Is CRP associated with the cause, duration, and severity of lower respiratory infections in primary care? A prospective cohort study

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The Research Question

- Lower respiratory tract infections are common in primary care and are often treated with antibiotics
- A simple way to identify patients with (or without) a bacterial pathogen could help physicians target antibiotics more appropriately

Research Question: In primary care patients with a lower respiratory tract infection, is elevated CRP an independent predictor that a bacterial pathogen will be detected?

Research Design and Method

Setting: Primary and urgent care sites in Madison, WI, Washington DC area, and Athens, GA

Participants: Adults age 18 to 75 with < 2 weeks new cough, and at least one systemic or lower respiratory symptom.

Data collection: June, 2019 to March, 2023

Baseline data: Demographics, comorbidities, medications, CRP, symptoms, severity, duration of illness, and PCR for 46 viral and bacterial pathogens

Follow-up data: Symptom diary daily + intermittent text messages to assess severity and duration of key symptoms for up to 28 days

Final population: Enrolled 718 patients of whom 618 had valid PCR and 503 had both valid PCR and valid CRP

What the Research Found

Clinical variable	Adj OR (95% CI)
C-reactive protein ≥ 20 mg/L	3.21 (1.61 to 6.40)
Sputum is colored	1.82 (1.19 to 2.80)
Sputum (mod/severe)	1.62 (1.05 to 2.50)
Physician says mod/severe ill	1.58 (1.02 to 2.44)
Nausea or vomiting with cough	1.55 (1.05 to 2.30)
Subjective fever (mod/severe)	0.53 (0.34 to 0.84)
Pulse oxygen saturation< 97%	0.53 (0.28 to 0.99)
Heart rate > 100 beats/minute	0.45 (0.26 to 0.77)

Logistic regression with “bacterial pathogen detected” as the dependent variable.

CRP ≥ 20 mg/L was the strongest single predictor of bacterial infection

Sputum color and severity, physician impression, and nausea or vomiting accompanying cough were also associated with bacterial infection

What this means for Clinical Practice

- CRP ≥ 20 mg/L is a moderately strong predictor of bacterial cause of the infection in US outpatients with acute lower RTI
- Use of elevated CRP to guide antibiotic has also been shown to safely reduce the rate of antibiotic prescribing (1)
- While widely available in primary care in some European and Asian countries, its use is restricted in the US to moderate complexity labs. This should be reconsidered.

1. Smedemark SA, Aabenhus R, Llor C, Fournaise A, Olsen O, Jørgensen KJ. Biomarkers as point-of-care tests to guide prescription of antibiotics in people with acute respiratory infections in primary care. *Cochrane Database Syst Rev*. 2022;10(10):CD010130. doi:10.1002/14651858.CD010130.pub3