PROCEDURE: BD VERITOR INFLUENZA

ISSUE DATE: November 2015

REVISION DATE:
REVIEWED DATE: May 2018

PRINCIPLE:

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The BD Veritor™ System for Rapid Detection of Flu A+B is a rapid chromatographic immunoassay for the direct and qualitative detection of influenza A and B viral nucleoprotein antigens from nasopharyngeal wash, aspirate and swab in transport media samples from symptomatic patients. The BD Veritor System for Rapid Detection of Flu A+B is a differentiated test, such that influenza A viral antigens can be distinguished from influenza B viral antigens from a single processed sample using a single device. The test is to be used as an aid in the diagnosis of influenza A and B viral infections. A negative test is presumptive and it is recommended that these results be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay. Negative test results do not preclude influenza viral infection and should not be used as the sole basis for treatment or other patient management decisions. The test is not intended to detect influenza C antigens.

CLINICAL SIGNIFICANCE:

Influenza illness classically presents with sudden onset of fever, chills, headache, myalgias, and a non-productive cough. Epidemics of influenza typically occur during winter months with estimated 114,000 hospitalizations[1] and 36,000 deaths[2] per year in the U.S. Influenza viruses can also cause pandemics, during which rates of illness and death from influenza-related complications can increase dramatically.

Patients who present with suspected influenza may benefit from treatment with an antiviral agent especially if given within the first 48 hours of onset of illness. It is important to rapidly distinguish influenza A from influenza B in order to allow physicians a choice in selective antiviral intervention. Moreover, it is important to determine if influenza A or B is causing symptomatic disease in a particular institution (e.g., nursing home) or community, so that appropriate preventative intervention can be taken for susceptible individuals. It is therefore important to not only rapidly determine whether influenza is present, but also which type of influenza virus is present as severity and treatment can be different.[3]

Diagnostic tests available for influenza include rapid immunoassay, immunofluorescence assay, polymerase chain reaction (PCR), serology, and viral culture.[4-11] Immunofluorescence assays entail staining of specimens immobilized on microscope slides using fluorescent-labeled antibodies for observation by fluorescence microscopy.[6,12,13] Culture methods employ initial viral isolation in cell culture, followed by hemadsorption inhibition, immunofluorescence, or neutralization assays to confirm the presence of the influenza virus.[13-15]

The BD Veritor System for Rapid Detection of Flu A+B (also referred to as the BD Veritor System and BD Veritor System Flu A+B) is a chromatographic immunoassay to detect influenza A or B nucleoprotein antigens from respiratory specimens of symptomatic patients with a time to result of 10 minutes. The speed and simplified workflow of the BD Veritor System for Rapid Detection of Flu A+B makes it applicable as a "STAT" influenza A and B antigen detection test providing relevant information to assist with the diagnosis of influenza.

PRINCIPLES OF THE PROCEDURE:

The BD Veritor System for Rapid Detection of Flu A+B is a chromatographic assay to qualitatively detect influenza A and B viral antigens in samples processed from respiratory specimens. When specimens are processed and added to the test device, influenza A or B viral antigens bind to anti-influenza antibodies conjugated to detector particles in the A + B test strip. The antigen-conjugate complex migrates across the test strip to the reaction area and is captured by the line of antibody on the membrane. A positive result for influenza A is determined by the BD Veritor System Reader when antigen-conjugate is deposited at the Test "A" position and the Control "C" position on the BD Veritor System Flu A+B assay device. A positive result for influenza B is determined by the BD Veritor System Reader when antigen-conjugate is deposited at the Test "B" position and the Control "C" position in the BD Veritor System Flu A+B assay device.

