Point of Care COVID-19 Testing: Guidance for Practicing Physicians

As of March 2, 2021, we now stand at a total of 339 test kits/test systems, this includes the Serology test and Home Collection kits (237 are PCR, 69 serological, three Immunoassay, 13 antigen, 15 home collection kit and two for IL-6). There are now nineteen that can be run in laboratories with only a CLIA Certificate of Waiver (COW). The (**) denotes a test system that is portable and can be used outside the clinical laboratory like mobile, nursing homes, or temporary sites like a drive thru or health fair. There are 4 of those. Currently there are 103 serology test awaiting review by the FDA for an EUA. There is a list of 240 serology tests that have been removed by the FDA or voluntarily withdrawn. These tests cannot be used by any US laboratory or distributed in the US.

Please see Provider Guide to SARS-CoV-2 Testing re: further guidance for questions to ask manufacturers of tests/vendors as well as definitions of laboratory terms, CLIA-waived testing, etc. at: https://www.communitycarenc.org/provider-guide-to-sars-cov-2-testing.

What's new? Pooled Samples!

UCSD RC SARS-CoV-2 Assay (University of California San Diego Health). This test is also for the qualitative detection of nucleic acid from the SARS-CoV-2 in pooled samples containing up to five individual upper respiratory swab specimens (nasopharyngeal, mid-turbinate, anterior nares or oropharyngeal swab specimens) that are collected under observation using individual vials containing transport media from individuals suspected of COVID-19 by their healthcare provider. Testing is limited to the Center for Advanced Laboratory Medicine 1300 Campus Point Drive, Suite 150, San Diego, CA 92121. Test is to be used with the Roche Cobas 6800/8800 systems with Roche Cobas 6800/8800 systems software v1.2 (ASAP v10.1.0) and v1.3 (ASAP 11.1.0).

Poplar SARS-CoV-2 TMA Pooling Assay (Poplar Healthcare). This test is for the qualitative detection of nucleic acid from the SARS-CoV-2 in pooled samples containing up to seven of the individual upper respiratory swab specimens (nasopharyngeal, nasal, or oropharyngeal swabs) that were collected using individual vials containing transport media from individuals suspected of COVID-19 by their healthcare provider. Testing is limited to Poplar Healthcare, located at 3495 Hack Cross Road, Memphis, TN 38125. The Poplar SARS-CoV-2 TMA Pooling assay is run on the Panther System. Specimens may be pooled via manual pipetting or using a Tecan Evo liquid handling system.

Verily Covid-19 RT-PCR Test (Verily Life Sciences). Testing is limited to Verily Life Sciences laboratory, located at 249 E Grand Avenue, South San Francisco, CA 94080. This test is also for the qualitative detection of nucleic acid from SARS-CoV-2 in pooled samples containing up to 12 individual upper respiratory specimens (such as nasopharyngeal, mid-turbinate, anterior nares or oropharyngeal swab specimens) that are collected by a HCP using individual vials containing transport media, from individuals suspected of COVID-19 by their HCP.

Use this link (https://www.finddx.org/test-directory) to access FIND's (Foundation for Innovative New Diagnostics) fully searchable directory currently lists all commercially available antigen RDTs and point-of-care molecular tests for COVID-19 of which FIND is aware. Manufacturer performance data (sensitivity and specificity) are included, where known, alongside data from independent evaluations conducted by FIND, where applicable. We are continuing to build this database and will be adding other test types, as well as data from independent evaluations by other entities.

