COVID-19: An Update on Testing

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Disclosures

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### Commercially Available SARS-CoV2 Tests

#### Viral Detection
- **Molecular (PCR)**
  - **Examples**
    - Roche, Abbott, Cepheid, Biofire, Becton Dickinson, ThermoFisher
  - **Performance**
    - Sensitivity – Very high**
    - Specificity – Very high***

#### Serology
- **Point of care (finger stick)**
  - **Examples**
  - **Performance**
    - Unproven and highly variable.
  - **High throughput serology**
    - **Examples**
    - Abbott, Diasorin, Roche
    - **Performance**
      - Sensitivity – Very high
      - Specificity – Very high***

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*Systems in yellow currently being used or evaluated at VCUHS.

** Most systems detect very low levels of virus but performance in asymptomatic patients is unknown. Performance likely similar to other PCR-based tests.

*** Tests do NOT cross react with season coronaviruses.

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VCU Medical Center
Value of Diagnosis COVID-19: Symptomatic and Asymptomatic Patients
“Public health is an essential trust, between government and its people, in a pursuit of health for all…”

Includes: “…a healthcare system that follows the primary maxim of medicine- do no harm.”

Goal is to maximize safety by identifying asymptomatic / pre-symptomatic patients upon entry into the healthcare system.
Value of COVID-19 Testing:

- Symptomatic (mild) outpatient:
  - Social isolation
  - Contact Tracing
  - Surveillance data (drive policy)

- Asymptomatic inpatient / outpatient
  - Diagnosis, isolation, contact tracing
  - Guide PPE use (inpatient, ORs, procedures)
  - Delay / postpone non-emergency procedure
  - Provider fear mitigation strategy
What has been the biggest problem with containment?!?

- The delay between exposure and showing symptoms
- Transmission from asymptomatic hosts
Transmission: Respiratory Droplets Among Close Contacts

- Transmission of SARS-CoV-2 person to person is thought to occur mainly through respiratory droplets
  - These are HEAVY, they tend to spread 3-6 feet & fall to the ground
- Droplets do not linger in the air
- Sneezing, coughing, talking
- Concern for aerolization with certain medical procedures
  - I.E. Intubation, bronchoscopy, HFNC, nebulizer
Transmission: Asymptomatic Person

Rothe et al., NEJM 2020
Transmission: Asymptomatic Person

- Diamond Princess cruise ship
  - 3,711 passengers, of whom 634 had confirmed SARS-CoV-2 infection
  - Modeling data estimated asymptomatic proportion: 18-40%
- 565 Japanese nationals evacuated from Wuhan all tested by PCR for SARS-CoV-2 and followed for 14 days
  - Asymptomatic proportion: 20%

Mizumoto et al., Euro Surveill. 2020
COVID-19 Disease Severity: What We Learned from China

- 36,160 cases (81%)
  - reported mild symptoms
- 6,168 cases (13.8%)
  - reported severe symptoms
- 2,087 cases (4.7%) critically ill
- Case fatality higher among those with comorbid conditions (2-12%) compared to those with no comorbid conditions (0.9%)

CDC China Weekly Report February 17, 2020
COVID-19 Disease Course

SARS-CoV-2 Viral Load

<table>
<thead>
<tr>
<th>Incubation Period</th>
<th>Acute Mild Phase *</th>
<th>ARDS/Pro-inflammatory Phase</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 days (median)</td>
<td>5-10 days</td>
<td>Days - weeks</td>
<td></td>
</tr>
</tbody>
</table>

Symptom onset

Hallmarks: dyspnea, tachypnea, hypoxemia

* Acute Mild Phase: nonspecific symptoms. Most commonly fevers, cough, myalgias, fatigue. Nausea, diarrhea reported <50% of the time

Pan Lancet ID 2020 https://doi.org/10.1016/S1473-3099(20)30113-4
Zou NEJM 2020 DOI: 10.1056/NEJMc2001737
Zhou Lancet 2020 https://doi.org/10.1016/S0140-6736(20)30566-3
Li NEJM 2020 DOI: 10.1056/NEJMoa2001316

Siddiqi JHLT 2020 doi:10.1016/j.healun.2020.03.012

VCU Medical Center
VCU Health COVID-19 Testing Experience (To Date)....
COVID 19 Testing: VCU Health

COVID 19 Test Results by week (all tests including re-tests)

<table>
<thead>
<tr>
<th>Date</th>
<th>Total Tests</th>
<th>Positive Tests</th>
<th>% Positive Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 1, 2020</td>
<td>1</td>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>March 8, 2020</td>
<td>24.0</td>
<td></td>
<td>8.3%</td>
</tr>
<tr>
<td>March 15, 2020</td>
<td>265.0</td>
<td>13.0</td>
<td>9.8%</td>
</tr>
<tr>
<td>March 22, 2020</td>
<td>265.0</td>
<td>26.0</td>
<td>18.5%</td>
</tr>
<tr>
<td>March 29, 2020</td>
<td>222.0</td>
<td>130.0</td>
<td>16.4%</td>
</tr>
<tr>
<td>April 5, 2020</td>
<td>259.0</td>
<td>25.0</td>
<td>11.0%</td>
</tr>
<tr>
<td>April 12, 2020</td>
<td>221.0</td>
<td>221.0</td>
<td>11.3%</td>
</tr>
<tr>
<td>April 19, 2020</td>
<td>421.0</td>
<td>35.0</td>
<td>12.7%</td>
</tr>
<tr>
<td>April 26, 2020</td>
<td>421.0</td>
<td></td>
<td>6.8%</td>
</tr>
<tr>
<td>May 3, 2020</td>
<td>203.0</td>
<td></td>
<td>6.3%</td>
</tr>
</tbody>
</table>

Total Tests with Positive: 924.0
% Positive Results: 8.5%
VCU SARS Cov2 Testing: April 30 – May 6

• Hospital Admission
  – Total tests = 1504
  – Positive = 116 (7.7%)
  – Presumptive positive = 5 (0.3%)
  – Inconclusive = 1 (0.06%)

• PACE tests = 182
  – Positive = 0
  – Presumptive positive = 0
  – Inconclusive = 0
Dear Colleagues,

Pre-operative and pre-procedural testing continues at the PACE clinic downtown, the PACE clinic in the NOW Center, and a drive-through location on the Patient and Visitor Parking Deck, 529 N. 12th Street. Starting today, Thursday, May 7, drive-through testing is available at Stony Point 9105.

We have successfully tested 297 pre-op and pre-procedural patients, all with negative results so far.

Rapid testing is available with approval from epidemiology. Rapid testing takes three to four hours to get results from the time the sample is obtained and is the fastest test offered by lab at this time.
The Satisfice Approach: Nobel Laureate- Herbert Simon

Satisfice: combination of satisfy and suffice

Nobel Prize speech: “...decision makers can satisfice either by finding optimum solutions for a simplified world, or by finding satisfactory solutions for a more realistic world.”
No Perfect Real World COVID-19 Testing Strategy...
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