REAGENTS:

The following components are included in the **BD Veritor** System for Rapid Detection of Flu A+B kit:

BD Veritor System Flu A+B Devices	30 devices	Foil pouched device containing one reactive strip. Each strip has two test lines of monoclonal antibody specific to either Flu A or Flu B influenza viral antigen and murine monoclonal control line antibodies.
RV Reagent D	30 tubes with 400 µL reagent	Detergent with < 0.1% sodium azide
Flexible minitip flocked swab	30 each	Swab for nasopharyngeal or nasal collection
Control A+/B- Swab	1 each	Flu A Positive and Flu B Negative Control Swab, influenza A antigen (inactive recombinant nucleoprotein) with < 0.1% sodium azide
Control B+/A- Swab	1 each	Flu A Negative and Flu B Positive Control Swab, influenza B antigen (inactive recombinant nucleoprotein) with < 0.1% sodium azide

MATERIALS REQUIRED BUT NOT PROVIDED:

- BD Veritor System Reader (Cat. No 256055)
- Timer
- Tube rack for specimen testing

WARNINGS AND PRECAUTIONS:

- For *in vitro* Diagnostic Use.
- Test results are not meant to be visually determined. *All test results must be determined using the BD Veritor System Reader.*
- If infection with a novel influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent influenza viruses and sent to the state or local health department for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.
- Pathogenic microorganisms, including hepatitis viruses, Human Immunodeficiency Virus and novel influenza viruses, may be present in clinical specimens. "Standard Precautions"[16-19] and institutional guidelines should be followed in handling, storing and disposing of all specimens and all items contaminated with blood and other body fluids. Personnel performing the assay must wear gloves while performing the test and also for the collection.
- Dispose of used BD Veritor System test devices as biohazardous waste in accordance with federal, state and local requirements.
- Reagents contain sodium azide, which is harmful if inhaled, swallowed or exposed to skin. Contact with acids produces very toxic gas. If there is contact with skin, wash immediately with plenty of water. Sodium azide may react with lead and copper plumbing to form highly explosive metal azides. On disposal, flush with a large volume of water to prevent azide build-up.
- Use the flocked swabs provided with the kit for specimen collection.
- Other than the flocked swabs that are used for speicimen collection, kit components should not make contact with the patient.
- Do not use kit components beyond the expiration date.
- Laboratory checks new BD Influenza new lots, each shipment and monthly on the current lots.
- Do not use the kit if the Control A+/B- swab and Control B+/A- swab do not yield appropriate results.
- To avoid erroneous results, specimens must be processed as indicated in the assay procedure section.
- Training is required for all operators performing the BD Rapid Influenza test.
- FluMist® is made from attenuated live flu virus and although the concentration tested (1%) was non-interfering, it is possible when tested with higher concentrations that an influenza A and/or influenza B false positive may occur.

STORAGE AND HANDLING:

- Kits may be stored at 2 – 30°C. DO NOT FREEZE.
- Reagents and devices must be at room temperature (15 – 30°C) when used for testing.

SPECIMEN COLLECTION AND HANDLING:

- **Specimen Collection and Preparation**
  - Acceptable specimens for testing with the BD Veritor System for Rapid Detection of Flu A+B include nasal swabs and nasopharyngeal (NP) swabs.
    - Freshly collected specimens are to be processed within **1** hour.
    - It is essential that correct specimen collection and preparation methods be followed.
    - Specimens obtained early in the course of the illness will contain the highest viral titers.
  - Inadequate specimen collection, improper specimen handling and/or transport may yield a false negative result; therefore,specimen collection requires specific training and guidance due to the importance of specimen quality to accurate test results.

PROPER NASAL SWAB SAMPLE COLLECTION:

1. The BD Veritor System Kit includes swabs with a flocked nylon tip for nasal specimen collection.

2. Insert the swab into one nostril of the patient.

3. Rotate the swab two (2) complete 360-degree turns; pressing firmly against the nasal mucosa to help ensure the swab obtains both cells and mucus.

