Acute Uncomplicated Influenza

Previously Healthy*
- Jennifer (age 36)
- Project manager
- Has two (2) children

High Risk†
- Frank (age 65)
- Construction foreman
- Has diabetes and COPD

*Refers to previously healthy, symptomatic outpatient not at high risk for influenza complications; †for influenza-related complications.
COPD=chronic obstructive pulmonary disorder.
### CASE DETAILS

- Age 36; Project manager
- Has two boys (aged 3 and 6)
- Woke up with a fever and congestion
- Cases of influenza have been reported at her office

### DISEASE COURSE

- Viral testing (RIDT) confirms presence of influenza
- Treated with an antiviral

*Refers to previously healthy, symptomatic outpatient not at high risk for influenza complications
RIDT=rapid influenza diagnostic test.
Seasonal Influenza Has a Significant Clinical and Economic Burden

**Clinical Burden of Illness**

- Annually, influenza infections occur in **5–20% of the population** in the US\(^1\)
- From 2010–2019, the CDC estimates that the **annual clinical burden** of seasonal influenza ranged from\(^2\):
  - 9.3–45.0 million illnesses
  - 4.3–21.0 million HCP visits
  - 140,000–810,000 hospitalizations
  - 12,000–61,000 deaths

**Economic Burden of Illness**

- As a result of influenza infection, there are an annual estimated:
  - 17 million **missed work days**\(^3\)
  - 91 million **missed school days**\(^4,5\)
- Influenza epidemics are estimated to cost the US economy **$≈87 billion/year** in illness (but not medically attended), outpatient visits, hospitalizations, mortality, and time lost from work or premature death\(^5,\dagger\)

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\(^1\)Data from 2012–2013. Statistic from an outside organization. Genentech does not endorse or review the content of external sites; \(^2\)total cost is the sum of all medical costs, loss of earnings due to lost productivity from illness (for recovered cases), and loss of earnings due to lost productivity from premature death. CDC=Centers for Disease Control and Prevention; HCP=healthcare provider.


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# Laboratory Tests for Influenza

**CDC Recommendation**
- A positive rapid influenza diagnostic test (RIDT) is likely to indicate influenza infection
- Influenza can be diagnosed based on symptoms and clinical judgment alone

<table>
<thead>
<tr>
<th>Antigen Detection</th>
<th>Test Time</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunofluorescence (IFA, DFA)</td>
<td>1–4 h²</td>
<td>Variable³,⁵,⁷</td>
</tr>
<tr>
<td>RT-PCR</td>
<td>1–8 h²</td>
<td>High³,⁸*</td>
</tr>
<tr>
<td>Rapid Molecular Assay (NAAT)</td>
<td>15–30 min²</td>
<td>High⁹</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nucleic Acid-Based</th>
<th>Test Time</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>3–10 d²</td>
<td>High³</td>
</tr>
<tr>
<td>Rapid</td>
<td>1–3 d²</td>
<td>High³</td>
</tr>
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<tr>
<th>Viral Cell Culture</th>
<th>Test Time</th>
<th>Sensitivity</th>
</tr>
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</table>

*Most commonly used test*

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1. CDC=Centers for Disease Control and Prevention; d=days; DFA=direct fluorescent antibody; h=hours; IFA=indirect fluorescent antibody; min=minutes; NAAT=nucleic acid amplification test; RT-PCR=reverse transcription polymerase chain reaction.
Alleviation of Influenza Symptoms

Seven (7) symptoms are typically associated with influenza¹

- Fever
- Cough
- Sore throat
- Runny/stuffy nose
- Muscular or body aches
- Headaches
- Fatigue

Scoring System²

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Mild</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
</tr>
</tbody>
</table>

Influenza antivirals (eg, NAIs) have been shown to shorten the duration of influenza symptoms³-⁶

Antivirals should be administered within the first 48 hours of symptom onset³

Time to Alleviation of Influenza Symptoms

has been used as a clinical outcome to evaluate the efficacy of influenza treatment⁷

Antivirals work on different stages of the viral life cycle such as blocking viral uncoating upon entry into the host cell, preventing viral replication, or blocking release of viral particles from the host cell⁴⁶

NAI=neuraminidase inhibitor.


