Clinical Laboratory COVID-19 Response Call
Monday, January 10, 2022, at 3:00 PM EDT

• Welcome
  – Jasmine Chaitram, CDC Division of Laboratory Systems (DLS)

• Evaluation of a SARS-CoV-2 Antigen Test in a Community Setting
  – Jessica Prince-Guerra, CDC Division of Viral Diseases (DVD)

• The TRUU-Lab Names Initiative: Towards Standardization, Interoperability, and Understanding
  – Ila Singh, Texas Children’s Hospital

• FDA Update
  – Tim Stenzel, US Food and Drug Administration (FDA)

• SARS-CoV-2 Variants Update
  – Natalie Thornburg, CDC Laboratory and Testing Task Force for the COVID-19 Response
Vision
Exemplary laboratory science and practice advance clinical care, public health, and health equity.

Mission
Improve public health, patient outcomes, and health equity by advancing clinical and public health laboratory quality and safety, data and biorepository science, and workforce competency.
Four Goal Areas

- **Quality Laboratory Science**
  - Improve the quality and value of laboratory medicine and biorepository science for better health outcomes and public health surveillance

- **Highly Competent Laboratory Workforce**
  - Strengthen the laboratory workforce to support clinical and public health laboratory practice

- **Safe and Prepared Laboratories**
  - Enhance the safety and response capabilities of clinical and public health laboratories

- **Accessible and Usable Laboratory Data**
  - Increase access and use of laboratory data to support response, surveillance, and patient care
Find CLCR call information, transcripts, and audio recordings on this page

Ask on order entry (AOE) questions are optional, however, core data elements are important.
The next call will be on **Monday, January 24**
from **3:00 PM to 4:00 PM ET**
We Want to Hear from You!

Training and Workforce Development

Questions about education and training?
Contact LabTrainingNeeds@cdc.gov
How to Ask a Question

- Using the Zoom Webinar System
  - Click the Q&A button in the Zoom webinar system
  - Type your question in the Q&A box and submit it
  - Please do not submit a question using the chat button

- For media questions, please contact CDC Media Relations at media@cdc.gov
- If you are a patient, please direct any questions to your healthcare provider
Slide decks may contain presentation material from panelists who are not affiliated with CDC. Presentation content from external panelists may not necessarily reflect CDC’s official position on the topic(s) covered.
Evaluation of a SARS-CoV-2 Antigen Test in a Community Setting

Jessica Prince-Guerra, PhD
Laboratory Leadership Service Fellow
CDC, Division of Viral Diseases

CDC’s Division of Laboratory Systems
Clinical Laboratory COVID-19 Response Call

January 10th, 2022

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention

cdc.gov/coronavirus
Overview

- Background
- Purpose
- Methods
- Results
- Discussion
Background
SARS-CoV-2 testing is an important prevention strategy
SARS-CoV-2 rapid antigen tests detect viral proteins

SARS-CoV-2

Santos et al., 2020 Front. Microbiol.
BinaxNOW™ COVID-19 Ag Card for SARS-CoV-2 Detection received FDA Emergency Use Authorization (EUA) in August 2020
FDA EUA validation data only included 102 individuals within 7 days of symptom onset

<table>
<thead>
<tr>
<th>BinaxNOW™ COVID-19 Ag Card</th>
<th>Comparator Method</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>34</td>
<td>1</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>1</td>
<td>66</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>67</td>
<td>102</td>
<td></td>
</tr>
</tbody>
</table>

Positive Agreement: 34/35  97.1% (95% CI: 85.1% - 99.9%)

Negative Agreement: 66/67  98.5% (95% CI: 92.0% - 100%)

https://www.fda.gov/media/141567/download
https://www.fda.gov/media/141570/download
Purpose
The **purpose of this evaluation** was to **assess the performance** of the BinaxNOW antigen test compared to real-time RT-PCR in **symptomatic and asymptomatic** persons at community testing sites.
Methods
Recruited 3,419 participants ≥ 10 years of age for paired antigen and rRT-PCR testing from two community-based testing sites in Pima County, Arizona - November 2020
Survey administered to participants

- Symptoms and days post onset
- Exposure to a diagnosed COVID-19 case
- Demographics – Pima County Health Department