CLIA-waived tests – MOLECULAR TESTING

1. **Xpert Xpress SARS-CoV-2 test - PCR (Cepheid):** Uses NP and nasal swabs. The test can provide rapid detection of the current pandemic coronavirus SARS-CoV-2 in as soon as 30 minutes for positive results* with less than a minute of hands on time to prepare the sample. Sensitivity 100% Specificity 100% on 30/30 negative samples and 30/30 "spiked" samples. **
2. **Accula SARS-Cov-2 Test – PCR (Mesa Biotech Inc.):** Using throat and nasal swabs, results are available in 30 minutes. Thirty (30) negative samples and 30 positive contrived samples were tested with the Accula SARS-CoV-2 Test. Positives were "spiked" samples of the negative samples collected from patients under IRB. Sensitivity 100% Specificity 99.8%. **
3. **ID NOW COVID-19 - PCR (Abbott Diagnostics Scarborough, Inc.):** This testing platform can deliver a POSTIVE test result in 5 minutes and NEGATIVE test results in 13 minutes targeting the coronavirus (COVID-19) RdRp Gene. Direct sample types include: Nasal, Throat, and Nasopharyngeal swabs. Urgent care clinic study shows ID NOW test performance of ≥94.7% positive agreement (sensitivity) and ≥98.6% negative agreement (specificity) compared to lab-based PCR reference tests.**
    - The Everett Clinic study shows 91.3% positive agreement and 100% negative agreement
    - Ongoing study of hospitalized and nursing home patients tested with late symptom onset shows ≥83.3% positive agreement and ≥96.5% negative agreement.
    - Abbott's studies suggest ID NOW performs best in patients tested earlier post symptom onset.
4. **Cue COVID-19 Test (Cue Health Inc.):** (waived, moderate, and high complexity laboratories): The test is run using the Cue Health Monitoring System (Cue Cartridge Reader), the Cue COVID-19 Test Cartridge, the Cue Sample Wand, and the Cue Health App on the Apple® iPhone® 8+ or newer mobile smart device with iOS 13 (or higher).
    - Clinical Evaluation: The Cue COVID-19 Test was also evaluated with 45 frozen nasopharyngeal swab samples were collected from patients suspected of SARS-CoV-2 infection and transported in viral transport media. The Cue COVID-19 Test result was positive for 100% of the 45 samples.
    - They also tested 60 negative patient samples and then spiked 30 of these with SARS-CoV-2. They were 30/30 on the negatives and were in agreement with expected results was ≥ 95% on the positives.
5. **Cobas SARS-CoV-2 & Influenza A/B Nucleic Acid Test (Roche Molecular Systems, Inc.):** (waived, moderate and high complexity laboratories): To be used with the cobas® Liat® Analyzer (P/N 07341920190) Including cobas® Liat® System Software (Core) Version 3.2 or higher and cobas® SARS CoV-2 & Influenza A/B Assay Script v1.0 or higher.
6. **BioFire Respiratory Panel 2.1-EZ (RP2.1-EZ) (BioFire Diagnostic LLC):** (waived, moderate, and high complexity laboratories). The panel is to be with the BioFire® FilmArray® 2.0 EZ Configuration System (BioFire 2.0 EZ). The Panel is a multi-organism detection system. There are 12 different viruses and four different bacteria it can detect to include SARS CoV-2. From the BioFire Instructions for Use packet: Clinical testing was performed using ten positive and five negative NPS specimens stored in transport media. The positive samples were collected from patients presenting with signs or symptoms of COVID-19, and previously identified as positive for SARS-CoV-2 by another test (nine specimens were determined positive by a validated laboratory developed test (NECOV19) and one was determined positive by the Roche cobas SARS-CoV-2

EUA Test). The negative samples were collected in 2018, and therefore were presumed negative for SARS-CoV-2. All samples were de-identified before testing on the BioFire COVID-19 Test. They also did contrived clinical samples – n=34 with expected PPA and NPA of 100%.

7. **Lucira COVID-19 All-In-One Test Kit (Lucira Health, Inc.):** (waived, moderate, and high complexity laboratories): This is a done with a special test unit that comes with each kit. The kit can also be used for individuals aged 13 and under when the specimen is collected by a healthcare provider at the POC.
8. **Xpert Express SARS-CoV-2 DoD (Cepheid):** (waived, moderate, and high complexity laboratories): Testing is limited to U.S. Department of Defense (DoD) designated laboratories using the GeneXpert Dx and GeneXpert Infinity systems.
9. **Visby Medical COVID-19 Point of Care Test (Visby Medical, Inc.):** (waived, moderate, and high complexity laboratories): Testing is performed with a single used device.

