COVID-19 Update
Briefing for MSV

Lilian Peake, MD, MPH
State Epidemiologist
Virginia Department of Health

April 24, 2020
EPIDEMIOLOGY
Figure 2. Epidemic curve of confirmed COVID-19, by date of report and WHO region through 17 April 2020

Source: www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/
Confirmed COVID-19 Cases and Deaths Across the Globe

Reported by the World Health Organization

<table>
<thead>
<tr>
<th></th>
<th>As of March 2</th>
<th>As of April 17</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Deaths</td>
</tr>
<tr>
<td>World</td>
<td>88,948</td>
<td>3,043</td>
</tr>
<tr>
<td>China</td>
<td>80,174</td>
<td>2,915</td>
</tr>
<tr>
<td>U.S.</td>
<td>62</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>8,712</td>
<td>128</td>
</tr>
</tbody>
</table>

Number of COVID-19 Cases in the U.S., by Date Reported

January 22 to April 22, 2020
(n=828,441)

Total Cases: 828,441
Total Deaths: 46,379
Total Jurisdictions: 55
Number of COVID-19 Cases in the U.S., by State or Territory$^{2,3}$

As of April 22, 2020
This map shows confirmed and probable COVID-19 cases reported by U.S. states, U.S. territories, and the District of Columbia. Each state’s health department reports how much the virus has spread in their community.

Reported Cases
- None
- 1 to 100
- 101 to 1000
- 1001 to 5000
- 5001 to 10000
- 10001 or more
Geographic Differences in U.S. COVID-19 Cases, Deaths and Incidence

- February 12 - April 7, 2020 (n=396,000)
  - Case doubling time = 6.5 days (Range: 5.5 - 8.0)
- 2/3 of all cases were in 8 jurisdictions: NYC, NY, NJ, MI, CA, LA, MA, PA
  - 53% of deaths in 3 places: NYC, NY, NJ
- National cumulative incidence: 120/100,000
  - Range across states: 21 - 915 cases/100,000
Factors Behind Geographic Variations

• Timing of Introduction of COVID-19
• Population density
• Access to and use of PCR viral testing programs
• Use of community mitigation strategies
• Ages of infected populations (especially LTCF)
• Underlying diseases of infected populations
• “Social supports” of infected populations
As of April 23, 2020

<table>
<thead>
<tr>
<th>Number of People Tested^</th>
<th>Total Cases*</th>
<th>Total Hospitalizations**</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>64,518</strong></td>
<td><strong>10,998</strong></td>
<td><strong>1,753</strong></td>
<td><strong>372</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Confirmed†</th>
<th>Probable†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cases*</td>
<td>10,627</td>
<td>371</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Confirmed†</th>
<th>Probable†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Hospitalizations**</td>
<td>1,743</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Confirmed†</th>
<th>Probable†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Deaths</td>
<td>370</td>
<td>2</td>
</tr>
</tbody>
</table>

Select Measure
- Cases

Select Count or Rate
- Count

Count of Cases
- 0
- 1-19
- 20-99
- 100-199
- 200-299
- 300-499
- 500+

Map of Virginia showing COVID-19 cases by county.
COVID-19 Cases in Virginia
Rate per 100,000, By Locality
Number of COVID-19 Cases in Virginia, by Event Date
February 28 to April 17, 2020* (n=7,491)

Governor declared state of emergency

First Executive Order

Second Executive Order

VDH VIRGINIA DEPARTMENT OF HEALTH
To protect the health and promote the well-being of all people in Virginia.
VA COVID-19 Data by Age Group

