PCR vs. Rapid Tests at the Point of Care

When time is of the essence and cultures don't meet the demand for speedy diagnosis, rapid antigen tests are incredibly useful. However, it is a platform with several drawbacks that have led practices to integrate PCR into their testing workflows, for several reasons:

1. PCR is more accurate than rapid tests.

It is no secret that rapid antigen tests suffer sub-optimal accuracy. The CDC recognizes that most traditional rapid flu tests found in offices only have a sensitivity of 50-70%.[1] A large Cochrane literature review found the average rapid antigen test for strep was only 86% accurate.[2]

2. PCR can test for more than one pathogen.

While it is uncommon to test for more than one pathogen using rapid tests, PCR is commonly used for this purpose. Multiplex PCR panels can famously detect the presence of multiple pathogens simultaneously, which allows facilities to capture the broad spectrum of agents common among their patient population.

3. PCR is getting faster and faster.

Even though they suffer poorer sensitivity, rapid tests have been popular considering their result times. However, PCR has progressed tremendously in this regard in recent years, often being able to produce results in just hours after processing. This means getting your patient on the right treatment, faster.

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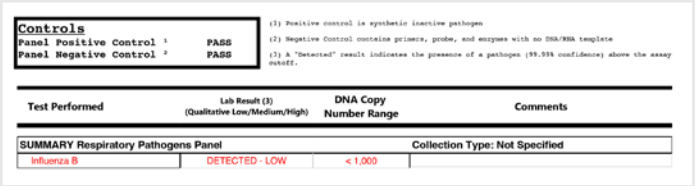
What these benefits have done for our clients.

As our clients have integrated the use of PCR, they've reported back with events that have cemented their usage of the technology:

> *"A patient presented to our client's Urgent Care with malaise and high fever, but a rapid flu test resulted as negative, which didn't sit right with her doctor. This facility has a protocol of validating rapid tests when they don't align with a provider's "eye test." Because of PCR validation, the patient tested positive for Flu B, was able to take a single-dose flu medication, and was back on her feet within 48 hours."*

> *Upon presenting with an acute viral illness, one patient resulted negative on rapid testing, and was going to be treated with just a steroid. "Because the facility doesn't normally validate negative tests, the patient independently sought PCR testing that was sent to our reference lab, which came back with Moraxella catarrhalis and allowed the patient to be treated appropriately."*

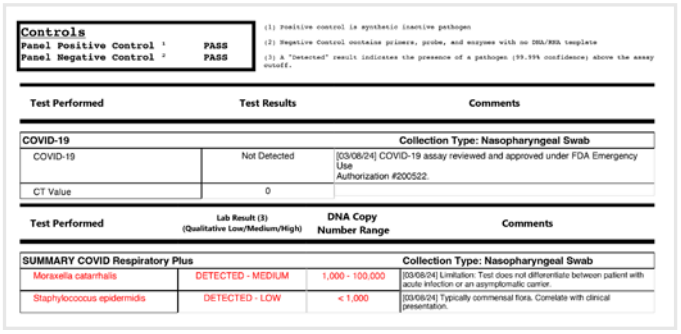


Controls		
Panel Positive Control [1]	PASS	
Panel Negative Control [2]	PASS	

(1) Positive control is synthetic inactive pathogen
(2) Negative Control contains primers, probe, and enzymes with no DNA/RNA template
(3) A "Detected" result indicates the presence of a pathogen (99.99% confidence) above the assay cutoff.

Test Performed	Lab Result (3) (Qualitative Low/Medium/High)	DNA Copy Number Range	Comments
SUMMARY Respiratory Pathogens Panel			Collection Type: Not Specified
Influenza B	DETECTED - LOW	< 1,000	

Snippet of the lab report.



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Test Performed	Test Results	Comments
COVID-19		Collection Type: Nasopharyngeal Swab
COVID-19	Not Detected	[03/08/24] COVID-19 assay reviewed and approved under FDA Emergency Use Authorization #200522.
CT Value	0	

Test Performed	Lab Result (3) (Qualitative Low/Medium/High)	DNA Copy Number Range	Comments
SUMMARY COVID Respiratory Plus			Collection Type: Nasopharyngeal Swab
Moraxella catarrhalis	DETECTED - MEDIUM	1,000 - 100,000	[03/08/24] Limitation: Test does not differentiate between patient with acute infection or an asymptomatic carrier.
Staphylococcus epidermidis	DETECTED - LOW	< 1,000	[03/08/24] Typically commensal flora. Correlate with clinical presentation.

Snippet of the lab report.

The Verdict

If you're bumping into the limits of what's possible with rapid antigen testing, consider how PCR may improve your diagnostic workflows with improved sensitivity, multiple pathogen detection, and progressively improving time-to-diagnosis.

References

1. Overview of influenza testing methods | CDC. https://www.cdc.gov/flu/professionals/diagnosis/overview-testing-methods.htm
2. Cohen JF, Bertille N, Cohen R, Chalumeau M. Rapid antigen detection test for group A streptococcus in children with pharyngitis. The Cochrane Library. 2016;2016(7). doi:10.1002/14651858.cd010502.pub2

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