

EVIDENCE BRIEF

(ARCHIVED) “Test-to-Stay” SARS-CoV-2 Rapid Antigen Testing Strategies in K-12 Schools

Published: October 2021

Archived: February 2022

ARCHIVED DOCUMENT

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Key Messages

- School-based testing strategies like “Test to Stay” (TTS) provide options for the initiation of daily (or frequent) severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antigen testing to decrease loss of in-person learning without increasing in-school transmission risks. Asymptomatic testing in this context should be considered as an additional prevention measure to existing layers of prevention in schools.
- There are two TTS strategies described in the literature for use in different groups, with different aims and triggers. The most commonly referenced TTS strategy is for exposed cohorts with daily rapid antigen testing (+/- PCR testing) as an alternative to quarantine, triggered by a case identified in a cohort. Another use of TTS has been described in one study for those who are not part of a cohort with a known exposure, to prevent whole school dismissal provided an adequate proportion of students participate, and based on a school trigger (e.g. increased cases or case distribution across cohorts in the school).
- TTS strategies are distinct from ongoing asymptomatic screen testing (discussed in this Evidence Brief posted to Public Health Ontario’s website¹) which could be based on a community- or school-based trigger, where testing is voluntary, without consequences at the individual or school level for not participating or for low uptake, respectively.
- Evidence suggests that TTS for exposed cohorts allows students to use rapid daily SARS-CoV-2 antigen testing (+/- PCR testing) as an alternative to quarantine, leading to a reduction in school days missed. However, there is mixed evidence about their effectiveness in mitigating SARS-CoV-2 transmission in schools when compared to other test and isolate/quarantine policies. Limited evaluations have been performed in the context of the SARS-CoV-2 Delta (B.1.617.2, first identified in India) variant of concern (VOC).

- Several states in the United States (US) and European countries have used TTS for exposed cohorts, requiring antigen testing to continue attending school in-person or in some cases to shorten their quarantine time after exposure in school. There are limited outcome data on these school-based TTS strategies.
- There are several logistical and operational considerations for TTS for exposed cohorts, including resource requirements to verify testing completion. There are also important considerations around equity in access to learning when students who do not participate in TTS are assigned to remote learning.
- There is one study evaluating a TTS strategy based on a school trigger to prevent whole school dismissal. This involved a one-time screen testing program used in Utah, when increased cases were identified in schools (> 2% test positivity or more than 30 cases over a 2-week period, depending on school size) to preserve in person learning, with a requirement that >60% of the school complete testing to allow in-person learning to continue. The impact of repeat screen testing among unexposed cohorts in a school was not evaluated in the literature.
- Key implementation considerations for the TTS to prevent whole school dismissal are similar to TTS for exposed cohorts in terms of communication, logistical and verification issues. In addition, TTS at the school level would require public health input regarding when to initiate testing and decisions on the frequency and duration of testing.

Issue and Research Question

The objective of this evidence brief is to summarize evidence on the effectiveness of and jurisdictional experiences with “Test-To-Stay” (TTS) COVID-19 testing strategies in K-12 schools. TTS strategies involve the administration of daily (or frequent) rapid antigen tests among unvaccinated students and staff to support ongoing school attendance in scenarios where students may otherwise be excluded (i.e., an exposed cohort, cases in a school leading to whole school dismissal), with consequences at the individual or school level for not participating or for low uptake, respectively.^{2,3} This approach is more specific than asymptomatic screen testing, which involves broader testing without an uptake requirement, that is initiated without exposure and seeks to identify and isolate infected individuals who are asymptomatic or pre-symptomatic to reduce in-school exposures.¹ While PCR testing may be used in addition to rapid antigen testing as part of TTS strategies, when repeat testing is discussed throughout this document it is primarily referring to rapid antigen testing (rather than PCR testing or other modalities).

Public Health Ontario (PHO) recently summarized evidence on the role of these asymptomatic screen testing strategies as a risk mitigation measure to prevent school transmission, outbreaks and closures.¹ The evidence indicated that an absolute threshold to initiate asymptomatic screen testing is variably defined by local factors, including school prevalence, community prevalence, local vaccination patterns, contact tracing and testing capacity and community supports for testing and isolation. It was suggested that the initiation of a rapid antigen screen testing program may be most effective in situations where students and families are motivated to complete the testing, for example, in situations of high community transmission or when multiple cases are detected in the school to support ongoing school attendance. However, the use of asymptomatic screen testing as a TTS strategy for exposed cohorts or whole school testing to prevent loss of in-person learning was previously out of scope.

