December 29, 2021

To: N.C. Department of Health and Human Services

Re: “Test-to-Stay in School: COVID-19 Testing Following Exposure in K-12 School Communities”

Enclosed, please find the report and initial analysis of data from participants from North Carolina school districts who enrolled in the “Test-to-Stay in School: COVID-19 Testing Following Exposure in K-12 School Communities” program, initiated on October 18, 2021. Data from participants who completed 14 days of follow-up by the data cut-off date of December 13, 2021 are included in this report. The data analysis presented in this report is consistent with ongoing data analysis from later data cut-off dates.

Our team initiated this study to address the COVID-19 pandemic’s negative impact on in-person learning in K-12 schools. Although many school districts have returned to in-person learning in the 2021-2022 school year, quarantine of close contacts of individuals with SARS-CoV-2 infection represents an ongoing challenge to in-person learning and to school staffing and operations.

The ABC Science Collaborative (through the Duke Clinical Research Institute) partnered with the N.C. Department of Health and Human Services to evaluate the safety and efficacy of a “test-to-stay” in school strategy as an alternative to quarantine after brief, unmasked close contact with a student or staff member who had tested positive for SARS-CoV-2. The study collected data from five universally masked school districts and one charter school in North Carolina. The following report includes details on data collection, analysis, and interpretation.


The ABC Science Collaborative and N.C. Department of Health and Human Services designed this study to evaluate if “test-to-stay” is an effective, viable, and safe approach to reduce quarantine while minimizing spread of SARS-CoV-2 in the universally masked K-12 school environment. Schools and school districts were eligible for participation if they had a universal masking policy in place during the study and received board of education and local health department approval.

Individuals from participating districts and schools were eligible for inclusion if they were identified as a close contact by the local health department and required to quarantine following an in-school SARS-CoV-2 exposure based on guidance in the NC StrongSchools Toolkit. Prior to participation, individuals had to consent to participate in the “test-to-stay” research study and be asymptomatic. Close contacts were given the option to quarantine according to local policies.

Participants in the study were administered a SARS-CoV-2 rapid antigen test at school when they were identified as a close contact and every other day for up to four times during the first
seven days after the known exposure. Participants remained in school if they tested negative. A positive COVID-19 test or the development of symptoms on any day after exposure required isolation according to state public health guidelines.

**Interpretation**

Our analysis of the data shows:

- In the universally masked environment, use of the “test-to-stay” protocol did not result in increased transmission of SARS-CoV-2 following unmasked encounters within schools.
  - Over six weeks, the study enrolled 367 participants from five North Carolina school districts and one charter school.
  - 883 tests were performed.
  - Six (6) participants became positive after day 1, leading to a within-school transmission rate of 1.7%.
  - No cases of tertiary transmission, defined as transmission from a study participant to another student or staff member, were identified.
  - Nearly all exposure encounters involved an unmasked index case (92%) and an unmasked close contact (92%), with most (96%) occurring indoors.
  - Most exposures occurred in the context of lunch (39%), while only 13% of exposures occurred during athletics; however, athletic exposures accounted for 50% of individuals with positive tests (see Figure 1).
  - Implementation of the “test-to-stay” protocol successfully and substantially reduced student absences from school after in-school exposure to COVID-19.
  - 1,628 in-person school days were saved, with only 136 days of quarantine required compared to the expected number of 1,764 days.

**What This Means for NC Schools**

In K-12 schools with universal masking, “test-to-stay” is an effective strategy for reducing absences from school after brief, unmasked, in-school exposures to COVID-19. “Test-to-stay” in the universal masking setting does not result in increased within-school transmission of SARS-CoV-2, even when the number of tests performed on close contacts is limited.

Given that the within-school transmission rate was so low and tests are anticipated to be in very limited supply (e.g., during the anticipated Omicron-induced surge), these data support an approach of two tests: 1) on the day of notification of exposure; and 2) as close to days 5 to 7 post-exposure as possible. Given the very low secondary attack rate, if tests are not available, it may be possible to occasionally defer testing. This limited or no-testing approach should generally be limited to low-risk exposure locations such as the classroom, outdoors, or lunch (see Figure 1 below). Given the high percentage of positive tests that occurred in the context of
athletics and data from the ABC national study in which athletics remain an area of higher transmission risk, these exposures seem to warrant dedicated testing efforts.

