Clinical Laboratory COVID-19 Response Call
Monday, January 25th, 2021 at 3:00 PM ET

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

- What Are the Clinical Laboratory Result Abnormalities in Patients Hospitalized with COVID-19?
  - Nadia Ayala-Lopez, Johns Hopkins Medical Institute

- COVID-19 Variants and Surveillance
  - Chris Elkins, CDC COVID-19 Laboratory and Testing Task Force

- CMS Billing Update
  - Sarah Harding, Centers for Medicare and Medicaid Services (CMS)

- FDA Update
  - Tim Stenzel, U.S. Food and Drug Administration (FDA)
COVID-19 At-Home Testing Webpage

https://www.cdc.gov/coronavirus/2019-ncov/testing/at-home-testing.html
COVID-19 Resources for Laboratories

- LOINC In-Vitro Diagnostic (LIVD) Test Code Mapping for SARS-CoV-2 Tests
- IVD Industry Connectivity Consortium
  [https://ivdconnectivity.org/livd/](https://ivdconnectivity.org/livd/)
- Antigen Testing Guidance
- Frequently Asked Questions about COVID-19 for Laboratories
- Interim Guidance for Collecting, Handling, and Testing Clinical Specimens
- Diagnostic Tools and Virus
- Emergency Preparedness for Laboratory Personnel
  [https://emergency.cdc.gov/labissues/index.asp](https://emergency.cdc.gov/labissues/index.asp)
- CDC Laboratory Outreach Communication System (LOCS)
  [https://www.cdc.gov/csels/dls/locs/](https://www.cdc.gov/csels/dls/locs/)
Excellent Laboratories, Outstanding Health

Find CLCR call information, transcripts, and audio recordings on the CDC Preparedness Portal

The next call will be on **Monday, February 8th**
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
What are the clinical laboratory result abnormalities in patients hospitalized with COVID-19?

Nadia Ayala-Lopez, PhD, MLS (ASCP)

Clinical Chemistry Fellow
Department of Pathology
Clinical laboratory hallmarks of severe COVID-19

Markers of
• Inflammation
• Coagulation
• Tissue injury
Inflammation

- ↑ C-reactive protein (CRP)$^1$
- ↑ IL-6, TNFα, IL-1, IL-10, IL-2$^2$
- ↑ ferritin$^4$
- ↑ neutrophils and WBCs$^1$
- ↑ procalcitonin$^1$
- **Lymphopenia**
  - Specific reductions in CD3+, CD4+ and CD8+ subpopulations of T-cells$^2$

Proposed biomarkers for severity of COVID-19

- ↑ IL-6 and CRP have a high predictive value for severe COVID-19$^5$
- A high neutrophil-to-lymphocyte ratio (NLR; RI ≤3) and low lymphocyte-to-CRP ratio$^4,6$
- A meta-analysis of 22 studies on hospitalized COVID-19 patients found that lymphopenia and neutrophilia at admission were associated with poorer outcomes$^7$
- Elevated red cell distribution width (RDW) at admission associated with mortality risk$^8$
Coagulopathy

• Abnormalities in coagulation leading to venous and thromboembolic complications are found in 10-25% of COVID-19 patients requiring hospital care.\textsuperscript{10}

• ↑ D-dimer in patients with COVID-19-coagulopathy
  – Higher risk of mortality (18-times) was observed with patients with D-dimer concentrations above 1 mg/L\textsuperscript{3}

• Prolongation of the prothrombin time (PT) and ↓ platelets, which may be mild.\textsuperscript{3}

• Fibrinogen concentrations may be either increased or decreased, depending on their stage in the progression of the disease.\textsuperscript{3}

\textbf{D-dimer values in ICU patients with COVID-19. Friedrich et al. 2020\textsuperscript{9}}
Tissue injury

- Lung, liver, renal and cardiac injury
  - Liver injury\textsuperscript{11}:
    - ↑ liver injury-associated enzymes: alanine aminotransferase (ALT) and aspartate aminotransferase (AST)\textsuperscript{11}
    - ↓ albumin with diminished liver function.\textsuperscript{1}
  - Acute kidney injury\textsuperscript{2}
    - ↑ serum creatinine and serum urea nitrogen are associated with high risk of mortality in COVID\textsuperscript{19}.
  - Cardiac injury\textsuperscript{2}
    - ↑ in troponin present in 7-17\% of hospitalized COVID-19 patients\textsuperscript{10}
    - ↑ lactate dehydrogenase (LDH)

Yang et al. 2020\textsuperscript{11}
Conclusion

• Clinical laboratory findings in COVID19 include parameters of
  – Inflammation: IL-6, procalcitonin, CRP, lymphopenia and neutrophilia.
  – Coagulopathy: D-dimer, PT, platelets, fibrinogen
  – Tissue injury: LDH, AST, ALT, creatinine, troponin

• More studies are needed on the associations of laboratory markers and predictive calculations to outcomes as therapies for COVID-19 evolve, as well as understanding the impact of comorbidities on these laboratory markers.