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Transmission of Influenza

Approximately two-thirds of influenza cases are estimated to be transmitted by symptomatic patients and one-third by asymptomatic patients

Estimated proportions of influenza infections caused by symptomatic and asymptomatic people during the 2009 A/H1N1pdm influenza pandemic (England, 2009–2010)

- Symptomatic: 66%
- Asymptomatic: 34%

Data may not be representative of the US during typical flu season


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**CASE DETAILS**

- **Age 65**
- Construction foreman
- Has diabetes and COPD
- Developed a fever, sore throat, and body aches
- Immediately called primary care provider (PCP) because of existing comorbidities

**DISEASE COURSE**

- Started on antiviral based on symptoms and PCP clinical judgment

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*Not all elderly patients will develop influenza-related complications, but they are at a greater risk for complications than the general population.*

COPD=chronic obstructive pulmonary disease.

Influenza is a serious health threat for high-risk patients²⁻⁴

- Most influenza-related hospitalizations in adults with seasonal influenza are related to exacerbations of underlying diseases²
- Adults aged ≥65 years account for the majority of influenza hospitalizations (50⁻70%†) and deaths (70⁻85%†) in the US each year³
- Adults aged ≥65 years are especially vulnerable to influenza and related complications due to diminished immune responses⁴

*Includes patients with asthma, neurological and neurodevelopmental conditions, chronic lung disease, heart disease, blood disorders, endocrine disorders, kidney disorders, liver disorders, metabolic disorders, people aged <19 years receiving long-term aspirin therapy, and people with extreme obesity (BMI ≥40 kg/m²); †CDC estimated occurrence.

AIDS-acquired immunodeficiency syndrome; BMI=body mass index; CDC=Centers for Disease Control and Prevention; COPD=chronic obstructive pulmonary disease; HIV=human immunodeficiency virus.

### Influenza-Related Complications

#### Moderate
- Sinus infection
- Ear infection

#### Severe
- Pneumonia
- Worsening of chronic medical conditions
- Myositis/rhabdomyolysis
- Multiorgan failure
- Sepsis
- **Myocarditis**
- **Encephalitis**

Influenza can make chronic health problems worse (eg, COPD, diabetes, asthma, heart failure)¹,⁴-⁷

- **COPD**: Exacerbations and increased clinical visits (outpatient, ED, inpatient)
- **Diabetes**: Difficulty with blood glucose control⁵
- **Asthma**: Triggered attacks, worsening of symptoms, and potentially pneumonia⁶
- **Heart failure**: Increased in-hospital morbidity and mortality⁷

Most frequently described extrapulmonary complications⁸

Recognition of these complications is critical to initiating organ-specific supportive care

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¹Not all high-risk patients will develop influenza-related complications, but they are at a greater risk for complications than the general population¹-³; †viral myocarditis; ‡viral encephalitis.⁸

COPD=chronic obstructive pulmonary disease; ED=emergency department.

Improvement of Influenza Symptoms

Seven (7) symptoms are typically associated with influenza:

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- Cough
- Sore throat
- Runny/stuffy nose
- Muscular or body aches
- Headaches
- Fatigue

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In High-risk Patients

- Cough
- Nasal congestion
- Aches and pains
- Phlegm production
- Fatigue
- Shortness of breath
- Fatigue
- Shortness of breath

Underlying conditions, illness manifestations, and clinical outcomes vary widely.

In clinical trials, pre-existing conditions and symptoms at baseline are relevant considerations for evaluating the efficacy of antiviral treatment.

COPD=chronic obstructive pulmonary disease.


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