Fever (100.4°F (38°C) or greater) or chills
Cough
Shortness of breath or difficulty breathing
Fatigue
Muscle or body aches
Headache
New loss of taste or smell
Sore throat
Congestion or runny nose
Nausea or vomiting
Diarrhea
Sample collection

- Paired samples collected by healthcare professional

- First: bilateral nasal swab according to BinaxNOW instructions for use

- Second: bilateral nasopharyngeal swab (for rRT-PCR test)
Laboratory testing

- BinaxNOW point-of-care antigen testing
  - Positive results reported to participants by phone

- Real-time RT-PCR testing
  - Commercial laboratory
  - CDC 2019-nCoV rRT-PCR Diagnostic Panel for detection of SARS-CoV-2
  - Fosun COVID-19 rRT-PCR Detection Kit

- Positives from either test (n=274) tested by viral culture
Results
Participant characteristics – 3,419 paired results

- Participants aged 10 - 95 years (median = 41)
  - 2,592 (76%) asymptomatic; 827 (24%) with ≥ 1 symptom

- Race/ethnicity
  - Nearly one-third self-reported ethnicity as Hispanic or Latino
  - Half self-reported race/ethnicity as White, Non-Hispanic

- Asymptomatic
  - 1.9% positive by antigen test; 4.7% positive by real-time RT-PCR

- Symptomatic
  - 13.7% positive by antigen test; 21.3% positive by real-time RT-PCR
Time to results

BinaxNOW
2.5 hours

rRT-PCR
26 hours

### BinaxNOW antigen test performance

<table>
<thead>
<tr>
<th></th>
<th>Symptomatic</th>
<th></th>
<th>Asymptomatic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCR +</td>
<td>PCR -</td>
<td>PCR +</td>
<td>PCR -</td>
</tr>
<tr>
<td>Binax +</td>
<td>113</td>
<td>0</td>
<td>44</td>
<td>4</td>
</tr>
<tr>
<td>Binax -</td>
<td>63</td>
<td>651</td>
<td>79</td>
<td>2465</td>
</tr>
<tr>
<td></td>
<td>176</td>
<td>651</td>
<td>123</td>
<td>2469</td>
</tr>
<tr>
<td></td>
<td>827</td>
<td></td>
<td>2544</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>113/176</td>
<td>64.2%</td>
<td>44/123</td>
<td>35.8%</td>
</tr>
<tr>
<td>Specificity</td>
<td>651/651</td>
<td>100%</td>
<td>2465/2469</td>
<td>99.8%</td>
</tr>
<tr>
<td>PPV</td>
<td>113/113</td>
<td>100%</td>
<td>44/48</td>
<td>91.7%</td>
</tr>
<tr>
<td>NPV</td>
<td>651/714</td>
<td>91.2%</td>
<td>2465/2544</td>
<td>96.9%</td>
</tr>
</tbody>
</table>

BinaxNOW antigen test performance is highest within 7 days of symptom onset

### Viral culture results in samples positive by either test

<table>
<thead>
<tr>
<th>Sample Categories</th>
<th>Virus Recovered N (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>All positive samples</td>
<td>96 (35%)</td>
<td>274</td>
</tr>
<tr>
<td>Antigen Positive, rRT-PCR Positive</td>
<td>85 (57.8%)</td>
<td>147</td>
</tr>
<tr>
<td>Antigen Negative, rRT-PCR Positive</td>
<td>11 (8.9%)</td>
<td>124</td>
</tr>
<tr>
<td>Antigen Positive, rRT-PCR Negative</td>
<td>0 (0%)</td>
<td>3</td>
</tr>
</tbody>
</table>

Samples with lower cycle threshold values were more likely to be concordant

BinaxNOW antigen test sensitivity improved in culture positive samples

<table>
<thead>
<tr>
<th></th>
<th>Symptomatic</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>68</td>
<td>28</td>
</tr>
<tr>
<td>Antigen Positive, rRT-PCR Positive</td>
<td>63</td>
<td>22</td>
</tr>
<tr>
<td>Antigen Negative, rRT-PCR Positive</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>92.6%</td>
<td>78.6%</td>
</tr>
</tbody>
</table>

The inability to isolate virus from a clinical sample should not be interpreted to mean a person is not infectious and incapable of transmission.
Limitations

- Nasal swabs were used for BinaxNOW antigen testing, but NP swabs were used for real-time RT-PCR testing

- COVID-19 symptoms are non-specific and difficult to capture

- Results not generalizable to other SARS-CoV-2 antigen tests
Discussion
Results summary

- The faster turnaround time of the antigen test, compared to rRT-PCR, is beneficial because it allows for rapidly identifying persons for isolation.

