Mitigation strategies for preventing SARS-CoV-2 spread in K-12 schools

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A number of mitigation strategies
What are we mitigating against?

• **March 2020 – school closures because of concern that schools would fuel the COVID-19 pandemic (influenza)**
  - of particular concern because of COVID-19 morbidity and mortality in adults

• **Within school transmission of SARS-CoV-2 is the single most important metric for determining the safety of in-person school**
  - When there are cases in the community, there will be cases in schools; this is fundamentally a question of controlling transmission
ABC Science Collaborative: A data-driven approach to support decision making

Informing Evidence-Based Decision Making

• Superintendent lifeline
• Coordination with state and local health departments
• Stakeholder groups

Delivering Educational Resources for All

Advancing Public Health

COVID-19 & The Classroom

Why Do We Need Masks or Face Coverings to Prevent Transmission of COVID-19?

La COVID-19 y la serie de seminarios web en el aula
ABC Science Collaborative studies NC schools

<table>
<thead>
<tr>
<th>Period</th>
<th>Grades</th>
<th>Number of School Districts</th>
<th>Number of Staff</th>
<th>Number of Students</th>
<th>Total (Students and Staff)</th>
<th>Community-acquired infections</th>
<th>Within-school transmission Students and Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2020</td>
<td>K-12</td>
<td>11</td>
<td>18,184</td>
<td>117,417</td>
<td>135,601</td>
<td>773</td>
<td>32</td>
</tr>
<tr>
<td>Winter 2020-21</td>
<td>K-12</td>
<td>13</td>
<td>23,134</td>
<td>138,071</td>
<td>161,205</td>
<td>4,969</td>
<td>209</td>
</tr>
</tbody>
</table>

In masked environments, data from North Carolina tell us the secondary attack rate was
- 1% in the fall, 32 cases from >3,000 quarantined
- <1% in the winter, 209 cases with 26,619 quarantined

**Without changes in ventilation practices and screening testing; masking adherence HIGH

Success in preventing COVID-19 transmission in classrooms is defined by strength of leadership in enforcing mitigation strategies➔ not by community transmission.
## Impact of distancing: NC and Wisconsin schools with universal masking*

<table>
<thead>
<tr>
<th>Bus practice (children per seat)</th>
<th>Districts, n (%)</th>
<th>Students, n (%)</th>
<th>Student Primary Infections, n</th>
<th>Student Secondary Infections, n</th>
<th>Secondary-to-primary Infection Ratio&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Relative Rate of Secondary Transmission&lt;sup&gt;c&lt;/sup&gt;</th>
<th>95% CIs&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>36,975</td>
<td>190</td>
<td>12</td>
<td>0.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>656,444</td>
<td>4388</td>
<td>210</td>
<td>0.05</td>
<td>0.76</td>
<td>0.19 - 2.96</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>205,996</td>
<td>1758</td>
<td>83</td>
<td>0.04</td>
<td>0.75</td>
<td>0.18 – 3.19</td>
</tr>
<tr>
<td>Other&lt;sup&gt;e&lt;/sup&gt;</td>
<td>6</td>
<td>43,519</td>
<td>353</td>
<td>25</td>
<td>0.07</td>
<td>1.12</td>
<td>0.27 – 4.71</td>
</tr>
<tr>
<td>Distancing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 feet</td>
<td>10 (9%)</td>
<td>54,557</td>
<td>276</td>
<td>12</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 feet</td>
<td>76 (67%)</td>
<td>610,236</td>
<td>4140</td>
<td>207</td>
<td>0.05</td>
<td>1.15</td>
<td>0.31 – 4.24</td>
</tr>
<tr>
<td>&lt;3 feet</td>
<td>27 (24%)</td>
<td>278,141</td>
<td>2273</td>
<td>111</td>
<td>0.05</td>
<td>1.12</td>
<td>0.28 – 4.45</td>
</tr>
</tbody>
</table>

<sup>a</sup>Analysis excludes the composite NC charter schools district because of varying practices among schools.

<sup>b</sup>Calculated by the composite number of student within-school–acquired infections (secondary infections) divided by the student community-acquired infection (secondary infections) for districts in each category of bus practices or distancing.

<sup>c</sup>Relative rate of secondary transmission for each primary infection, compared to the reference range (for bus analysis: 1 child per seat; for distancing analysis: 6 feet of distancing). Relative rates were calculated by quasi-Poisson regression with the number of primary student cases as the denominator.

<sup>d</sup>Robust CIs calculated to account for overdispersion.

<sup>e</sup>Other category was assigned when districts could not give a policy practice for children per bus seat because of widely varying practices.