• The ability for laboratories to provide valuable, timely, and accurate testing in the setting of COVID-19 is essential in the management of the pandemic.

@drayalalopez


COVID-19 Variants and Surveillance

Chris Elkins
CDC COVID-19 Laboratory and Testing Task Force
SARS-CoV-2 Variants and Surveillance Update

- Overview of National SARS-CoV-2 Strain Surveillance (NS3)
- Update on SARS-CoV-2 variants
- Summary
Enhancing Surveillance for SARS-CoV-2

NS3

- National SARS-CoV-2 Surveillance System (NS3)
  - Goals
    - Establish a representative system for baseline virus surveillance
    - Build a collection of representative SARS-CoV-2 specimens and sequences
    - Isolation and characterization of viruses
  - Strategy
    - Public Health labs initially providing ~600 specimens to CDC every 2 Weeks
      - Expanded to 1,500 specimens to CDC every 2 weeks
    - Specimens from a variety of geographic locations over time
    - Demographic and clinical metadata contributed
    - Provide viruses, reagents, and constructs for USG, academic, and private developers
National SARS-CoV-2 Surveillance System (NS3)

- November 2020 – present
  - Establish a representative system for baseline virus surveillance
  - Most states and territories participating
  - 1,144 specimens sequenced
  - Expanded to 1,500 specimens to CDC every 2 weeks

NS3 Diversity
- Baseline surveillance
- Representative specimens
- Demographics

1,144 SARS-CoV-2 genomes
Enhancing Surveillance for SARS-CoV-2
Expanded Commercial Laboratory Support

3,081 SARS-CoV-2 genomes

New and Expanded Sequencing Contracts through CDC

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B.1.1.7 lineage (20I/501Y.V1, VOC 202012/01)
- Emerged in U.K. September 2020
- In more than 55 countries, including U.S. and Canada
- N501Y, P681H, ORF8 stop codon (Q27stop)
- 69/70 deletion (produces S-gene target failure with ThermoFisher TaqPath)
- Associated with increased transmissibility

B.1.351 lineage (20H/501Y.V2)
- First detected in South Africa October 2020, now in >15 countries
- Multiple substitutions in the spike protein: K417T, E484K, N501Y
- Some evidence indicated E484K may affect neutralization by antibodies

P.1 lineage (a.k.a. 20J/501Y.V3)
- Branch off the B.1.1.28 lineage
- First reported by the NIID in Japan in four travelers from Brazil
- Contains 17 unique amino acid changes and 3 deletions
- May additionally be circulating in Brazil without K417T and N501Y
Enhancing Surveillance for Variant SARS-CoV-2
NS3 and Expanded Commercial Laboratory Support

- **NS3**: Additional specimens sent to CDC to address SARS-CoV-2 variants of interest
  - Targeted surveillance
  - Specimens shipped to CDC **weekly** from Public Health Labs
  - More narrow selection criteria
  - Dynamic, short-term requests
  - Guidance continually updated
    - B.1.1.7 lineage
    - B.1.351 lineage
    - Future variant viruses
- **Commercial Laboratories**: Initial focus prioritize S-gene target failures (SGTF) to improve detection of B.1.1.7 (UK Variant)
U.S B.1.1.7 Variant SARS-CoV-2 Cases
January 24, 2021

Genomics for Public Health Decisions

- Genomic Surveillance
- Vaccines
- Diagnostics
- Therapeutics
- Animal-Human Interface
- Virus Characterization & Pathogenesis
CMS Billing Update

Sarah Harding
Centers for Medicare & Medicaid Services (CMS)
Centers for Medicare and Medicaid Services (CMS)

- CLIA Laboratory Guidance During COVID-19 Memo and FAQs

- FAQs Only
FDA Update

Tim Stenzel
U.S. 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

CDC Social Media

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Thank You For Your Time!

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

This box being opened by an American Hero

#lovetheLab
#
.labprofessionalsrock