

# Adult Outpatients With Acute Cough Due to Suspected Pneumonia or Influenza

## CHEST Guideline and Expert Panel Report

*Adam T. Hill, MD; Philip M. Gold, MD, FCCP; Ali A. El Solh, MD, MPH; Joshua P. Metlay, MD, PhD; Belinda Ireland, MD; Richard S. Irwin, MD, Master FCCP; on behalf of the CHEST Expert Cough Panel*

CHEST 2019; 155(1):155-167

*Online supplements are not copyedited prior to posting and the author(s) take full responsibility for the accuracy of all data.*

© 2018 AMERICAN COLLEGE OF CHEST PHYSICIANS. Reproduction of this article is prohibited without written permission from the American College of Chest Physicians. See online for more details. DOI: 10.1016/j.chest.2018.09.016

## **e-Appendix 1 – Search Strategies**

### **PICO 1 = 6/2014**

#### **PubMed Search**

"acute cough" AND ("clinical judgment" OR predictive value of tests OR sensitivity and specificity OR decision making OR primary care OR chest x-ray OR chest radiography OR thoracic radiography OR outpatient OR ambulatory) AND ("community acquired pneumonia" OR community-acquired infections OR CAP OR pneumonia) NOT (child OR children)

*Filters:* English; Spanish

#### **Scopus Search**

TITLE-ABS-KEY "acute cough" AND ("clinical judgment" OR "predictive value of tests" OR "sensitivity and specificity" OR decision making OR primary care OR chest x-ray OR chest radiography OR thoracic radiography OR outpatient OR ambulatory) AND ("community acquired pneumonia" OR community-acquired infections OR CAP OR pneumonia) *Filters:* ( LIMIT-TO (LANGUAGE,"English" ) OR LIMIT-TO(LANGUAGE,"Spanish" ) AND NOT DBCOLL(medl) [*removes MEDLINE (PubMed) duplicates*]

### **PICO 2 = 6/2014**

#### **PubMed Search**

(cough OR "acute cough") AND (c-reactive protein OR procalcitonin OR CRP OR biomarker\* OR biological markers) AND (ambulatory OR primary care OR outpatient) AND (pneumonia OR "community acquired pneumonia" OR community-acquired infections OR CAP OR respiratory tract infections)

*Filters:* English; Spanish

#### **Scopus Search**

TITLE-ABS-KEY (cough OR "acute cough") AND (c-reactive protein OR procalcitonin OR CRP OR biomarker OR biological markers) AND (ambulatory OR primary care OR outpatient) AND (pneumonia OR "community acquired pneumonia" OR community-acquired infections OR CAP OR respiratory tract infections) AND ( LIMIT-TO(LANGUAGE,"English" ) OR LIMIT-TO (LANGUAGE,"Spanish" ) AND NOT DBCOLL(medl) [*removes MEDLINE (PubMed) duplicates*]

### **Updated search June 2014 – March 10, 2017**

#### **PubMed Search:**

(c-reactive protein OR CRP OR procalcitonin OR biomarker OR biomarkers OR biological marker\*) AND (ambulatory OR primary care OR outpatient) AND (pneumonia OR

"community acquired pneumonia" OR community-acquired infections OR CAP OR respiratory tract infections) NOT (editorial[pt] OR letter[pt] OR comment[pt])

### **Scopus Search**

TITLE-ABS-KEY ( ( "c-reactive protein" OR crp OR procalcitonin OR biomarker OR biomarkers OR "biological marker" ) AND ( ambulatory OR "primary care" OR outpatient ) AND ( pneumonia OR "community acquired pneumonia" OR "community-acquired infections" OR cap OR "respiratory tract infections" ) ) AND ( LIMIT-TO ( PUBYEAR , 2017 ) OR LIMIT-TO ( PUBYEAR , 2016 ) OR LIMIT-TO ( PUBYEAR , 2015 ) OR LIMIT-TO ( PUBYEAR , 2014 ) )

### **PICO 3 = 8/2016**

#### **PubMed:**

(cough OR coughing) AND ("community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR (community acquired infections[mh] AND pneumonia)) AND ("decision support techniques" OR decision tree\* OR algorithm OR "clinical pathway" OR "diagnostic score" OR "clinical rule" OR "clinical prediction rules" OR "decision analysis" OR "decision support models" OR "differential diagnosis" OR judgment OR "clinical competence" OR "decision making") AND (ambulatory OR primary health care[mh] OR primary care[tiab] OR outpatient) NOT (child OR children OR comment[pt] OR letter[pt] OR editorial[pt])