Ontario’s current guidance for school case, contact and outbreak management describes high-risk exposures as students in the COVID-19 case’s classroom or before/after school cohort(s) regardless of

where they were positioned in relation to the case. Exposures in other school-related situations may also be deemed high-risk, for example sitting within 2 metres of a case on a bus. Guidance indicates asymptomatic fully vaccinated and previously positive persons are generally not required to isolate following a high-risk exposure to a case therefore do not need to be dismissed. The isolation period for high-risk contacts who are not fully immunized or previously positive is 10 days.

Ontario's Ministry of Health School Outbreak Guidance defines an outbreak in a school as two or more lab-confirmed COVID-19 cases in students or staff (or other visitors) in a school with an epidemiological link, within a 14-day period, where at least one case could have reasonably acquired their infection in the school (including transportation and before or after school care).⁴ In response to multiple cases in a school and other criteria, the local public health unit (PHU) then works with the school to determine the presence of an epidemiological link and which cohort(s) may be sent home (for self-isolation), if whole school testing (i.e., one-time voluntary PCR testing) is necessary, and/or if whole school dismissal is warranted.⁵ In a cohort with known high levels of vaccination, immediate dismissal of the cohort due to high-risk contacts may not be needed, however in cohorts with unknown or low levels of vaccination PHUs may consider cohort dismissal. Key criteria to consider whole-school testing to inform whether additional cohort dismissals or whole school dismissal are needed include: multiple cohorts have been dismissed within a 14-day period; a high percentage (e.g., 5-10%) of staff and students are identified as probable or confirmed COVID-19 cases within a 14-day period; a high attack rate in a single cohort; there are multiple cases with unknown acquisition; or there are concerns about immune escape.

Methods

Public Health Ontario (PHO) Library Services conducted searches for peer-reviewed and pre-print literature on TTS strategies in schools published January 2020 onward in MEDLINE and the National Institutes of Health (NIH) COVID-19 Portfolio (preprints) on October 4 and October 1, 2021 respectively. We included English-language articles that examined the effectiveness of school-based TTS strategies in minimizing SARS-CoV-2 transmission in school and mitigating cohort and school dismissals due to COVID-19 cases or outbreaks. The evidence is summarized as TTS based on the following use case scenarios 1) exposed cohorts and 2) prevention of whole school dismissal using a school-based trigger (versus community incidence). Test-to-Play strategies (i.e., testing to participate in extra-curricular or school-based activities), and broad asymptomatic screen testing programs triggered by community incidence are out of scope of this Evidence Brief, as is the use of antigen screen testing for symptomatic individuals. The full search strategy is available upon request.

In addition, a rapid environmental scan was conducted using Google and relevant government websites to document jurisdictional examples of TTS strategies being implemented in K-12 schools to minimize cohort or school dismissals due to a COVID-19 case, outbreak or other school-based trigger. This search was limited to English sources and therefore may not capture the full extent of initiatives in non-English speaking countries.

Findings

The sections below summarize relevant peer-reviewed and pre-print evidence on and jurisdictional experiences with TTS to minimize cohort or school dismissals due to a COVID-19 case exposure or other school-based triggers. The TTS strategies summarized in this document differ with respect to thresholds for initiating the strategy, testing modalities (i.e., polymerase chain reaction testing [PCR], rapid antigen testing [RAT]), testing frequency and other operational factors.

Evidence Review

TEST TO STAY FOR EXPOSED COHORTS

Summary: A clustered randomized control trial from England found a non-significant decrease in student and staff COVID-19-related absences using TTS for exposed cohorts versus 10 day quarantine, and no difference in cases identified among contacts. Modelling studies from the United States (US) and from England suggest that policies that allow students and staff to “test out” of quarantine after exposure may lead to greater reductions in COVID-19 related absences when compared to usual contact management requiring quarantine.