4. Withdraw the swab from the nasal cavity. The sample is now ready for processing using the BD Veritor System Kit.

PROPER NASOPHARYNGEAL SWAB SAMPLE COLLECTION

1. The BD Veritor System Kit includes swabs with a flocked nylon tip for nasopharyngeal specimen collection.

2. Insert the swab into one nostril of the patient, reaching the surface of the posterior nasopharynx.

3. Rotate the swab over the surface of the posterior nasopharynx.

4. Withdraw the swab from the nasal cavity. The sample is now ready for processing using the BD Veritor System Kit.

NOTE: *THE DO'S AND DON'TS OF SAMPLE COLLECTION:*

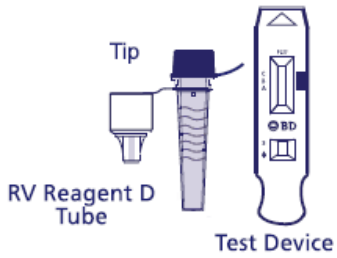
- *Do collect sample as soon as possible after onset of symptoms*
- *Do test sample immediately*
- *BD flocked swabs which are provided in the BD Veritor System Flu A+B Kit*
- *Do not use cotton tips and wooden shafts*
- *Do not use calcium alginate swabs*

NASAL AND NASOPHARYNGEAL SWAB TEST PROCEDURE:

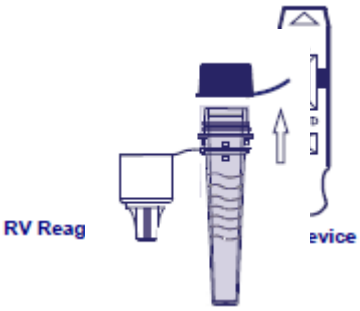
NOTE: *Reagents, specimens and devices must be at room temperature (15–30°C) prior to testing.*

NOTE: *The CLIA-waived BD Veritor System for Rapid Detection of Flu A+B kit is only intended for nasal and nasopharyngeal swab specimens that are collected and tested directly (i.e. dry swabs that have not been placed in transport media). The kits include a pre-diluted process reagent in a ready to use "unitized" tube. This CLIA-waived kit IS NOT INTENDED for testing liquid samples such as wash or aspirate samples or swabs in transport media as results can be compromised by over dilution. SLCH labeling policy for identification must include labeling swabs and BD test device with patient label that has 2 identifiers.*

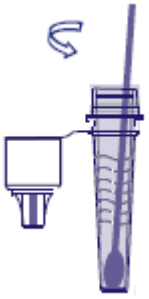
1. For each patient specimen, remove one **RV Reagent D** tube/tip and one BD Veritor System Flu A+B device from its foil pouch immediately before testing.



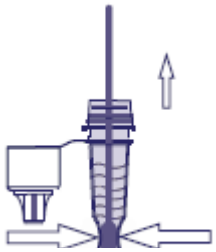
2. Remove and discard the cap from the **RV Reagent D** tube corresponding to the sample to be tested.



3. Insert the patient sample swab all the way into the **RV Reagent D** tube and swirl it against the inside wall three (3) times.

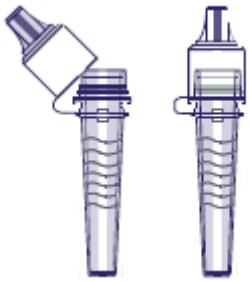


4. Remove the swab while squeezing the sides of the tube to extract the liquid from the swab. Properly discard the swab.



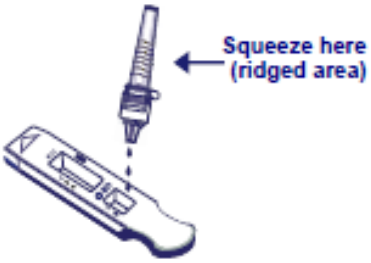
5. Press the attached tip firmly onto the **RV Reagent D** tube containing the processed sample (threading/twisting not required).

   NOTE: *Do not use tips from any other product, including other products from BD or other manufacturers.*



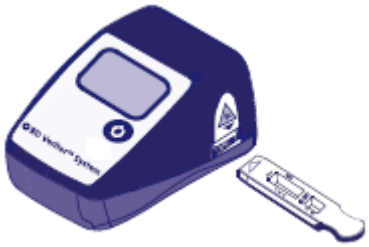
6. Invert the **RV Reagent D** tube and hold the tube vertically one inch above the BD Veritor System Flu A+B device sample well). Holding the tube at the ridged area, squeeze gently allowing three (3) drops of the processed sample to be dispensed into the sample well of the appropriately labeled BD Veritor System Flu A+B device.

   NOTE: *Squeezing the tube too close to the tip may cause leakage.*



7. After adding the sample, allow the test to run for 10 minutes before inserting in the reader. May be read 10mts and up to 20 minutes.

