Figure 1. Guide for considering influenza virus diagnostic tests for individual patients when influenza viruses are circulating in the community

1. Confirmation of influenza virus infection by diagnostic testing is not required for clinical decisions to prescribe antiviral medications. Decisions to administer antiviral medications for influenza treatment or chemoprophylaxis, if indicated, should be based upon clinical illness and epidemiologic factors, and start of therapy should not be delayed pending testing results. (place link to CDC website guidance). Respiratory specimens should be collected from an ill patient as early as possible after onset of symptoms (ideally <48-72 hours after onset) to help maximize influenza testing sensitivity.

2. Influenza like-illness (history of feverishness or documented fever with either cough or sore throat), fever with other respiratory symptoms, etc. Note that some persons may have atypical presentations (e.g. elderly, very young infants, immunosuppressed, and patients with certain chronic medical conditions). Fever is not always present (e.g. premature infants, young infants, elderly, immunosuppressed). Other symptoms associated with influenza include myalgias, headache, fatigue. Complications include exacerbation of underlying chronic disease, (e.g. congestive cardiac failure, asthma), pneumonia, bacterial co-infection, bronchiolitis, croup, encephalopathy, seizures, myositis, and others.

3. e.g. Decisions on use of antibiotics or antiviral medications, on conducting further diagnostic tests, on recommendations for home care, or on recommendations for ill persons living with persons with high-risk conditions. Consult IDSA, ATS, AAP, ACIP for antibiotic guidance.

4. Persons ≥65 years or <2 years; pregnant women; persons with chronic lung disease (including asthma), heart disease, renal, metabolic, hematologic and neurologic disease; immunosuppression; and morbid obesity.

5. e.g. Decisions on changing infection control practices (such as in hospitalized patients); if a positive influenza test result is used for confirming influenza virus circulation in the community which might inform clinical practices related to home care guidance, hospital infection control practices, future testing practices, etc
Figure 2. Guide to use of influenza virus diagnostic tests in investigating outbreaks in institutional or other closed settings

Are there 2 or more persons with onset within 2-3 days of each other currently with clinical signs and symptoms compatible with influenza virus infection?

- **No**
  - Influenza virus testing probably not indicated
- **Yes**
  - Will the results of influenza virus testing change outbreak control strategies in the population?
  - *or*
  - Does the setting include persons at high risk of influenza complications should they become infected (e.g. LTCFs)?

- **No**
  - Influenza virus testing probably not indicated
- **Yes**
  - Consider influenza virus testing (see Table 1 for summary of test methods; and Table 2 for list of available RIDTs). Consult local or state health department

Interpret influenza test results (See Figure 3 for RIDTs)

1. Examples of institutional or closed settings include long-term care facilities, nursing homes, schools, correctional facilities, hospitals, ships.
2. In settings where persons at high-risk of influenza complications reside, a single case of suspected influenza is sufficient for triggering influenza testing and consideration of implementation of empiric control measures, including active surveillance for new illness cases.
3. e.g., Influenza like-illness (fever with either cough or sore throat), fever with other respiratory symptoms, etc. Note that some persons may have atypical presentations (e.g. elderly, very young infants, immunosuppressed, and patients with certain chronic medical conditions). Fever is not always present. Other symptoms associated with influenza include myalgias, headache, fatigue. Complications include exacerbation of underlying chronic disease, (e.g. congestive cardiac failure, asthma), pneumonia, bacterial co-infection, bronchiolitis, croup, encephalopathy, seizures, myositis, and others.
4. e.g., use of antivirals empirically for treatment or for chemoprophylaxis of influenza, changes in infection control practices (isolation or cohorting of ill, quarantine of exposed), changes in admission or staffing policies, or changes in social distancing recommendations, etc.
5. Persons >65 years or <2 years; pregnant women; persons with chronic lung disease (including asthma), heart disease, renal, metabolic, hematologic and neurologic disease; immunosuppression; and morbid obesity.
6. In an outbreak setting, because of the low sensitivity of RIDTs, use of the tests on specimens from more than one ill person is recommended. The presence of any influenza positives among persons with clinically compatible illnesses is supportive of influenza as the probable cause of the outbreak. Confirmation of RIDT results by more specific influenza testing is indicated.
Figure 3. Algorithm to assist in the interpretation of RIDT results and clinical decision-making during periods when influenza viruses are circulating in the community

**RIDT POSITIVE for one of the following:**
- Influenza A
- Influenza B
- Influenza A and B (A/B)

**Interpretation:** *Influenza virus infection likely*¹,²

**Actions:**
- Initiate antiviral treatment for influenza if clinically indicated.
  - Consider additional influenza virus testing to confirm RIDT results, for subtyping of influenza A virus, to distinguish between influenza A and B viruses, or for more specific analyses, if indicated.
  - Consider additional diagnostic testing for other pathogens and/or empiric antibiotic therapy for bacterial co-infection, if indicated.³