As of 4-21-20, 9,630 total cases

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Virginia Population</th>
<th>Total Cases</th>
<th>Total Hosp’zations</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>12%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>10-19</td>
<td>13%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>20-29</td>
<td>14%</td>
<td>12%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>30-39</td>
<td>14%</td>
<td>15%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>40-49</td>
<td>13%</td>
<td>17%</td>
<td>12%</td>
<td>2%</td>
</tr>
<tr>
<td>50-59</td>
<td>14%</td>
<td>19%</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>60-69</td>
<td>11%</td>
<td>15%</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>70-79</td>
<td>7%</td>
<td>9%</td>
<td>19%</td>
<td>27%</td>
</tr>
<tr>
<td>80+</td>
<td>4%</td>
<td>9%</td>
<td>17%</td>
<td>46%</td>
</tr>
</tbody>
</table>
VA COVID-19 Data by Race & Ethnicity
As of April 21, 2000

Case Demographics: Race and Ethnicity
Not Reported: 3,072

- Hispanic or Latino: 2,672
- non-Hispanic Black: 1,474
- non-Hispanic white: 1,767
- Other: 645
COVID-19 Outbreaks Reported in Virginia
As of April 21, 2020

Outbreaks by Week

Number of Confirmed Outbreaks Reported to Public Health
148

Facility Types
- Congregate Setting
- Correctional Facility
- Educational Setting
- Healthcare Setting
- Long Term Care Facilities
- Gym/Spa

Week Beginning Date - Sunday through Saturday
Risk Factors for COVID-19 Outbreaks in Long Term Care Facilities

• Challenges to adhering to infection control practices
  • Inadequate PPE and other supplies
• Inadequate staffing
• Staff working while symptomatic
• Some staff unfamiliar with PPE guidelines
• Delayed case recognition
  • Low index of suspicion (of COVID-19)
  • Difficulty of clinical diagnosis
  • Limited COVID-19 testing ability
• Inter- and intra-facility transfer of residents
COVID-19 Symptoms

- Fever
- Cough
- Shortness of breath or difficulty breathing
- Chills
- Repeated shaking with chills
- Muscle pain
- Headache
- Sore throat
- New loss of taste or smell
Asymptomatic (or Pre-symptomatic) Spread of SARS-CoV-2 Virus

• 2-3 days of pre-symptomatic spread possible in some patients
• Some children and some elderly people are asymptomatic during entire infection course
  • Many infected but asymptomatic people found in recent LTCF studies
• Prolonged PCR-positivity in some pts after symptoms resolve
  • Studies ongoing to understand how related to infectiousness
Among HCP identified (n=9,282):

- 92% had cough, fever and/or shortness of breath
- 73% female
- Mean age = 42
- 38% with ≥1 underlying illness
- 55% reported contact with COVID-19 only in health care setting
- 8-10% hospitalized
  - 2-5% admitted to ICU; 0.3-0.6% died
  - 6% were aged ≥ 65 years old; 37% of total deaths
TESTING IN VIRGINIA
COVID-19 Tests Reported to VDH

Number of COVID-19 Tests Reported by Day
Percent of COVID-19 Reported Tests that were Positive by Day
# SARS-CoV-2 Testing

<table>
<thead>
<tr>
<th></th>
<th>Nucleic acid amplification test for viral RNA</th>
<th>Antibody detection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>Molecular</td>
<td>Serologic</td>
</tr>
<tr>
<td><strong>Measure</strong></td>
<td>Current infection</td>
<td>Recent or past exposure</td>
</tr>
<tr>
<td><strong>Specimen</strong></td>
<td>Includes nasopharyngeal swab, oropharyngeal swab, sputum, BAL</td>
<td>Blood</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>Identify infection (diagnosis)</td>
<td>Identify exposed or possibly recovered individuals</td>
</tr>
<tr>
<td><strong>Considerations</strong></td>
<td>Many different tests. VDH recommends tests evaluated by FDA through EUA process.</td>
<td>Immune response to SARS-CoV-2 is not well understood. Length of antibody persistence and level of protection is not known.</td>
</tr>
</tbody>
</table>

**Considerations:**
- Many different tests. VDH recommends tests evaluated by FDA through EUA process.
- Immune response to SARS-CoV-2 is not well understood. Length of antibody persistence and level of protection is not known.