Limit: English, Spanish

#### **SCOPUS:**

TITLE-ABS-KEY((cough OR coughing) AND ("community acquired pneumonia" OR ("community acquired infections" AND pneumonia)) AND ("decision support techniques" OR decision tree\* OR algorithm OR "clinical pathway" OR "diagnostic score" OR "clinical rule" OR "clinical prediction rules" OR "decision analysis" OR "decision support models" OR "differential diagnosis" OR judgment OR "clinical competence" OR "decision making") AND NOT (child OR children)) Limit: English, Spanish

#### **Cochrane:**

(cough OR coughing) AND ("community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR ("community acquired infections" AND pneumonia)) AND ("decision support techniques" OR "decision tree" OR algorithm OR "clinical pathway" OR "diagnostic score" OR "clinical rule" OR "clinical prediction rules" OR "decision analysis" OR "decision support models" OR "differential diagnosis" OR judgment OR "clinical competence"

OR "decision making") AND (ambulatory OR "primary health care" OR "primary care" OR outpatient) in Title, Abstract, Keywords

**PICO 4 = 8/2016**

**PubMed:**

(cough OR "acute cough" OR coughing) AND ("community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR (community acquired infections[mh] AND pneumonia) OR ("respiratory tract infections" AND pneumonia) OR (respiratory tract infections[mh] AND pneumonia)) AND (Diagnostic Techniques, Respiratory System[mh] OR "laboratory diagnosis" OR "laboratory tests" OR routine diagnostic tests[mh] OR sputum OR "gram stain" OR serology OR titer OR PCR OR "polymerase chain reaction" OR microbiological OR microbiology OR quantiferon OR "clinical judgment") AND (ambulatory OR primary health care[mh] OR primary care[tiab] OR outpatient\* OR outpatients[mh]) NOT (child OR children OR comment[pt] OR letter[pt] OR editorial[pt])

Limits: English, Spanish

**SCOPUS:**

TITLE-ABS-KEY(cough OR "acute cough" OR coughing) AND ("community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR ("respiratory tract infections" AND pneumonia) AND ("laboratory diagnosis" OR "laboratory tests" OR sputum OR "gram stain" OR serology OR titer OR PCR OR "polymerase chain reaction" OR microbiological OR microbiology OR quantiferon OR "clinical judgment") AND (ambulatory OR "primary health care" OR "primary care" OR outpatient OR outpatients) AND NOT (child OR children OR infants OR neonates)) AND ( LIMIT-TO(LANGUAGE,"English" ) OR LIMIT-TO(LANGUAGE,"Spanish" ) ) AND ( LIMIT-TO(DOCTYPE,"ar" ) OR LIMIT-TO(DOCTYPE,"re" ) OR LIMIT-TO(DOCTYPE,"cp"))

**Cochrane:**

(cough OR "acute cough" OR coughing) AND ("community acquired pneumonia" OR pneumonia) AND ("laboratory diagnosis" OR "laboratory tests" OR sputum OR "gram stain" OR serology OR titer OR PCR OR "polymerase chain reaction" OR microbiological OR microbiology OR quantiferon OR "clinical judgment") AND (ambulatory OR "primary health care" OR "primary care" OR outpatient OR outpatients)

**PICO 5 = 8/2016****PubMed:**

(cough OR coughing) AND (pneumonia OR "community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR (community acquired infections[mh] AND pneumonia) OR ("respiratory tract infections" AND pneumonia) OR (respiratory tract infections[mh] AND pneumonia)) AND (antibiotics OR antimicrobial OR azithromycin OR quinolone OR ampicillin OR cephalosporin OR fluoroquinolone) AND (ambulatory OR primary care OR outpatient OR outpatients) NOT (child OR children OR comment[pt] OR letter[pt] OR editorial[pt]) Limit: English, Spanish

**SCOPUS:**

TITLE-ABS-KEY ( ( cough OR coughing ) AND ( pneumonia OR "community acquired pneumonia" OR ( "community acquired infections" AND pneumonia ) OR ( "respiratory tract infections" AND pneumonia ) ) AND ( antibiotics OR antimicrobial OR azithromycin OR quinolone OR ampicillin OR cephalosporin OR fluoroquinolone ) AND ( ambulatory OR "primary care" OR outpatient ) AND NOT (child OR children OR infants OR neonates)) AND ( LIMIT-TO(LANGUAGE,"English" ) OR LIMIT-TO(LANGUAGE,"Spanish" ) ) AND ( LIMIT-TO(DOCTYPE,"ar" ) OR LIMIT-TO(DOCTYPE,"re" ) OR LIMIT-TO(DOCTYPE,"cp" ) )