CI, confidence interval; NC, North Carolina; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2

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*Schools did not make substantial investment in ventilation or screening testing.
Research from N.C. is consistent with other studies with universal masking

<table>
<thead>
<tr>
<th>State</th>
<th>Period</th>
<th>Grades</th>
<th>School Districts</th>
<th>Staff</th>
<th>Students</th>
<th>Students and Staff</th>
<th>Community-acquired infections</th>
<th>Within-school transmission students and staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia</td>
<td>12/2020-01/2021</td>
<td>Elem.</td>
<td>1</td>
<td>700</td>
<td>2,600</td>
<td>--</td>
<td>--</td>
<td>45</td>
</tr>
<tr>
<td>Missouri</td>
<td>12/7/2020-12/18/2020</td>
<td>K-12</td>
<td>2</td>
<td>--</td>
<td>21,342</td>
<td>--</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>Utah</td>
<td>12/3/2020-1/31/2021</td>
<td>K-6</td>
<td>20*</td>
<td>1,214</td>
<td>10,171</td>
<td>11,385</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Virginia</td>
<td>9/14/2020-1/29/2021</td>
<td>K-12</td>
<td>1</td>
<td>20,681</td>
<td>4,282</td>
<td>24,963</td>
<td>787</td>
<td>33</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>8/31/2020-11/29/2020</td>
<td>K-12</td>
<td>1</td>
<td>654</td>
<td>4,876</td>
<td>5,530</td>
<td>184</td>
<td>7</td>
</tr>
</tbody>
</table>

*In Utah study, data are from 20 schools.

SCHOOL SAFETY, MASKING AND THE DELTA VARIANT

• Goal: Assess K-12 school safety in the Delta era
• Methods: Study time, 14 June-13 August 2021, NC; mitigation (<3ft recommended, mask mandate, quarantine for contacts)
• Results: Participants = 20 school districts, 783 schools, 59,561 students, 11,854 staff.
  - No schools closed as result of COVID-19
  - Community-acquired to school acquired infection ratio was ~12.4 (808/64).
  - Secondary attack rate of 2.6% (64 secondary infections/2,431 quarantined close contacts).

Table 1. Primary Infections, Secondary Infections, and Quarantine Occurrences in Students and Staff

<table>
<thead>
<tr>
<th>Total Districts, n</th>
<th>Total Children, n</th>
<th>Total Staff, n</th>
<th>COVID-19 Transmission</th>
<th>Quarantine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Student Primary, n</td>
<td>Student Secondary, n</td>
</tr>
<tr>
<td>Total districts</td>
<td>20</td>
<td>59,561</td>
<td>11,854</td>
<td>619</td>
</tr>
<tr>
<td>District size</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>6</td>
<td>4,071</td>
<td>484</td>
<td>26</td>
</tr>
<tr>
<td>Medium</td>
<td>7</td>
<td>9,915</td>
<td>1,599</td>
<td>47</td>
</tr>
<tr>
<td>Large</td>
<td>7</td>
<td>45,575</td>
<td>9,771</td>
<td>546</td>
</tr>
</tbody>
</table>

COVID-19, coronavirus 2019

Outbreak Associated with SARS-CoV-2 B.1.617.2 (Delta) Variant in an Elementary School

- **Symptomatic, unvaccinated teacher unmasks** to read aloud to class despite school requirements to mask while indoors.

- Class with open windows and doors and portable HEPA filter

- 6ft Distancing between students

- 26 cases were identified
  - 12/22 students test positive test results.
  - 6/18 students in a separate grade are positive and with same genome sequencing
  - 8 additional cases in parents and siblings of students in these two grades

We now have THE key to avoid the morbidity and mortality for which schools closed: VACCINATIONS

• Now approved ≥5 years of age
• Single most important opportunity to protect yourself...all other strategies rely on others and come with uncertainty
• Vaccines REMAIN HIGHLY EFFECTIVE AGAINST COVID-19

• During May 1–July 25, 2021, among 43,127 SARS-CoV-2 infections
  – 10,895 (25.3%) were in fully vaccinated persons
  – 1,431 (3.3%) were in partially vaccinated persons
  – 30,801 (71.4%) were in unvaccinated persons.

• On July 25, infection and hospitalization rates among unvaccinated persons were 4.9 and 29.2 times, respectively, those in fully vaccinated persons.

Next Steps for COVID and schools

• What we know:
  – In 2020-2021: foundational understanding that consistent universal masking allows for safe in-person instruction (independent of community transmission)
  – Vaccination substantially reduces spread of infection, acquisition of infection, and severity of infection
  – Prior infection provides some protection for at least several months
  – At some point, mitigation strategies will unwind…foundational understanding will relate to vaccination and community transmission
  – Lot’s of work to do to recover from the last year+ (learning loss, obesity, mental health, etc)

• What we don’t know:
  – How much vaccination and recent infection provides protection to a community

• What we can do: develop plans to start to unwind mitigation strategies → data monitoring is key
Key Takeaways

- Within-school transmission is the key measure by which to measure school success
- Within-school transmission does not depend on community transmission when mitigation strategies (universal masking) are in place
- We can have success in limiting within-school transmission— even with Delta
- Vaccinations are the single most effective strategy to protect the K-12 school worker (and students) from SARS-CoV-2
- As mitigation strategies unwind, data monitoring is key