- BinaxNOW antigen test sensitivity was lower in asymptomatic than symptomatic persons (35.8% versus 64.2%), but specificity was high.

- Sensitivity was higher among viral culture positive samples, however some antigen test-negative samples also had culturable virus.
Takeaway Messages
Antigen test results may need confirmatory testing

Despite lower sensitivity, the faster results from point of care antigen tests can lead to more rapid isolation of COVID-19 cases.
COVID-19 Viral Testing Tool is an interactive web tool designed to help both healthcare providers and individuals understand COVID-19 testing options.

Acknowledgements

- Pima County Health Department
  - Theresa Cullen
  - Julie Kudrna
  - Khalilullah Sheiban
- Arizona Department of Health Services
  - Ken Komatsu
  - Ariella Dale
- CDC State, Tribal, Local and Territorial Task Force
  - William Bower
  - Peggy Honein
  - Mark Anderson
  - Julie Villanueva
  - Dale A. Rose

CDC Laboratory Task Force
- Paul Rota
- Natalie Thornburg
- Azaibi Tamin
- Jennifer Harcourt
- Ren Salerno
- Wendi Kuhnert-Tallman
- TLR Lab members

CDC Epidemiology Task Force
- Olivia Almendares
- Hannah Kirking
- Jackie Tate

CDC Arizona Field Team Participants
Thank-you

Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
The TRUU-Lab Names Initiative: Towards Standardization, Interoperability and Understanding

Ila Singh, MD, PhD
Chief of Laboratory Medicine
Chief of Pathology Informatics
Texas Children’s Hospital
Professor, Baylor College of Medicine
Today’s Talk

• TRUU-Lab and Goals
• What we have done:
  • Identified & Categorized Common Problematic Names
  • Finished First Surveys of 200 Clinicians
  • Gone Live with Second Survey
• Yet to Come – in brief

• Not - about what has been previously covered
  • Why Naming Problems Exist
  • Safety Issues related to Names
  • Current Practices to Address ‘bad’ Names
  • Other Naming Practices or Attempts

No Conflicts of Interest
A Case of Measles …No Lab Test?

Test found in EMR
Rubeola IgM

Pic: Mayo Foundation for Medical Education and Research
TRUU-Lab

Aims to bring together

- Healthcare Providers,
- Professional Societies,
- Industry Groups, and
- Federal Liaisons

to address problems caused by ambiguous, incomplete, and non-standard laboratory test names
TRUU-Lab’s Goals

• Generate consensus names for existing lab tests
• Generate a consensus guideline for test naming
• Promote the adoption and implementation of consensus lab test names and guidelines
TRUU-Lab Members

AACC
- Sridevi Devaraj, PhD

AAFP
- Keith Davis, MD

ACLPS
- Neal Lindeman, MD

AMP
- Rick Nolte, PhD
- Mary Williams
- Robin Temple-Smolkin

API
- Monica de Baca, MD
- David McClintock, MD

ASCP Choosing Wisely
- Lee Hilborne, MD
- Iman Kundu, Edna Garcia

ASM
- Laura Filkins, PhD

CAP
- Peter Perrotta, MD

EMR/LIS/Terminology Groups
- Nick Trentadue (Epic)
- Jigar Patel, MD (Cerner)
- Jeff Watson (Sunquest)
- Amanda Caudle (Atlas/Sunquest)
- Holly van Kleeck JD (Health Language)
- Dale Davidson (Health Language)
- Nancy Sokol (UpToDate)
- Cheryl Mason
- Steve Box (X-Lab Systems, UK)

LOINC
- Jami Deckard

Nudge Unit
- Mitesh Patel MD, PhD, MBA

PLUGS
- Mike Aston, MD, PhD
- Jane Dickerson, PhD

Reference Labs
- Brian Jackson, MD, MS (ARUP)
- Lee Hilborne, MD, PhD (Quest)
- Mohamed Salama MD (Mayo)