**Cochrane:**

(cough OR coughing) AND (pneumonia OR "community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR ("respiratory tract infections" AND pneumonia)) AND (antibiotics OR antimicrobial OR azithromycin OR quinolone OR ampicillin OR cephalosporin OR fluoroquinolone) AND (ambulatory OR primary care OR outpatient OR outpatients) NOT children

**PICO 6 = 8/2016****PubMed:**

(cough OR "acute cough" OR coughing) AND (pneumonia OR "community acquired pneumonia" OR ("community acquired infections" AND pneumonia) OR (community acquired infections[mh] AND pneumonia) OR ("respiratory tract infections" AND pneumonia) OR (respiratory tract infections[mh] AND pneumonia)) AND (bromhexine OR ambroxol OR neltexine OR antitussive OR antihistamines OR "cough suppressants" OR non-antibiotics OR nonantibiotic OR mucolytics OR steroids OR glucocorticoids OR prednisone OR ibuprofen OR "nonsteroidal anti-inflammatory" OR nsaid OR naproxen OR sulindac OR ipratropium OR tiotropium OR vitamins OR dextromethorphan OR codeine OR morphine) AND (ambulatory

OR primary care OR outpatient OR outpatients) NOT (child OR children OR comment[pt] OR letter[pt] OR editorial[pt]) Filters: English; Spanish

**SCOPUS:**

TITLE-ABS-KEY ( bromhexine OR ambroxol OR neltexine OR antitussive OR antihistamines OR "cough suppressants" OR non-antibiotics OR nonantibiotic OR mucolytics OR steroids OR glucocorticoids OR prednisone OR ibuprofen OR nonsteroidal antiinflammatory OR nsaid OR nsaid OR naproxen OR sulindac OR ipratropium OR tiotropium OR vitamins OR dextromethorphan OR codeine OR morphine ) AND ( "community acquired pneumonia" OR pneumonia ) AND ( coughing OR cough OR "acute cough" ) AND ( ambulatory OR "primary care" OR outpatient OR outpatients) AND NOT (child OR children OR infant OR neonates) AND ( LIMIT-TO(LANGUAGE,"English" ) ) AND ( LIMIT-TO(DOCTYPE,"re" ) OR LIMIT-TO(DOCTYPE,"ar" ) OR LIMIT-TO(DOCTYPE,"cp" ) )

**Cochrane:**

(bromhexine OR ambroxol OR neltexine OR antitussive OR antihistamines OR "cough suppressants" OR non-antibiotics OR nonantibiotic OR mucolytics OR steroids OR glucocorticoids OR prednisone OR ibuprofen OR nonsteroidal antiinflammatory OR nsaid OR nsaid OR naproxen OR sulindac OR ipratropium OR tiotropium OR vitamins OR dextromethorphan OR codeine OR morphine) AND ("community acquired pneumonia" OR pneumonia ) AND (coughing OR cough OR "acute cough") AND (ambulatory OR "primary care" OR outpatient OR outpatients)

**PICO 7 = 6/2014**

**PubMed Search**

cough AND atypical AND (anti-bacterial agents OR antimicrobial OR antibiotics) AND (community acquired pneumonia OR community acquired infections OR pneumonia) AND (zoonotic OR pneumococcal OR chlamydia OR legionella OR legionnaires OR "Q fever" OR mycoplasma OR chlamydia OR coxiella brunetti)

*Filters:* English; Spanish

**Combined with the results of another PubMed Search**

atypical AND (anti-bacterial agents OR antimicrobial OR antibiotics) AND (community acquired pneumonia OR community acquired infections OR pneumonia) AND (primary care OR outpatient OR ambulatory) AND (zoonotic OR pneumococcal OR chlamydia OR legionella OR legionnaires OR "Q fever" OR mycoplasma OR chlamydia OR coxiella brunetti)

*Filters:* English; Spanish

### **Scopus Search**

TITLE-ABS-KEY (coughing AND atypical AND (legionella OR chlamydia OR mycoplasma) AND community acquired pneumonia) AND NOT INDEX(medline) [*removes MEDLINE (PubMed duplicates)*]

### **PICO 8 = 7/2016**

#### **PubMed systematic reviews:**

influenza AND (antiviral OR antiviral agents[mh] OR amantadine OR rimantadine OR neuraminidase inhibitor OR zanamivir OR oseltamivir OR anti influenza drugs[tiab]) AND (cough OR coughing) AND systematic[sb]