The available literature on TTS for exposed cohorts is summarized below with a focus on the outcomes of 1) impact on sustaining in-person learning and 2) impact on within-school transmission detection of cases (when reported).

- A clustered randomized trial in England randomly assigned schools (with students 11 years and older) to either a policy of offering contacts daily testing (antigen lateral flow device) over 7 days to allow continued school attendance (intervention arm) or to follow usual policy of isolation of contacts for 10 days (control arm). All schools at baseline were conducting bi-weekly antigen as part of asymptomatic screen testing. Students in the exposed cohort self-collected their specimens which were tested by school staff.⁶
 - Absenteeism: There were 55,718 COVID-related absences during 3,092,515 person-school-days (1.8%) in the control arm and 48,609 during 3,305,403 person-school-days (1.5%) in the intervention arm. Rates of COVID-19 absences were 3,704/566,502 (0.65%) in the control arm and 2,932/539,805 (0.54%) in the intervention arm. The adjusted incidence rate ratio (IRR) (adjusting for randomization strata and participant type) for the intervention arm was 0.80 (95%CI: 0.54-1.19; p=0.27). After accounting for incomplete participation in the intervention the IRR was 0.61 (95%CI: 0.30-1.23).
 - In-school transmission: The overall proportion of contacts testing positive, with or without symptoms, in both study groups was low at approximately 2%. While the intervention did not create significant reduction in school transmission compared to the control group, this study found allowing potential cases to remain in school with daily testing also did not cause any significant increase in school transmission.
- Modelling from the US estimated the effects of different testing strategies (no testing, “test to stay”, and once-weekly PCR testing) in elementary and middle schools.⁷ The model accounted for the context of the Delta variant’s dominance in the US.
 - Absenteeism: A “test to stay” strategy had the benefit of far fewer days spent in isolation and quarantine, averaging <0.2 days per student per month, even at the highest modeled rates of community transmission and paired with maximal case detection through weekly screening.
 - In-school transmission: In elementary schools, if students with known exposures were allowed to stay in school with daily testing (the “test to stay” strategy), slightly more transmission occurred compared to remote-only baseline and in-person with quarantine (from a 40% increase with quarantine to an 43% increase with test-to-stay at 10 community notifications/100k/day). Similarly, in middle school, the “test to stay” strategy increased transmission slightly compared to the remote-only baseline (from a

72% increase with quarantine to an 82% increase with test-to-stay at 10 community notifications/100k/day).

- Kunzmann et al. (2021)'s modelling study from England compared test and isolation policies to prevent outbreaks in schools in England. The policies were: Test and Trace (reference policy where contacts were excluded from in-person learning), Extended Weekend (remote learning Thursday, Friday), Test for Release (daily testing contacts to be exempt from isolation), once-weekly asymptomatic testing, and twice-weekly asymptomatic testing.⁸
 - Absenteeism: "Test for release" resulted in the lowest proportion of school-days missed when compared to all other policies examined.
 - In-school transmission: Neither the reference policy (symptom-driven testing and contact isolation) nor the "test for release" strategy succeeded in containing school outbreaks, with the reference policy performing slightly better than "test for release".⁸ Regular once- and twice-weekly asymptomatic testing improved school outbreak control when compared to reference and test for release policies. "Test for release" requires a symptomatic index case to trigger testing within an exposed cohort, thus in this model this strategy did not contain outbreaks in scenarios with high infectivity and a high proportion of asymptomatic cases.
- Leng et al. (2021)'s modelling used a US school structure to simulate transmission in elementary and middle schools in England over the course of a seven-week half-term, comparing the impact of differing strategies on transmission, absences and testing volume.⁹ Strategies evaluated included 1) isolation of cohorts; 2) serial contact testing; 3) regular mass testing; 4) combination of regular mass testing with serial contact testing and 5) no school level testing or isolation of year-group bubbles.
 - Absenteeism: repeated testing of year-group bubbles following case detection or regular mass-testing strategies substantially reduced absences.
 - In-school transmission: Repeated testing of year-group bubbles following case detection or regular mass-testing strategies resulted in a modest increase in infections compared to the policy of isolating year-group bubbles. When combined, these two testing strategies can reduce infections to levels lower than would occur under year-group isolation, although such a policy requires a high volume of testing. Serial contact testing alone was insufficient in this model to control within-school transmission.