Commercial
- Kara Johnson (Abbott)
- Ross Molinaro MD (Siemens)
- Daniel Johnson (Sysmex)
- Jeff Schreier (Diaetrics)
- Jon Nakamoto, MD, PhD (Amazon)

Clinical Pathologists and Scientists
- Ila Singh (Texas Children’s/Baylor)
- Emily Garnett, PhD (Texas Children’s/Baylor)
- Laura Filkins (UT, Southwestern)
- Grace Kroner, PhD (Cleveland Clinic)
- Gary Procop MD (American Board of Pathology)
- Charlene Bierl, MD, PhD (Penn)
- Swapna Abhayankar MD (Regenstrief)
- Elissa Passiment, PhD
- Michael Laposata MD, PhD (UTMB)
- Anand Dighe, MD, PhD (MGH/Harvard)
- David Alter (Emory U)
- Sam McCash (Memorial Sloan Kettering)
- Andrea Pitkus

Federal Liaisons

CDC
- Sara Brenner
- Greg Pappas

FDA
- Talisha Searcy

ONC
- Serafina Brea

International Partners

National Health Service
United Kingdom

Standardization in Pharmacologic/Toxicology Testing
Norway

Royal College of Pathologists of Australasia
Sydney, Australia

Brazil Association of LIS Directors
Sao Paulo, Brazil
CDC

Jasmine Chaitram
Nancy Cornish
Maribeth Gagnon
Reynolds Salerno

Param Sandhu
Monica Toles
# Lack of Standardization in Test Names

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin D</td>
<td>25 hydroxy 1,25 dihydroxy</td>
</tr>
<tr>
<td>Thalassemia Screen</td>
<td>Hemoglobin Variant Reflexive Panel Hemoglobin A2</td>
</tr>
<tr>
<td>eGFR vs EGFR</td>
<td>SM Ab (Smith or Smooth muscle?)</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>Antidiuretic hormone (ADH) Arginine Vasopressin (AV)</td>
</tr>
<tr>
<td>Quantiferon Gold and Interferon-Gamma Release assay (TB)</td>
<td></td>
</tr>
<tr>
<td>Factor V Leiden Vs Factor V Levels</td>
<td></td>
</tr>
<tr>
<td>Hemoglobin A1c</td>
<td>Glycated hemoglobin A1c</td>
</tr>
<tr>
<td>Free</td>
<td>LC/MS-MS</td>
</tr>
<tr>
<td>Character limits Respiratory Virus Panels Celiac algorithm</td>
<td></td>
</tr>
<tr>
<td>Human Chorionic Gonadotrophin for Pregnancy vs Tumor Marker</td>
<td></td>
</tr>
</tbody>
</table>

TRUU-LAB Sub-Committee Dr. Gary Procop
Creating ‘Good’ Names

Traditionally - Names are chosen by Lab Directors *without* input from people who use them.

Let’s ask the people who use the names, i.e. clinicians of all kinds.

Clinician’s idea of a ‘good’ name is colored by their own experiences – good or bad.

Experiences vary an enormous amount: **HIV RNA test (quantitative)**
- HIV-1, Quantitative, Real-Time PCR (Quest Diagnostics)
- HIV-1 RNA by Quantitative RT-PCR, Plasma (ARUP Laboratories)
- HIV 1 RNA NAA+probe, Log #/Vol (LOINC)
- HIV viral load PCR (Mass General Hospital)

No one calls it an *AIDS* test (compare that with ‘COVID test’).
Survey Takers and the Brand Institute

Surveyed Clinicians from Specialties that order quite a few tests

Two surveys, Name Survey & FMEA survey, 100 clinicians each

- 20 Emergency Physicians
- 20 Pediatricians
- 20 Obstetrician-Gynecologists
- 20 Family Practice and General Practice Physicians
- 10 Nurse Practitioners
- 10 Physician Assistants

37% > 20 yr experience
42% with 10-20 years experience

Involved in naming >80% of Pharmaceutical Products in the world.
Both Generic and Brand Names.
Lab Names Survey

Two Structural Parts

1. Give a clinical scenario for which they choose appropriate Lab tests Unaided Survey

2. Provide background information about the test and then ask questions about what would make an ideal name Aided Survey

- Avoids provider responses that are driven by prior knowledge and experience
- Ensures providers are making informed decisions
- Reaches intuitive test names that we anticipate will be widely understandable
A 40-year old woman presents with fever and shortness of breath. She is not vaccinated against COVID-19. You would like to test her for potential SARS-CoV-2 infection.