FDA list of tests granted an EUA is [here](#)
Serology Testing

• There are a lot of unknowns
  • How should results be interpreted?
  • How long do antibodies persist?
  • What level is considered protective?

• As of 4/21/20
  • 4 tests granted an EUA by FDA (2 for diagnostic testing, 2 for research/surveillance)
  • Others offered under special COVID-19 FDA policy
    • Lsted on FDA FAQ page - NOT reviewed by FDA unless EUA was submitted and reviewed
  • Performance likely varies widely
Point-of-Care Testing

• To improve availability of testing, FDA issued emergency use authorization for CLIA-waived point-of-care diagnostic tests

• The authorized setting for each test type can be found on the FDA’s website
  • CLIA-waived point-of-care tests are indicated with a “W” under the “Settings for Use” column
# COVID-19 Testing Availability

<table>
<thead>
<tr>
<th>Virginia Public Heath Lab (DCLS)</th>
<th>Private Labs</th>
<th>Community Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Molecular testing only</td>
<td>• List of private and commercial labs offering testing for Virginia residents is <a href="#">here</a></td>
<td>• Provide improved access to testing</td>
</tr>
<tr>
<td>• Reserved for patients meeting VDH public health priority investigation criteria</td>
<td>• VDH approval is not necessary</td>
<td>• VDH approval is not necessary</td>
</tr>
<tr>
<td>• VDH approval is required - specimens should not be sent without approval</td>
<td>• Contact your lab provider to determine testing availability</td>
<td>• Local health departments are working with community partners to set up testing sites and target hard-to-reach populations</td>
</tr>
<tr>
<td>• Specimen collection guidance available on DCLS website</td>
<td>• Provide complete demographic information on testing request form</td>
<td>• Testing event details provided by local health department or partners</td>
</tr>
</tbody>
</table>

List of available testing sites in Virginia is [here](#)
# Criteria for DCLS Testing

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Epidemiologic Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever, cough, shortness of breath, difficulty breathing, or sore throat</td>
<td>Healthcare worker or first responder</td>
</tr>
<tr>
<td>• Fever may not be present in some persons</td>
<td>Hospitalized</td>
</tr>
<tr>
<td>• Older adults may have atypical symptoms</td>
<td>Resides or works or is about to be admitted into a congregate setting</td>
</tr>
<tr>
<td>AND</td>
<td>Potential cluster of unknown respiratory disease (priority for healthcare facilities)</td>
</tr>
<tr>
<td></td>
<td>Underlying Condition that increases risk of severe disease (new)</td>
</tr>
<tr>
<td></td>
<td>Uninsured or underinsured (new)</td>
</tr>
<tr>
<td></td>
<td>Newborn of mother with COVID-19 diagnosed at delivery (new)</td>
</tr>
</tbody>
</table>

More details can be found on the [VDH Updated Testing Guidance](https://www.vdh.virginia.gov/coronavirus/updated-testing-guidance/)
Testing Resources

• FDA
  • List of FDA Authorized Tests
  • FDA Serology Testing FAQs

• Other
MODELING
**Modeling**

### Statistical Models
- IHME model
- Projections based on curves that are fitted to historical data
- Include other factors as controls, such as policy responses

### Systems Dynamics Models
- UVA model and CHIME model
- Assume exponential growth in the number infected
- Rely on estimates of the rate of spread
# Model Strengths & Weaknesses

<table>
<thead>
<tr>
<th>Type of Model</th>
<th>Systems Dynamics</th>
<th>Statistical</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>UVA and CHIME</td>
<td>IHME</td>
<td>VDH</td>
</tr>
<tr>
<td>Degree of a Threat</td>
<td></td>
<td></td>
<td>Surveillance</td>
</tr>
<tr>
<td>Rate of Spread</td>
<td></td>
<td></td>
<td>Surveillance</td>
</tr>
<tr>
<td>Extent of Spread</td>
<td></td>
<td></td>
<td>Experts</td>
</tr>
<tr>
<td>Timing of the Peak</td>
<td></td>
<td></td>
<td>Experts</td>
</tr>
<tr>
<td>Severity</td>
<td></td>
<td></td>
<td>Experts</td>
</tr>
</tbody>
</table>