CLIA-waived tests – MOLECULAR TESTING – ANTIGEN

1. **Sofia 2 SARS Antigen FIA (Quidel Corporation):** (waived, moderate, and high complexity laboratories) using the Sofia 2 instrument. The assay demonstrated acceptable clinical sensitivity (80%) when compared to an EUA molecular device. A more recent pre-market study showed sensitivity of 97%. The assay demonstrated excellent clinical specificity (100%). There was no demonstrable cross-reactivity with seventy-nine (79) specimens containing seasonal CoVs detected by the BioFire® FilmArray® Respiratory Panel. Nasal or NP swab.
2. **BD Veritor System for Rapid Detection of SARS-CoV-2 (Becton Dickinson and Company [BD]):** (waived, moderate, and high complexity laboratories) using the BD Veritor™ Plus Analyzer. BD clinical studies performed at more than 20 sites across the U.S. demonstrated that the test is capable of achieving 84% sensitivity and 100% specificity. Like all immunoassay tests, FDA recommends that negative test results be confirmed by a molecular method to confirm the result, if necessary, for patient management. Nasal swab.
3. **Lumira SARS-CoV-2 Ag Test (LumiraDX UK Ltd.):** (waived, moderate, and high complexity laboratories) using the LumiraDx Instrument. This test combines a single use fluorescence immunoassay device with an instrument to provide a result within 12 minutes. That is roughly in line with Quidel and BD turnaround times. The test is touting 98% sensitivity and 97% specificity in pre-market analysis. NP swab.
4. **BinaxNow™ COVID-19 Ag Card (Abbott Diagnostics Scarborough, Inc.):** (waived, moderate, and high complexity laboratories) Direct read card test. Simple test procedure using a **direct nasal swab.** Direct nasal swabs from individuals suspected of COVID-19 by their healthcare provider within the first seven days of symptom onset. Onboard extraction allows the swab to be directly inserted into the test card. Room temperature storage. Visually read results in 15 minutes - no instrument required. 97% sensitivity and 98.5% specificity in pre-market analysis.
5. **Sofia 2 Flu + SARS Antigen FIA (Quidel Corporation):** (waived, moderate, and high complexity laboratories) using the Sofia 2 instrument.
6. **CareStart COVID-19 Antigen Test (Access Bio, Inc.):** (waived, moderate, and high complexity laboratories) This is a cassette kit. Clinical Performance: These were real clinical data in 92 patients collected at 3 different clinical sites. PPA = 87.18% NPA = 100%.

7. **Clip COVID Rapid Antigen (Luminostics, Inc.):** (waived, moderate, and high complexity laboratories) using a cartridge and Clip analyzer. Clinical Performance: These were real clinical data performed on 166 patients at two sites. PPA = 96.9% and NPA = 100%.
8. **BinaxNOW™ COVID-19 Ag Card Home Test (Abbott Diagnostics Scarborough, Inc.):** This test is authorized for prescription home use with self-collected observed direct anterior nasal (nares) swab samples from individuals aged 15 years or older who are suspected of COVID-19 by their healthcare provider within the first seven days of symptom onset or adult collected nasal swab samples from individuals aged four years or older who are suspected of COVID-19 by their healthcare provider within the first seven days of symptom onset. The BinaxNOW™ COVID-19 Ag Card Home Test is to be performed only with the supervision of a telehealth proctor. The BinaxNOW™ COVID-19 Ag Card Home Test does not differentiate between SARS-CoV and SARS-CoV-2. The BinaxNOW™ COVID-19 Ag Card Home Test is a rapid lateral flow immunoassay for the qualitative detection of SARS-CoV-2 directly from nasal swabs, without viral transport media. The BinaxNOW™ COVID-19 Ag Card Home Test kit contains all components required to carry out an assay for SARS-CoV-2.
9. **QuickVue SARS Antigen Test (Quidel Corporation):** (waived, moderate, and high complexity laboratories) Testing is done using a lateral flow test strip. Clinical Performance: Combination of fresh (138 patients) and frozen (56 patients) – PPA 96.6% and NPA 99.3% (combined data).
10. **STATUS™ COVID19/Flu (Princeton BioMeditech Corp.):** (waived, moderate, and high complexity laboratories) Results are for the simultaneous identification of nucleocapsid antigens of SARS-CoV-2, influenza A and influenza B, but does not differentiate between SARS-CoV and SARS-CoV-2 viruses and is not intended to detect influenza C antigens. It is a lateral flow test strip. Clinical Performance: 125 real patients – sensitivity = 93.9% and specificity = 100%.