Which of the tests listed below would you order?

Please rank up to three tests listed below that best communicate exactly what you want:

For the test that best communicates what you want select “1”
For the second test that best communicates what you want select “2”
For the third test that best communicates what you want select “3”

A number of choices with SARS-CoV-2 nucleic acid, antibodies, and antigens were provided.
Unaided Surveys

Vitamin D
Testosterone
Anti-Xa
SARS-CoV-2 RNA
SARS-CoV-2: Correct Test Choice same as by Chance

- 76% of all providers chose at least one incorrect test name (out of 3)
- **66% of selections were correct, equal to chance (66% of choices were correct)**
- Pediatricians and PAs did worse than chance
- 10% of OB-GYNs and Pediatricians chose only incorrect tests
Lab Test Names are really a problem!
What information in a test name would be most helpful to differentiate between an Antigen test and a molecular test:

- **Type of target (antigen vs. viral RNA):** 37.0%
- **Indication for use (early exposure risk vs. diagnosis of COVID-19):** 34.0%
- **Method (immunoassay vs. RT-PCR):** 25.0%
- **Test setting (POCT vs. laboratory):** 4.0%
- **Other:** 0.0%
Preference for Keywords

Overall (n=100)

<table>
<thead>
<tr>
<th>Name of the disease</th>
<th>Specific name of the pathogen</th>
<th>General name of the pathogen</th>
<th>Method</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19</td>
<td>69.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COVID</td>
<td>36.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SARS-CoV-2</td>
<td>56.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoV-2</td>
<td>12.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronavirus</td>
<td>31.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoV</td>
<td>12.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCR</td>
<td>29.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic</td>
<td>18.0%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
General Consensus among Specialties about Keywords
Lessons Learned

- Test Names are a Problem – respondents do not perform much better than chance. They need help!
- The most widely preferred types of information within names were “core identifiers” (i.e. the name of the target) and “utilization aids” (i.e. indication for testing)
- The “actual name of the target” was preferred for testosterone and Vitamin D, but the name of the disease (COVID-19) was more frequently chosen than SARS-CoV-2
- Indications FOR use were strongly preferred over warnings AGAINST improper use when both options were given
- For Vitamin D testing, where the target names are complex and the indications are complex too, warnings against inappropriate use were preferred
- There isn’t a ‘One Size Fits All’, but there are likely common patterns that will become clearer with subsequent surveys

We will use Results from these Surveys to build General Guidelines for Test Naming
Test Before Widespread Implementation

- Present a Clinical Scenario within a Mock EMR
- Populate the Mock EMR with optimal as well as sub-optimal names. See what people choose.

Goal – Get these standardized names in the foundation build of all EMRs and LIS – Better Interoperability
Thank you!

**CDC**
- Jasmine Chaitram
- Nancy Cornish
- Maribeth Gagnon
- Reynolds Salerno
- Param Sandhu
- Monica Toles

**Brand Institute**
- Jacob Barnes
- Matthew Filbert
- Brian Frasca
- Luisanna Meija
- Carlos Gomez
- Minnie Suh
- Ricardo Montemayor
FDA Update

Tim Stenzel
US Food and Drug Administration (FDA)
COVID-19 Emergency Use Authorization (EUA) Information for Medical Devices
https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations

COVID-19 In Vitro Diagnostic EUAs

COVID-19 Frequently Asked Questions

COVID-19 Updates

FDA Townhall Meetings

Independent Evaluations of COVID-19 Serological Tests
https://open.fda.gov/apis/device/covid19serology/
COVID-19 Diagnostic Development
CDRH-EUA-Templates@fda.hhs.gov

Spot Shortages of Testing Supplies: 24-Hour Support Available
1. Call 1-888-INFO-FDA (1-888-463-6332)
2. Then press star (*)

FDA MedWatch
Thank You For Your Time!

Photo submitted by the Microbiology Laboratory at The University of Pittsburgh Medical Center

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# lab.professionals.rock