- **Highly Suitable**
- **Suitable**
- **Somewhat suitable**
- **Not Suitable**

UVA Model: Simulation Engine - PatchSim

Metapopulation model
- Represents each population and its interactions as a single patch
- 133 patches for Virginia counties and independent cities

Extended SEIR disease representation
- Includes asymptomatic infections and treatments

Mitigations affect both disease dynamics and population interactions

Runs fast on high-performance computers
- Ideal for calibration and optimization

Short-term Projections

**Confirmed cases**

Virginia - Daily Confirmed cases - Comparison

**Hospitalizations**

Virginia - Daily Hospitalized cases - Comparison

**Ventilated Cases**

Virginia - Daily Ventilated cases - Comparison
Stay the Course: Future Depends on Policy

Weekly New Confirmed Cases*

<table>
<thead>
<tr>
<th>Week Ending</th>
<th>Unmitigated</th>
<th>Slow-Apr30</th>
<th>Pause-Jun10</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/12/20</td>
<td>25,081</td>
<td>9,341</td>
<td>2,690</td>
</tr>
<tr>
<td>4/19/20</td>
<td>52,280</td>
<td>14,769</td>
<td>2,878</td>
</tr>
<tr>
<td>4/26/20</td>
<td>99,816</td>
<td>23,060</td>
<td>3,076</td>
</tr>
<tr>
<td>5/3/20</td>
<td>161,820</td>
<td>34,911</td>
<td>3,279</td>
</tr>
<tr>
<td>5/10/20</td>
<td>199,424</td>
<td>62,282</td>
<td>3,494</td>
</tr>
<tr>
<td>5/17/20</td>
<td>181,024</td>
<td>96,540</td>
<td>3,714</td>
</tr>
<tr>
<td>5/24/20</td>
<td>134,380</td>
<td>131,506</td>
<td>3,936</td>
</tr>
<tr>
<td>5/31/20</td>
<td>85,116</td>
<td>145,552</td>
<td>4,145</td>
</tr>
<tr>
<td>6/7/20</td>
<td>47,402</td>
<td>133,432</td>
<td>4,362</td>
</tr>
<tr>
<td>6/14/20</td>
<td>24,724</td>
<td>106,902</td>
<td>4,938</td>
</tr>
<tr>
<td>6/21/20</td>
<td>12,258</td>
<td>75,603</td>
<td>8,582</td>
</tr>
<tr>
<td>6/28/20</td>
<td>6,007</td>
<td>49,996</td>
<td>13,118</td>
</tr>
</tbody>
</table>

*Numbers are medians of projections
Hospital Demand and Capacity

Capacities by Region – Pause June 10
COVID-19 capacity ranges from 80% (dots) to 120% (dash) of total beds

* Assumes average length of stay of 10 days
UVA Model: Key Takeaways

• Projecting future cases precisely is impossible and unnecessary. Even without perfect projections, we can confidently draw conclusions:

  • Current social distancing efforts are working.
  • Under current conditions, Virginia as a whole will have sufficient medical resources for at least the next couple months.
  • Lifting social distancing restrictions too soon can lead quickly to a second wave.
  • Further modeling could explore the effectiveness of containment strategies (test-isolate-contact tracing-quarantine).
  • The situation is changing rapidly. Models will be updated regularly.
GUIDANCE FOR OUTPATIENT PROVIDERS
COVID-19 Personal Protective Equipment (PPE) for Healthcare Personnel

Preferred PPE – Use

N95 or Higher Respirator

Face shield or goggles

Isolation gown

One pair of clean, non-sterile gloves

Acceptable Alternative PPE – Use

Facemask

Face shield or goggles

Facemask

N95 or higher respirators are preferred but facemasks are an acceptable alternative.