Along with other proven safety measures such as vaccination and rapid identification and contact tracing of SARS-CoV-2 cases, “test-to-stay” can be part of a comprehensive plan to increase in-person learning and return to a resemblance of pre-pandemic life in schools.

Of note, one of the districts offered centralized testing. Consent and participation were considerably lower in this setting, suggesting low compliance with centralized testing. As such, testing should be offered at the school that the child attends, if at all possible, to increase testing compliance.

What's Next
The ABC Science Collaborative will continue to analyze data from ongoing enrollment in the Test-to-Stay protocol in districts with universal masking. We have also initiated evaluation of Test-to-Stay as a strategy to understand and control transmission in districts with optional masking.

Thank you for the opportunity to serve and assist the State of North Carolina with this study. We look forward to discussing this with you in the coming weeks.

Regards,

The co-chairs of the ABC Science Collaborative:

Danny Benjamin, MD PhD

Kanecia Zimmerman MD MPH

Danny Benjamin, MD, MPH, PhD

Kanecia Zimmerman, MD, MPH
Table 1. Baseline Exposure Characteristics of Students and Staff Exposed to Index Cases

<table>
<thead>
<tr>
<th></th>
<th>Total students and staff enrolled</th>
<th>Days to notification of exposure; Median (Q1, Q3)</th>
<th>% Unmasked Index case</th>
<th>% Unmasked Close Contacts</th>
<th>% Exposed Indoor</th>
<th>% Positive following known within-school exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>All districts</td>
<td>367</td>
<td>3.0 (2.0, 4.0)</td>
<td>221/241 (91.7%)</td>
<td>218/238 (91.6%)</td>
<td>353/366 (96.4%)</td>
<td>6/357 (1.7%) (0.6%- 4.7%)</td>
</tr>
<tr>
<td>District 1</td>
<td>31</td>
<td>3.0 (1.0, 4.0)</td>
<td>31/31 (100.0%)</td>
<td>30/31 (96.8%)</td>
<td>28/31 (90.3%)</td>
<td>0/31 (0%)</td>
</tr>
<tr>
<td>District 2</td>
<td>60</td>
<td>3.0 (2.0, 4.0)</td>
<td>59/60 (98.3%)</td>
<td>60/60 (100.0%)</td>
<td>60/60 (100.0%)</td>
<td>0/60 (0%)</td>
</tr>
<tr>
<td>District 3</td>
<td>1</td>
<td>3.0 (3.0, 3.0)</td>
<td>1/1 (100.0%)</td>
<td>1/1 (100.0%)</td>
<td>0/1 (0%)</td>
<td>0/1 (0%)</td>
</tr>
<tr>
<td>District 4</td>
<td>135</td>
<td>3.0 (2.0, 4.0)</td>
<td>130/135 (96.3%)</td>
<td>127/135 (94.1%)</td>
<td>126/135 (93.3%)</td>
<td>3/125 (2.4%)</td>
</tr>
<tr>
<td>District 5</td>
<td>11</td>
<td>0.0 (0.0, 0.0)</td>
<td>0/11 (0%)</td>
<td>0/11 (0%)</td>
<td>11/11 (100.0%)</td>
<td>0/11 (0%)</td>
</tr>
<tr>
<td>District 6</td>
<td>129</td>
<td>3.0 (2.0, 5.0)</td>
<td>0/3 (0%)</td>
<td>Not Reported</td>
<td>128/128 (100.0%)</td>
<td>3/129 (2.3%)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>176</td>
<td>3.0 (1.0, 4.0)</td>
<td>121/135 (89.6%)</td>
<td>121/135 (89.6%)</td>
<td>174/176 (98.9%)</td>
<td>2/170 (1.2%)</td>
</tr>
<tr>
<td>Middle School</td>
<td>90</td>
<td>3.0 (2.0, 4.0)</td>
<td>38/40 (95.0%)</td>
<td>35/38 (92.1%)</td>
<td>88/90 (97.8%)</td>
<td>2/90 (2.2%)</td>
</tr>
<tr>
<td>High School</td>
<td>101</td>
<td>4.0 (3.0, 4.0)</td>
<td>62/66 (93.9%)</td>
<td>62/65 (95.4%)</td>
<td>91/100 (91.0%)</td>
<td>2/97 (2.1%)</td>
</tr>
</tbody>
</table>

Figure 1. Exposure locations among students and staff

- **Exposure locations among students and staff enrolled, N = 355**
- **Exposure locations among students and staff with positive COVID-19 test results, N = 6**