**RIDT NEGATIVE for one or more of the following:**
- Influenza A
- Influenza B
- Influenza A and B (A/B)

**Interpretation:** *Cannot rule out Influenza virus infection*¹,²

**Actions:**
- Use clinical signs, symptoms, history, examination, information on local influenza activity in the community to decide if antiviral treatment is indicated.
  - Do not use negative RIDT results exclusively for clinical decision-making, or for public health decisions, including identifying influenza outbreaks, or for decisions on infection control measures.
  - Consider additional influenza testing if indicated. Consider additional diagnostic testing and/or empiric antibiotic therapy for bacterial infection if indicated.³

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¹. During periods when influenza activity is high and influenza viruses are circulating among persons in the community (see 3. below), the positive predictive value of a test result is high (that is, the chance that a positive result indicates that the patient has influenza is high), and the negative predictive value of a test result is low (the chance that a negative result is a true negative is low) due to low sensitivity of RIDTs to detect influenza virus in respiratory specimens compared to RT-PCR or viral culture: **false negative results are common**.

². Influenza virus infection may include seasonal influenza A (H3N2), 2009 H1N1, influenza B, or rarely, a novel influenza A virus infection. The interpretation of RIDTs will, in part, depend on the test used - some will detect influenza A, some will detect influenza B and some will detect both A and B viruses. If tests for both influenza A and influenza B are positive, refer specimen to a public health laboratory for resolution, as dual infections are uncommon.

³. Consult local or state health departments or other sources (e.g. virology testing at a local hospital) for local activity on other respiratory pathogens associated with acute respiratory illness. Empiric antibiotic coverage should include coverage for *Streptococcus pneumoniae*, *Staphylococcus aureus* (including MRSA), Group A *Streptococcus*, and others, especially for hospitalized adult patients per IDSA/ATS CAP guidelines.
Figure 4. Algorithm to assist in the interpretation of RIDT results and clinical decision-making during periods when influenza viruses are not circulating or influenza activity is low in the community

**RIDT POSITIVE for one of the following:**
- Influenza A
- Influenza B
- Influenza A and B (A/B)

**Interpretation:**
*Cannot exclude false positive result*¹ ²

**Actions:**
- Use clinical signs, symptoms, history, examination, information on local influenza activity in the community to decide if antiviral treatment is indicated.
- Additional influenza virus testing is recommended to confirm RIDT results, for subtyping of influenza A virus, to distinguish between influenza A and B viruses, or for more specific analyses, if indicated.
- Consider additional diagnostic testing for other pathogens and/or empiric antibiotic therapy for bacterial co-infection, if indicated.³

**RIDT NEGATIVE for one or more of the following:**
- Influenza A
- Influenza B
- Influenza A and B (A/B)

**Interpretation:**
*Influenza virus infection unlikely*²

**Actions:**
- Use clinical signs, symptoms, history, examination, information on local influenza activity in the community to decide if antiviral treatment is indicated.
- Do not use negative RIDT results exclusively for clinical decision-making, or for public health decisions, including identifying influenza outbreaks, or for decisions on infection control measures.
- Consider additional influenza testing if indicated. Consider additional diagnostic testing and/or empiric antibiotic therapy for bacterial infection if indicated.³

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1. During periods when influenza activity is low and there is low influenza virus circulation among persons in the community, the positive predictive value of a rapid influenza diagnostic test is low (that is, the chance that a positive result indicates that the patient has influenza is low), and the negative predictive value is high (the chance that a negative result is a true negative is high). Even though RIDTs have high specificity, **false positive RIDT results are more common when influenza activity is low.**

2. Influenza virus infection may include seasonal influenza A (H3N2), 2009 H1N1, influenza B, or rarely, a novel influenza A virus infection. The interpretation of RIDTs will, in part, depend on the test used - some will detect influenza A, some will detect influenza B and some will detect both A and B viruses. If tests for both influenza A and influenza B are positive, refer specimen to a public health laboratory for resolution, as dual infections are uncommon.

3. Consult local or state health departments or other sources (e.g. virology testing at a local hospital) for local activity on other respiratory pathogens associated with acute respiratory illness. Empiric antibiotic coverage should include coverage for *Streptococcus pneumoniae, Staphylococcus aureus* (including MRSA), Group A *Streptococcus*, and others, especially for hospitalized adult patients per IDSA/ATS CAP guidelines.
<table>
<thead>
<tr>
<th>Method1</th>
<th>Types Detected</th>
<th>Acceptable Specimens3</th>
<th>Test Time3</th>
<th>CLIA Waived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral cell culture (conventional)</td>
<td>A and B2</td>
<td>NP swab, throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum</td>
<td>3-10 days</td>
<td>No</td>
</tr>
<tr>
<td>Rapid cell culture (shell vials; cell mixtures)</td>
<td>A and B2</td>
<td>As above</td>
<td>1-3 days</td>
<td>No</td>
</tr>
<tr>
<td>Immunofluorescence, Direct (DFA) or Indirect (IFA) Antibody Staining</td>
<td>A and B2</td>
<td>NP swab or wash, bronchial wash, nasal or endotracheal aspirate</td>
<td>1-4 hours</td>
<td>No</td>
</tr>
<tr>
<td>RT-PCR4 (singleplex and multiplex; real-time and other RNA-based)</td>
<td>A and B2</td>
<td>NP swab, throat swab, NP or bronchial wash, nasal or endotracheal aspirate, sputum</td>
<td>Varied (Generally 1-6 hours)</td>
<td>No5</td>
</tr>
<tr>
<td>Rapid Influenza Diagnostic Tests6</td>
<td>A and B</td>
<td>NP swab, (throat swab), nasal wash, nasal aspirate</td>
<td>&lt;30 min.</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