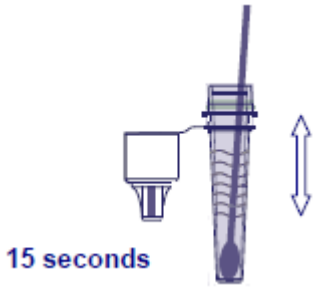
8. Veritor System Reader must be turned on before inserting. Insert the BD device.



9. Follow the reader on-screen prompts to obtain the test result.
10. Result the Control line as present and patient in the Electronic
11. Medical Record.

CONTROL SWAB TEST PROCEDURE:

1. Insert the swab all the way into the appropriately labeled **RV Reagent D** tube and vigiorously plunge the swab up and down in the fluid for a minimum of 15 seconds.



2. Continue processing the swab according to the NASAL AND NASOPHARYNGEAL SWAB TEST PROCEDURE above beginning at Step 4.

QUALITY CONTROL:

Each BD Veritor System Flu A+B device contains both positive and negative internal/procedural controls:

1. The internal positive control validates the immunological integrity of the device, proper reagent function, and assures that the correct test procedure was followed.
2. The membrane area surrounding test lines functions as a background check on the assay device.

These positive and negative internal/procedural controls are evaluated by the BD Veritor System Reader after insertion of the BD Veritor System test device. The BD Veritor System Reader will prompt the operator should a quality issue occur. Failure of the internal/procedural controls will generate an invalid test result.

External Positive and Negative Controls:

Swab controls (Flu A positive/B negative and Flu B positive/A negative) are supplied with each kit. These controls provide additional quality control material to demonstrate positive or negative assay results using the BD Veritor System Reader and BD Veritor System test device.SLCH Lab assays a positive and negative controls be run once for:

- Each new kit lot
- Each new shipment of test kits
- Each new operator

or

- As required by internal quality control procedures and in accordance with local, state and federal regulations or accreditation requirements.

NOTE: *If the kit controls do not perform as expected, do not test patient specimens. Contact BD Technical Services at 1-800-638-8663.*

INTERPRETATION OF RESULTS:

The BD Veritor System Reader instrument (purchased separately) must be used for all interpretation of test results. Operators should not attempt to interpret assay results directly from the test strip contained within the BD Veritor System Flu A+B assay device.

Reader Display	Interpretation
FLU A: + FLU B: -	Positive Test for Flu A (influenza A antigen present)
FLU A: - FLU B: +	Positive Test for Flu B (influenza B antigen present)
FLU A: - FLU B: -	Negative Test for Flu A and Flu B (no antigen detected)
RESULT INVALID	Result Invalid
CONTROL INVALID	Control line error

- *Invalid Test:* If the test is invalid, the BD Veritor System Reader will display a "RESULT INVALID" or "CONTROL INVALID" result and the test or control must then be repeated.

REPORTING OF RESULTS:

Positive Test: Positive for the presence of influenza A or influenza B antigen. A positive result may occur in the absence of viable virus.

Negative Test: Negative for the presence of influenza A and influenza B antigen. Infection due to influenza cannot be ruled-out because the antigen present in the sample may be below the detection limit of the test. A negative test is presumptive and it is recommended that these results be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay.

Invalid Test: Test result is inconclusive. Do not report results. Repeat the test.

Control Line must be resulted as Present to be a valid test result. When Control line is not present, repeat the test.

LIMITATIONS OF THE PROCEDURE:

