (RSV).

Cautions

Given that influenza A and B and respiratory syncytial virus (RSV) are common and can cause an indistinguishable clinical disease, this test is offered only as a panel.

This test has been designed to minimize the likelihood of false-positive test results. However, should false-positive results occur, risks to patients could include a recommendation for quarantine of household or other close contacts, a recommendation for patient isolation that might limit contact with family or friends, the ability to work, or the ability to receive certain medical care, prescription of an antiviral drug or other therapy, or other unintended adverse effects.

The sensitivity of the assay is very dependent upon the quality of the specimen submitted. Nasopharyngeal swabs or aspirates are the preferred specimen types and are optimal for detection of RSV RNA. However, the test is validated for use with most upper and lower respiratory specimens, including nasal swabs, throat swabs, bronchoalveolar lavage specimens, and bronchial washings. Tracheal aspirates are not acceptable for testing due to the viscous nature of these specimens.

The test is specific for influenza A, influenza B, and RSV; therefore, the results do not exclude the possibility of infection with other respiratory viruses. Influenza C virus is not detected by this assay.

This assay detects influenza A virus RNA, but does not distinguish between the different subtypes of influenza A.

Negative results do not preclude infection with influenza A, influenza B, or RSV viruses and should not be used as the sole basis for treatment or other patient management decisions.

This assay detects both viable and nonviable virus. Test performance depends on viral load in the specimen and may not correlate with cell culture performed on the same specimen.

The assay has not been Food and Drug Administration approved for detection of Influenza A H7N9, though comparison of primer and probe sequences suggest that the assay will detect the H7N9 virus.

Supportive Data

Accuracy:

To assess accuracy, clinical or spiked specimens were tested by the proposed Simplexa Flu A/B and respiratory syncytial virus (RSV) assay and the results compared to those of the current method (Gen-Probe/Hologic ProFlu assay).

Table 1. Comparison of the proposed Simplexaassay to the Gen-Probe/Hologic ProFlu assay using clinical and spiked samples (n=198).

Source	Analyte	Positives	Negatives	Concordance
Respiratory Swab	Influenza A	47/47	92/92	100%
Respiratory Swab	Influenza B	31/31	92/92	100%
Respiratory Swab	RSV	30/30	92/92	100%
Respiratory Non-Swab	Influenza A	30/30	10/10	100%
Respiratory Non-Swab	Influenza B	30/30	10/10	100%
Respiratory Non-Swab	RSV	30/30	10/10	100%

Clinical Reference

1. Centers for Disease Control and Prevention. Influenza (Flu). Reviewed July 2, 2020. Accessed July 8, 2020. Available at www.cdc.gov/flu/

2. Lee N, Lui GC, Wong KT, et al: High morbidity and mortality of adults hospitalized for respiratory syncytial virus infections. Clin Infect Dis. 2013;57(8):1069-1077

3. Meerhoff TJ, Houben ML, Coenjaerts FE, et al: Detection of multiple respiratory pathogens during primary respiratory infection: nasal swab versus nasopharyngeal aspirate using real-time polymerase chain reaction. Eur J Clin Microbiol Infect Dis. 2010;29:365-371

4. Heikkinen T, Marttila J, Salmi AA, Ruuskanen O: Nasal swab versus nasopharyngeal aspirate for isolation of respiratory viruses. J Clin Microbiol. 2002;40(11):4337-4339

Performance

Method Description

The DiaSorin Simplexa Flu A/B and respiratory syncytial virus (RSV) direct assay system is a real-time reverse-transcription polymerase chain reaction (RT-PCR) assay for the in vitro qualitative direct detection and differentiation of influenza A virus, influenza B virus, and RSV RNA directly from clinical samples. The system consists of the DiaSorin Simplexa Flu A/B and RSV direct assay, the 3M Integrated Cycler (with Integrated Cycler Studio Software), the Direct Amplification Disc and associated accessories.

The test is a real-time RT-PCR amplification and detection system that utilizes a bifunctional fluorescent probe-primer for the detection and differentiation of human influenza A virus RNA, human influenza B virus RNA and RSV RNA in nasopharyngeal swabs (NPS). The assay is composed of 2 principal steps: (1) extraction of RNA from patient specimens, (2) a bifunctional fluorescent probe-primer is used together with a reverse primer to amplify a specific target (for each analyte and the RNA internal control). The assay targets 3 viral gene segments, including conserved regions of influenza A virus (matrix gene), influenza B virus (matrix gene), and RSV (M gene). An RNA internal control is used to monitor the extraction process and to detect RT-PCR inhibition.(Package Insert: Simplexa Flu A/B and RSV Direct. DiaSorin; 05/2014)

PDF Report

No

Specimen Retention Time

1 week

Performing Laboratory Location

Rochester

Fees & Codes

Test Classification

This test has been modified from the manufacturer's instructions. Its performance characteristics were determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

87631

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
FLUMS	Influenza A/B and RSV, PCR, Misc	92143-7

Result ID	Reporting Name	LOINC®
SS020	Specimen Source	31208-2
35980	Influenza A, PCR	92142-9
35981	Influenza B, PCR	92141-1
35982	Respiratory Syncytial Virus, PCR	92131-2