1. Serologic (antibody detection) testing is not recommended for routine patient diagnosis.
2. May be adapted to identification of specific subtypes.
4. Reverse transcriptase polymerase chain reaction, including FDA-approved test systems, reference laboratory testing using ASR or lab-developed reagents.
5. Random-access, single cartridge tests may be moderately complex.
Table 2: Characteristics of Rapid Influenza Diagnostic Tests

<table>
<thead>
<tr>
<th>Procedure (Manufacturer/Distributor)</th>
<th>Influenza Virus Types Detected</th>
<th>Approved Specimens</th>
<th>Test Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>3M™ Rapid Detection Flu A+B Test*&lt;sup&gt;4,6&lt;/sup&gt; (3M)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; swab/aspirate Nasal wash/aspirate</td>
<td>15 minutes</td>
</tr>
<tr>
<td>BinaxNOW® Influenza A&amp;B&lt;sup&gt;5,6&lt;/sup&gt; (Alere)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; swab Nasal wash/aspirate/swab</td>
<td>15 minutes</td>
</tr>
<tr>
<td>BioSign® Flu A+B&lt;sup&gt;4,6&lt;/sup&gt; (Princeton BioMedtech)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; swab/aspirate/wash, nasal swab</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Clearview® Exact Influenza A &amp; B&lt;sup&gt;4,6&lt;/sup&gt; (Alere)</td>
<td>A and B</td>
<td>Nasal swab</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Directigen™ EZ Flu A+B&lt;sup&gt;4,6&lt;/sup&gt; (Becton-Dickinson)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; wash/aspirate/swab Throat swab</td>
<td>15 minutes</td>
</tr>
<tr>
<td>OSOM® Influenza A&amp;B&lt;sup&gt;4,6&lt;/sup&gt; (Genzyme)</td>
<td>A and B</td>
<td>Nasal swab</td>
<td>10 minutes</td>
</tr>
<tr>
<td>QuickVue® Influenza Test&lt;sup&gt;3,5&lt;/sup&gt; (Quidel)</td>
<td>A or B</td>
<td>Nasal wash/aspirate/swab</td>
<td>10 minutes</td>
</tr>
<tr>
<td>QuickVue® Influenza A+B Test&lt;sup&gt;5,6&lt;/sup&gt; (Quidel)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; swab Nasal wash/aspirate/swab</td>
<td>10 minutes</td>
</tr>
<tr>
<td>SAS™ FluAlert A&amp;B&lt;sup&gt;4,6&lt;/sup&gt; (SA Scientific)</td>
<td>A and B</td>
<td>Nasal wash/aspirate</td>
<td>15 minutes</td>
</tr>
<tr>
<td>SAS™ FluAlert A&lt;sup&gt;3,5&lt;/sup&gt; (SA Scientific)</td>
<td>A only</td>
<td>Nasal wash/aspirate</td>
<td>15 minutes</td>
</tr>
<tr>
<td>SAS™ FluAlert B&lt;sup&gt;3,5&lt;/sup&gt; (SA Scientific)</td>
<td>B only</td>
<td>Nasal wash/aspirate</td>
<td>15 minutes</td>
</tr>
<tr>
<td>TRU FLU®&lt;sup&gt;5,6&lt;/sup&gt; (Meridian Bioscience)</td>
<td>A and B</td>
<td>NP&lt;sup&gt;2&lt;/sup&gt; aspirate/swab Nasal wash</td>
<td>15 minutes</td>
</tr>
<tr>
<td>XPECT™ Flu A&amp;B&lt;sup&gt;4,6&lt;/sup&gt; (Remel/Thermofisher)</td>
<td>A and B</td>
<td>Nasal wash/swab Throat swab</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>

1. List may not include all test kits approved by the U.S. Food and Drug Administration. Discontinued tests not included. Approved respiratory specimens according to manufacturer's package insert. Note that test performance may vary if other respiratory specimens are used.
2. NP = nasopharyngeal.
3. Does not distinguish between influenza A and B virus infections when used alone.
5. CLIA-waived test. Can be used in any office setting. Requires a certificate of waiver or higher laboratory certification.
6. Distinguishes between influenza A and B virus infections.

Disclaimer: Use of trade names or commercial sources is for identification only and does not imply endorsement by the Centers for Disease Control and Prevention or the Department of Health and Human Services.


