COVID-19 for Pediatric Populations

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Disclosures

• No financial disclosures

• The world has changed and is changing
  – What gets said here today may change based on new data and recommendations
  – Knowledge is moving rapidly, the fastest it has for any pandemic
Agenda

• Epidemiology
• Schools and COVID
  – Who needs to be tested
  – What to do with those exposed
• Convalescent sera in adults
• Discussion
Epidemiology
Limited Secondary Transmission of SARS-CoV-2 in Child Care Programs — Rhode Island, June 1–July 31, 2020

• Licensed center- and home-based child care programs
• To open had to agree to
  – a maximum of 12 persons, including staff members, in stable groups (i.e., staff members and students not switching between groups), increasing to a maximum of 20 persons on June 29
  – Universal use of masks for adults
  – Daily symptom screening of adults and children
  – Enhanced cleaning and disinfection
  – No masking required of children
• As of July 31, 666 of 891 (75%) programs were approved to reopen, with capacity for 18,945 children, representing 74% of the state’s January 2020 child care program population (25,749 children)
Rhode Island Child Care Associated Cases

• Cases occurred in 29 programs, 20 (69%) had 1 case with no apparent secondary transmission, five (15%) programs had 2-5 cases
  – Possible secondary transmission was identified in 4 of the 666 programs that had been allowed to reopen
• The identification of 101 possible child care–associated COVID-19 cases resulted in the quarantine of 687 children and 166 staff members, including contacts
Schools and Symptomatic Children
IDPH/ISBE COVID-19 Exclusion Guidance

• Decision Tree for Symptomatic Individuals in Pre-K, K-12 Schools and Day Care Programs
  – Send home or deny entry (and provide remote instruction) if ANY of the following symptoms are present:
    • Fever (100.4°F or higher), headache, shortness of breath, cough, sore throat, vomiting, diarrhea, abdominal pain
    • In addition, some individuals (especially adults) may present with the following symptoms: congestion or runny nose, new loss of sense of taste or smell, nausea, fatigue, muscle or body aches
  – Medical Evaluation and Testing are Strongly Recommended for ALL Persons with COVID-Like Symptoms
<table>
<thead>
<tr>
<th>Status</th>
<th>COVID diagnostic test positive (confirmed) OR diagnosis w/o testing (probable)</th>
<th>Symptomatic with neg COVID test (collected 48 hrs prior to or after sx onset)</th>
<th>Symptomatic with alternate diagnosis w/o negative COVID test</th>
<th>Symptomatic without testing or clinical evaluation</th>
<th>Asymptomatic and close contact to confirmed OR probable case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluated by Healthcare Provider?</td>
<td>Yes</td>
<td>Yes/No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Return to School Guidance</td>
<td>Stay home ≥10d from onset of symptoms AND for 24h with no fever off fever-reducing med) AND improved sx</td>
<td>Stay home until symptoms have improved/resolved per return-to-school criteria for dx condition</td>
<td>Stay home until sx have improved/resolved per return-to-school criteria for dx condition</td>
<td>Stay home at least 10d from onset of sx AND for 24h with no fever off fever-reducing med) AND improved sx</td>
<td>Stay home for 14d after last exposure to COVID and if illness develops, follow 10d isolation rule</td>
</tr>
<tr>
<td>Quarantine for Close Contacts?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Household Member</td>
<td>NA</td>
</tr>
<tr>
<td>Document Required to Return to School</td>
<td>‘Release from Isolation’ letter issued by LHD and given to parent/guardian or individual</td>
<td>Negative COVID-19 test result OR healthcare provider note indicating negative test result</td>
<td>Healthcare Provider note with alternate dx</td>
<td>Note from parent/guardian documenting that the ill student and/or household contacts meets 10 day rule</td>
<td>‘Release from Quarantine’ letter issued by LHD and given to parent/guardian or individual</td>
</tr>
</tbody>
</table>
Themes

• One symptom is enough to send the child home

• If symptomatic, then to get back into school, must be seen by a provider or get a COVID test, otherwise must wait at least 10 days
  – Back earlier if alternate diagnosis or negative test and low suspicion
If a student is sent home sick with suspected COVID-19 symptoms, must all their siblings/household members be sent home as well and quarantined for 14 calendar days?