One pair of clean, non-sterile gloves

Isolation gown

cdc.gov/COVID19
Universal Masking of Healthcare Personnel

To address asymptomatic and pre-symptomatic transmission, implement universal masking for everyone entering a healthcare facility (e.g., healthcare personnel, patients, visitors), regardless of symptoms.

Facemask
- Contain respiratory secretions of individual AND provide protection against respiratory droplets
- Recommended for HCP providing direct patient care
- To avoid risking self-contamination, HCP should consider continuing to wear their respirator or facemask (extended use) instead of intermittently switching back to their cloth face covering

Cloth Face Covering
- Contain respiratory secretions of individual, not considered protective
- Recommended for visitors, patients, and HCP not providing direct patient care (e.g., clerical personnel)
- Should be laundered regularly (e.g., daily and when soiled), and, hand hygiene should be performed immediately before and after any contact with the cloth face covering
PPE Resources

• CDC Resources
  • Using PPE
  • Strategies to Optimize Supplies
  • PPE Burn Rate Calculator
  • Decontamination and Reuse of Filtering Facepiece Respirators

• FDA Resource
  • FDA Emergency Use Authorization of Respiratory Protection Devices
HCP Exposure in Healthcare Facilities

• Forego contact tracing for exposures in a healthcare setting

• Perform universal source control for healthcare personnel
  • Reduce facility risk
  • Isolate symptomatic patients promptly
  • Protect healthcare personnel

• Perform screening for fever and symptoms of COVID-19 before every shift
Return-to-Work Criteria

• Preferred: Exclude until fever resolved AND respiratory symptoms improved AND negative results from two consecutive nasopharyngeal specimens >24 hours apart

• Alternate (if testing not available): Exclude until at least 72 hours after fever resolved and respiratory symptoms improved AND at least 7 days have passed since symptoms first appeared

• Wear facemask when returning to work until all symptoms are resolved, or 14 days after symptom onset, whichever is longer
HCP Exposure Resources

• CDC Resources
  • Return to Work for Healthcare Personnel with Confirmed or Suspected COVID-19
  • Strategies to Mitigate Healthcare Personnel Staffing Shortages
  • Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings
New or Updated VDH Resources

- COVID-19 Activity Report

- Testing
  - List of private or commercial labs


<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/20</td>
<td>New or Updated CDC Guidance</td>
</tr>
<tr>
<td>4/17</td>
<td>Information for Pediatric Healthcare Providers</td>
</tr>
<tr>
<td>4/16</td>
<td>Outpatient Hemodialysis Facility Recommendations</td>
</tr>
<tr>
<td>4/16</td>
<td>Strategies for Optimizing Supply of N95 Respirators</td>
</tr>
<tr>
<td>4/14</td>
<td>Collecting, Handling, and Testing Clinical Specimens from Persons for Coronavirus Disease 2019 (COVID-19) Guidance</td>
</tr>
<tr>
<td>4/13</td>
<td>Strategies to Mitigate Healthcare Personnel Staffing Shortages</td>
</tr>
<tr>
<td>4/13</td>
<td>Return to Work for Healthcare Personnel with Confirmed or Suspected COVID-19</td>
</tr>
<tr>
<td>4/13</td>
<td>Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed COVID-19 in Healthcare Settings</td>
</tr>
<tr>
<td>4/12</td>
<td>Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (COVID-19)</td>
</tr>
<tr>
<td>4/10</td>
<td>Discontinuation of Isolation for Persons with COVID-19 Not in Healthcare Settings</td>
</tr>
<tr>
<td>4/9</td>
<td>Decontamination and Reuse of Filtering Facepiece Respirators</td>
</tr>
</tbody>
</table>

Hands-on Help and Additional Resources

Thank you!

Please send questions to:

respiratory@vdh.virginia.gov