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COVID-19 Rapid Reviews

Along with regular Tools for Practice, the PEER team will be writing rapid reviews to address COVID-19 topics relevant for primary care. The evidence is changing rapidly and it is possible that as you read this, new evidence will already be available. We will try our best to stay in front and keep you up-to-date during these challenging times.
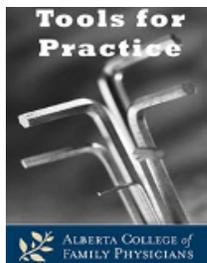
Finding COVID - How Good is the Test to Detect it?

Clinical Question: What is the chance of obtaining an incorrect result with the polymerase chain reaction (PCR) test for COVID-19?

Bottom Line: If the PCR COVID-19 test is positive you have COVID-19 (specificity ~100%). Small Canadian studies suggest the test will detect COVID-19 ~80-90% of the time (sensitivity), although estimates range from ~50%-90%. Collection technique, anatomical sample and timing of collection influence these numbers. The chance of a false negative depends on sensitivity and the pre-test probability the person has COVID-19. Example: someone with abnormal chest x-rays and close COVID-19 positive contacts has a higher risk of false negatives than someone who is asymptomatic.

Evidence:
- Hospitalized patients in China:
  - Retrospective study, 1014 patients, COVID-19 symptoms, all underwent both CT chest and PCR.[1]
    - Using CT chest and symptoms as the "gold standard":
      - PCR sensitivity 68% (601/888).
    - Using PCR as the "gold standard":
      - CT chest sensitivity 97% (580/601).
  - Samples from various anatomic sites:

- 866 samples from 213 inpatients who previously tested positive.[2] Sensitivity of swabs collected 0-7 and 8-14 days after symptom onset:
  - Sputum: 83% (45/54) and 77% (47/61).
  - Nasal: 72% (158/219) and 58% (130/226).
  - Throat: 61% (58/95) and 41% (26/63).
- 1070 specimens from 205 patients (disease course not reported):[3,4]
  - Sensitivity of bronchoalveolar lavage 93%, sputum 72%, nasal/nostril swabs 63%, and pharyngeal swabs (oral or nasopharyngeal) 32%.
- Alberta (30 outpatients) and Toronto (53 inpatients) initial positive nasopharyngeal swab, re-swabbed 10-11 days after symptom onset. Sensitivity:[5,6]
  - Nasopharyngeal 90%.
  - Throat 87%.
  - Nasal 80%.
  - Saliva 77%.
- Limitations: studies were of low quality or non-peer reviewed preprints; no gold standard test[7] for COVID-19; sampling techniques not always reported.

Context:
- Inappropriate specimen collection, storage, and transport are likely the biggest contributors to false negative results.[8-10]
- Chance of false negatives depends on both sensitivity and pre-test probability (the chance of having the disease).
- Sensitivities of PCR are between 90% and 50%.
  - If pre-test probability is ≤10% (example minimally symptomatic patient in community): False negatives from 1% to 5%.
  - If pre-test probability is ~80% (example hospitalized patient with x-ray findings and known exposure): False negatives from 8% to 40%.
- While not a reliable indicator of prevalence, positive rates for COVID-19 testing are persistently below 10% in Canada.[11]

Authors:

Christina Korownyk MD CCFP & James McCormack PharmD

Disclosures:

Authors do not have any conflicts of interest to declare.

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