CLIA moderate complexity labs – MOLECULAR TESTING

Use this link (https://www.finddx.org/covid-19-old/sarscov2-eval-molecular) to access FIND independent evaluations at the University Hospitals of Geneva (HUG). Their goal was to verify the limit of detection (LOD) – as reported by the manufacturers – and the clinical performance of 22 manual molecular test kits in comparison to an in-house PCR protocol that was optimized based on the Tib Molbiol assay. The LOD analysis was performed using cultured viral stocks from a clinical isolate from Switzerland that was quantified using an E gene standard. The clinical performance analysis was conducted on extracted samples from individuals suspected to have COVID-19, 50 of which were reference PCR positive and 100 of which were reference PCR negative. That analysis is available at the above link.

***These tests were included on our list because they all had third party validation (by FIND – Foundation for New Innovative Diagnostics) and were not manufactured in China. These results can be found at https://www.finddx.org/covid-19.**

CLIA moderate complexity labs – ANTIBODY TESTING

1. **SARS-CoV-2 IgG Assay (Abbott Laboratories):** (moderate and high complexity laboratories) to be used on the Architect system both the i1000 or i2000 instruments and the Alinity I instrument.
    - This test is for the detection of IgG antibodies only.

Abbot Alinity i SARS-CoV-2 IgG
Developer: Abbott
Test: Alinity i SARS-CoV-2 IgG
Technology: High Throughput CMIA
Target: Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
IgG	Sensitivity (PPA)	100% (34/34)	(89.9%; 100%)
IgG	Specificity (NPA)	99.0% (99/100)	(94.6%; 99.8%)
IgG	PPV at prevalence = 5%	84.0%	(46.7%; 96.3%)
IgG	NPV at prevalence = 5%	100%	(99.4%; 100%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use

2. **Platella SARS-CoV-2 Total Ab Assay (Bio-Rad Laboratories):** This test is for the detection of IgM/IgA/IgG antibodies.

Bio-Rad Platelia SARS-CoV-2 Total Ab
Developer: Bio-Rad Laboratories, Inc
Test: Platelia SARS-CoV-2 Total Ab
Technology: ELISA
Target: Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
Pan-Ig	Sensitivity (PPA)	92.2% (47/51)	(81.5%; 96.9%)
Pan-Ig	Specificity (NPA)	99.6% (684/687)	(98.7%; 99.9%)
Pan-Ig	PPV at prevalence = 5%	91.7%	(76.7%; 98.1%)
Pan-Ig	NPV at prevalence = 5%	99.6%	(99.0%; 99.8%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use

3. **Cellex Inc. qSARS-CoV-2 IgG/IgM Rapid Test (Cellex Inc.):** (moderate and high complexity laboratories). This is a kit test no instrument required.

Developer: Cellex, Inc.
Test: qSARS-CoV-2 IgG/IgM Rapid Test
Technology: Lateral Flow
Target: Spike and Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
Combined	Sensitivity (PPA)	93.8% (120/128)	(88.2%; 96.8%)
Combined	Specificity (NPA)	96.0% (240/250)	(92.8%; 97.8%)
Combined	PPV at prevalence = 5%	55.2%	(39.2%; 69.8%)
Combined	NPV at prevalence = 5%	99.7%	(99.3%; 99.8%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use

4. **Liaison SARS-CoV-2 S1/S2 IgG (DiaSorin Inc):** (moderate and high complexity laboratories) to be use with the Liaison XL Analyzer.
    - This test is for the detection of IgG antibodies only.

Developer: DiaSorin
Test: LIAISON SARS-CoV-2 S1/S2 IgG
Technology: High Throughput CMIA
Target: Spike

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
IgG	Sensitivity (PPA)	97.6% (40/41)	(87.4%; 99.6%)
IgG	Specificity (NPA)	99.3% (1082/1090)	(98.6%; 99.6%)
IgG	PPV at prevalence = 5%	88.0%	(76.7%; 92.9%)
IgG	NPV at prevalence = 5%	99.9%	(99.3%; 100%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use