#### **PubMed:**

influenza AND (antiviral OR antiviral agents[mh] OR amantadine OR rimantadine OR neuraminidase inhibitor OR zanamivir OR oseltamivir OR anti influenza drugs[tiab]) AND (cough OR coughing)

Filters: English; Spanish; Adult: 19+ years

#### **Cochrane Systematic reviews:**

influenza AND (antiviral OR "antiviral agents" OR "antivirus agent" OR "antiviral drugs" OR amantadine OR rimantadine OR "neuraminidase inhibitor" OR zanamivir OR oseltamivir OR "anti influenza drugs") AND (cough OR coughing)

#### **Cochrane Central Register:**

influenza AND (antiviral OR "antiviral agents" OR "antivirus agent" OR "antiviral drugs" OR amantadine OR rimantadine OR "neuraminidase inhibitor" OR zanamivir OR oseltamivir OR "anti influenza drugs") AND (cough OR coughing)

#### **SCOPUS systematic reviews:**

TITLE-ABS-KEY ( influenza AND ( antiviral OR "antiviral agents" OR "antivirus agent" OR "antiviral drugs" OR amantadine OR rimantadine OR "neuraminidase inhibitor" OR zanamivir OR oseltamivir OR "anti influenza drugs" ) AND ( cough OR coughing ) AND ( "systematic review" OR guideline ) AND NOT ( child OR children OR infants OR neonates ) ) AND ( EXCLUDE ( LANGUAGE , "German" ) OR EXCLUDE ( LANGUAGE , "Turkish" ) )

<b>e-Table 1. Adult Outpatients with Acute Cough due to Suspected Pneumonia or Influenza: CHEST Guideline and Expert Panel Report</b>						
<b>Suggestions</b>	<b>Adam T. Hill, MD</b>	<b>Ali El Solh, MD, FCCP</b>	<b>Philip M. Gold, MD, FCCP</b>	<b>Belinda Ireland, MD, MS</b>	<b>Richard S. Irwin, MD, Master FCCP</b>	<b>Joshua P. Metlay, MD, PhD</b>
	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>
	Description of COI	Description of COI	Description of COI	Description of COI	Description of COI	Description of COI
<b>1. For outpatient adults with acute cough due to suspected pneumonia, we suggest assessment of clinical symptoms and signs. (Ungraded Consensus Based).</b>	none	none	none	none	none	none
<b>2. For outpatient adults with acute cough due to suspected pneumonia, we suggest measuring C-reactive protein (CRP) because the addition of CRP to features such as fever (38°C or greater), pleural pain, dyspnea and tachypnoea and signs on physical examination of the chest (particularly when new and localising) strengthens both the diagnosis and exclusion of pneumonia. (Grade 2C).</b>	none	none	none	none	none	none
<b>3. For outpatient adults with acute cough due to suspected pneumonia, we suggest not to routinely measure procalcitonin. (Ungraded Consensus Based)</b>	none	none	none	none	none	none



<b>e-Table 1. Adult Outpatients with Acute Cough due to Suspected Pneumonia or Influenza: CHEST Guideline and Expert Panel Report</b>						
<b>Suggestions</b>	<b>Adam T. Hill, MD</b>	<b>Ali El Solh, MD, FCCP</b>	<b>Philip M. Gold, MD, FCCP</b>	<b>Belinda Ireland, MD, MS</b>	<b>Richard S. Irwin, MD, Master FCCP</b>	<b>Joshua P. Metlay, MD, PhD</b>
	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>	<b>Financial COI</b>
	Description of COI	Description of COI	Description of COI	Description of COI	Description of COI	Description of COI
<b>4. For outpatient adults with acute cough and abnormal vital signs secondary to suspected pneumonia, we suggest ordering a chest x-ray to improve diagnostic accuracy. (Grade 2C)</b>	none	none	none	none	none	none
<b>5. For outpatient adults with acute cough and suspected pneumonia, we suggest that microbiologic diagnostic testing should be considered when the results may result in a change in therapy. (Ungraded Consensus Based)</b>	none	none	none	none	none	none
<b>6. For outpatient adults with acute cough, we suggest the use of empiric antibiotics as per local and national guidelines when pneumonia is suspected based on epidemiologic and clinical features in settings where imaging cannot be obtained. (Ungraded Consensus Based)</b>	none	none	none	none	none	none