- Yes, if one of the household members is being evaluated for COVID-19, the rest of the household must be quarantined until an alternative diagnosis is made or negative result received.

- If the sick student becomes a confirmed case (i.e., tests positive for COVID-19) or a probable case (i.e., has COVID-like symptoms and is epidemiologically linked to known case), the local health department (LHD) conducting contact tracing will place household contacts, including siblings, in quarantine for 14 calendar days.
If someone has previously tested COVID-19 positive, do they need to be sent home if ill or do they need to be quarantined if named as a close contact?

- Individuals who tested COVID-19 positive within the past 3 months by PCR or antigen test should not have a suspicion of COVID-19 reinfection, and therefore, do not need to be excluded, isolated or quarantined for a period of 3 months prior to onset date or specimen collection date if asymptomatic.
Washington University Algorithm
School Nurse Algorithm: Screen all students for potential COVID-19 symptoms or exposure:

Any new **cough, difficulty breathing, loss of taste/smell**, fever (≥100.4°F), congestion/runny nose, nausea/vomiting/diarrhea, sore throat, headache, myalgia, or exposure* to COVID-19 positive person?

- 1 low-risk symptom
  - No exposure
  - Return to school 24 hr after symptom resolution

- ≥2 low-risk symptoms OR
  - 1 high risk symptom***
    - No exposure
    - Evaluation by Healthcare Provider
    - Negative swab**
    - Return to school 24 hr after symptom resolution

- ± symptoms
  - Positive exposure*
  - Lab testing and evaluation; alternative diagnosis likely
  - Positive swab**
  - Return to school after 24 hrs afebrile and symptoms improving
    - and approval of local health department (typically 10-14 days); for St. Louis City, also release by primary care provider required; quarantine contacts
  - Return to school after 14 days from last contact unless symptoms develop. If symptoms develop, obtain swab**.

*Exposure defined as close contact >15 minutes with no mask.
**Swab refers to SARS-CoV-2 PCR test
***High risk symptoms (bolded) include cough, difficulty breathing and loss of taste or smell

Prepared by David Rosen et al. revised 7/20/2020

Antibody Testing
Recommendations
IDSA Panel
Recommendations Re: SARS-CoV-2 Ab Testing

• Do not use serologic testing to diagnose SARS-CoV-2 infection during the first 2 weeks following symptom onset

• When SARS-CoV-2 infection requires laboratory confirmation for clinical or epidemiological purposes, use SARS-CoV-2 IgG or total antibody 3-4 weeks after symptom onset

• No recommendation either for or against using SARS-CoV-2 IgM

• Do not use SARS-CoV-2 IgA

• Do not use IgM or IgG combination tests where detecting either antibody class is used to define a positive result

• Can use SARS-CoV-2 IgG to provide evidence of COVID-19 infection in symptomatic patients with a high clinical suspicion and repeatedly negative NAAT testing 3-4 weeks post-symptom onset

• In pediatric patients with possible MIS-C, use both IgG and NAAT to provide evidence of current or past COVID-19 infection

https://www.idsociety.org/practice-guideline/covid-19-guideline-serology/?referringSource=articleShare#Figure3
Predictive Model for Theoretical Test with 96% Sensitivity and 99% Specificity Vs Prevalence

https://www.idsociety.org/practice-guideline/covid-19-guideline-serology/?referringSource=articleShare#Figure3
Convalescent Sera
Effect of Convalescent Plasma on Mortality among Hospitalized Patients with COVID-19: Initial Three-Month Experience

- Open-label, treatment of COVID-19 patients with convalescent plasma (no control, no randomization)
- 2,807 acute care facilities in the US and territories
- Adult between April 4 - July 4 hospitalized with (or at risk of) severe or life threatening acute COVID resp. syndrome
- Transfusion of at least one unit of convalescent plasma
- Antibody levels in the units were unknown at time of transfusion
- 7d and 30d mortality calculated
- 35,322 transfused patients
  - A high proportion of critically-ill patients, 52.3% in ICU and 27.5% on mechanical ventilation at the time of transfusion

medRxiv preprint: https://doi.org/10.1101/2020.08.12.20169359
Variability in Treatment