- Failure to follow the Test Procedure may adversely affect test performance and/or invalidate the test result.
- The contents of this kit are to be used for the qualitative detection of influenza type A and B antigens from NP wash, aspirate and swab in transport media specimens.
- The BD Veritor System for Rapid Detection of Flu A+B is capable of detecting both viable and non-viable influenza particles. The BD Veritor System for Rapid Detection of Flu A+B performance depends on antigen load and may not correlate with other diagnostic methods performed on the same specimen.
- Results from the BD Veritor System for Rapid Detection of Flu A+B test should be correlated with the clinical history, epidemiological data and other data available to the clinician evaluating the patient.
- A false-negative test result may occur if the level of viral antigen in a sample is below the detection limit of the test or if the sample was collected or transported improperly; therefore, a negative test result does not eliminate the possibility of influenza A or influenza B infection, and should be confirmed by viral culture or an FDA-cleared influenza A and B molecular assay.
- Positive test results do not rule out co-infections with other pathogens.
- Positive test results do not identify specific influenza A virus subtypes.
- Negative test results are not intended to rule out other non-influenza viral or bacterial infections.
- Children tend to shed virus for longer periods of time than adults, which may result in differences in sensitivity between adults and children.
- Positive and negative predictive values are highly dependent on prevalence rates. Positive test results are more likely to represent false positive results during periods of little/no influenza activity when disease prevalence is low. False negative test results are more likely during peak influenza activity when prevalence of disease is high.
- This device has been evaluated for use with human specimen material only.
- Monoclonal antibodies may fail to detect, or detect with less sensitivity, influenza A viruses that have undergone minor amino acid changes in the target epitope region.
- The analytical reactivity of this device has not been established for avian or swine origin influenza strains other than those included in the “strain reactivity” tables in the product package insert.
- The performance characteristics of this test with specimens from humans infected with H5N1 or other avian influenza viruses are unknown.
- The performance of this test has not been evaluated for use in patients without signs and symptoms of respiratory infection.
- New lots are checked by Point of Care, and lots are checked monthly by Point of Care/Lab.
- The BD Veritor Reader has a lifetime based on the number of tests performed or a maximum shelf life.
- Number of tests performed: 3000 Number of months from first use is 22 months, or a maximum of 24 months.

INTERFERING SUBSTANCES:

Various substances were evaluated with the BD Veritor System for Rapid Detection of Flu A+B test. These substances included whole blood (2%) and various medications. No interference was noted with this assay for any of the substances tested.

Substance	Concentration
4-Acetamidophenol	10 mg/mL
Acetylsalicylic acid	20 mg/mL
Albuterol	0.083 mg/mL
Amantadine Hydrochloride	500 ng/mL
Ayr Saline Nasal Gel	10 mg/mL
Beclomethasone	500 ng/mL
Budesonide	500 ng/mL
Chlorpheniramine maleate	5 mg/mL
Dexamethasone	10 mg/mL
Dextromethorphan	10 mg/mL
Diphenhydramine HCl	5 mg/mL
Fexofenadine	500 ng/mL
FluMist	1%
Flunisolide	500 ng/mL
Fluticasone	500 ng/mL
Four OTC nasal sprays	10 %
Four OTC throat drops	25 %
Guaiacol Glyceryl Ether	20 mg/mL
Homeopathic Allergy Medicine	10 mg/mL
Ibuprofen	10 mg/mL

Substance	Concentration
Loratidine	100 ng/mL
Menthol Throat Lozenges	10 mg/mL
Mometasone	500 ng/mL
Mupirocin	500 ng/mL
Oseltamivir	500 ng/mL
Oxymetazoline	0.05 mg/mL
Phenylephrine	1 mg/mL
Pseudoephedrine HCl	20 mg/mL
Purified Mucin Protein	1 mg/mL
Ribavirin	500 ng/mL
Rimantadine	500 ng/mL
Three OTC mouthwashes	5 %
Tobramycin	500 ng/mL
Triamcinolone	500 ng/mL
Whole Blood	2%
Zanamivir	1 mg/mL

Of the 44 substances tested in this study, none exhibited interfering reactions when tested with influenza A and influenza B positive samples. Based on the data, the substances tested at the indicated concentration levels did not interfere with the BD Veritor System for Rapid Detection of Flu A+B test.

AVAILABILITY:

Cat. No. **Description**

256041 BD Veritor™ System for Rapid Detection of Flu A+B, 30 tests

256055 BD Veritor™ System Reader

256051 BD Veritor™ System Flu A+B Control Swab Set, 10 pairs of swabs

220252 COPAN Flexible Minitip Flocked Swabs, 100 swabs

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Technical Supervisor Date

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Medical Director Date

Annual Review: Medical Director/Designee Date

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