<table>
<thead>
<tr>
<th>Medications during hospital stay</th>
<th>Apr 04 - May 01 (N=6,990)</th>
<th>May 01 - Jun 04 (N=14,846)</th>
<th>Jun 04 - Jul 04 (N=13,486)</th>
<th>Total Patients (N=35,322)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiotensin Receptor Blocker</td>
<td>397 (5.7%)</td>
<td>839 (5.7%)</td>
<td>779 (5.8%)</td>
<td>2,015 (5.7%)</td>
</tr>
<tr>
<td>Ace Inhibitor</td>
<td>467 (6.7%)</td>
<td>1,130 (7.6%)</td>
<td>1,023 (7.6%)</td>
<td>2,620 (7.4%)</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>3,811 (54.5%)</td>
<td>5,717 (38.5%)</td>
<td>5,456 (40.5%)</td>
<td>14,984 (42.4%)</td>
</tr>
<tr>
<td>Remdesivir</td>
<td>329 (4.7%)</td>
<td>4,066 (27.4%)</td>
<td>6,240 (46.3%)</td>
<td>10,635 (30.1%)</td>
</tr>
<tr>
<td>Steroids</td>
<td>3,736 (53.4%)</td>
<td>6,137 (41.3%)</td>
<td>7,735 (57.4%)</td>
<td>17,608 (49.8%)</td>
</tr>
<tr>
<td>Chloroquine</td>
<td>33 (0.5%)</td>
<td>22 (0.1%)</td>
<td>6 (0.0%)</td>
<td>61 (0.2%)</td>
</tr>
<tr>
<td>Hydroxychloroquine</td>
<td>4,356 (62.3%)</td>
<td>2,437 (16.4%)</td>
<td>245 (1.8%)</td>
<td>7,038 (19.9%)</td>
</tr>
</tbody>
</table>

medRxiv preprint: [https://doi.org/10.1101/2020.08.12.20169359](https://doi.org/10.1101/2020.08.12.20169359)
Outcomes

• 7d mortality rate was 8.7% in patients transfused within 3 days of COVID-19 diagnosis but 11.9% in patients transfused 4 or more days after diagnosis (p<0.001). Similar findings were observed in 30-day mortality (21.6% vs. 26.7%, p<0.0001)

• A gradient of mortality was seen in relation to IgG antibody levels in the transfused plasma (p=0.048)
  – High IgG plasma (>18.45 S/Co), 7d mortality was 8.9%
  – Medium IgG plasma (4.62 to 18.45 S/Co) 7d mortality was 11.6%
  – Low IgG plasma (<4.62 S/Co) 7d mortality was 13.7%

medRxiv preprint: https://doi.org/10.1101/2020.08.12.20169359
## Outcomes

<table>
<thead>
<tr>
<th>Study Period and Days to Transfusion</th>
<th>Seven-day Mortality</th>
<th>Thirty-day Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample, No</td>
<td>Events, No</td>
</tr>
<tr>
<td>Apr 04 - May 01 (&lt;= 3 days)</td>
<td>1,731</td>
<td>232</td>
</tr>
<tr>
<td>Apr 04 - May 01 (4+ days)</td>
<td>5,259</td>
<td>853</td>
</tr>
<tr>
<td>May 01 - Jun 04 (&lt;= 3 days)</td>
<td>6,346</td>
<td>659</td>
</tr>
<tr>
<td>May 01 - Jun 04 (4+ days)</td>
<td>8,500</td>
<td>1,060</td>
</tr>
<tr>
<td>Jun 04 - Jul 04 (&lt;= 3 days)</td>
<td>7,330</td>
<td>449</td>
</tr>
<tr>
<td>Jun 04 - Jul 04 (4+ days)</td>
<td>6,156</td>
<td>453</td>
</tr>
<tr>
<td>Overall Mortality</td>
<td>35,322</td>
<td>3,706</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt;0.0001</th>
<th>&lt;0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - 39 y</td>
<td>3,472</td>
<td>3,472</td>
</tr>
<tr>
<td>40 - 59 y</td>
<td>12,168</td>
<td>12,168</td>
</tr>
<tr>
<td>60 - 69 y</td>
<td>8,968</td>
<td>8,968</td>
</tr>
<tr>
<td>70 - 79 y</td>
<td>6,704</td>
<td>6,704</td>
</tr>
<tr>
<td>80 y or older</td>
<td>4,010</td>
<td>4,010</td>
</tr>
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</table>