TEST TO STAY TO PREVENT WHOLE SCHOOL DISMISSAL

There is one study on TTS to prevent whole school dismissal which is summarized below. This study involved one-time antigen testing. The role of repeat antigen testing in this scenario has not been evaluated.

- In Utah, a Test-to-Stay (TTS) program was instituted when a school crossed a specified threshold of cases in the school over a 14-day period (in schools >1,500 students, when test positivity among students exceeded 2%, or 30 student cases in schools <1,500 students).¹⁰ From January 4 to March 20, 2021, 13 high schools conducted 14 in-school TTS events (consisting of a one-time rapid antigen test), performing 14,531 tests among students. Among 13,809 students who received testing at least once during these events, representing an estimated 70% of students participating in in-person instruction at these 13 schools, 90 (0.7%) had a positive result (range

of test positivity among events = 0.0%–2.7%). After the testing events, the 13 schools continued in-person instruction, collectively saving an estimated 109,752 in-person instruction student-days. At least 60% participation was required to continue in-person learning and percent positivity <2.5% recommended as threshold to continue in-person learning (vs. closure for at least 10 days); home collection was not permitted.

Jurisdictional Scan of “Test-To-Stay” (TTS) Strategies in Schools

Several jurisdictions in the US and Europe have school testing strategies in place that allow students to take a daily rapid antigen test (RAT) (PCR is also offered in some jurisdictions) after exposure to a confirmed COVID-19 case at school as an alternative to quarantine. Most strategies (California, Kentucky, Massachusetts, Vermont, France, Denmark) initiate testing after a student or staff member is identified as a school-based close contact of a confirmed COVID-19 case. In Utah, a one-time test is initiated after a school-wide threshold is reached.

All testing strategies summarized below are for asymptomatic close contacts, with some variation in vaccine status of those eligible to “test out” of quarantine after exposure. In California, Kentucky, Massachusetts, Utah, Vermont, and Denmark, unvaccinated, asymptomatic close contacts in K-12 schools who were exposed to a confirmed COVID-19 case must undergo rapid testing (or PCR in some jurisdictions) to continue in-person learning. France’s testing strategy is for both vaccinated and unvaccinated students in middle and high schools only (grade 6 to 12). In France, if vaccinated close contacts test negative on Day 0 (when COVID-19 case identified in the cohort) they may return to school on Day 1, however, unvaccinated close contacts must quarantine for at least 7 days (if Day 0 and Day 7 tests are negative, they may return to school on Day 8). While all testing strategies included in this review are voluntary, testing is a requirement to continue in-person learning for a defined period after exposure, and those who do not participate in testing are required to quarantine.

Table 1 summarizes TTS strategies in schools documented in the US (California, Kentucky, Massachusetts, Utah, Vermont) and Europe (France and Denmark). The strategies are summarized according to: thresholds for initiating the strategy, modality and location of testing, participant eligibility, indicators for school closure, frequency of testing, direction for asymptomatic high-risk contacts, outcomes of the strategy if reported, and other considerations where applicable. For more details on these strategies see **Appendix A**.

Table 1. Summary of Test-to-Stay (TTS) strategies in select US and European jurisdictions

Considerations	California ^{11,12}	Kentucky ¹³	Massachusetts ^{14,15}	Utah ^{16,17}	Vermont ¹⁸	France ^{19,20}	Denmark ²¹
Threshold for initiating	Identification of a school-based close contact	Identification of a school-based close contact	Identification of a school-based close contact	1% test positive (past 14 days) in schools with >1,500 students 30 students test positive (past 14 days) in schools with <1,500 students	Identification of a school-based close contact	Cohort exposure to a confirmed case of COVID-19 in middle or high schools (applicable to all students in the class).	Identification of a school-based close contact
Testing (modality and location)	On-site RAT, PCR or other rapid molecular testing	On-site or off-site; RAT or PCR	RAT or other	On-site RAT (or PCR depending on resource availability)	At home RAT	Fully vaccinated students in exposed cohort: home/lab lateral flow test, antigen test or RT-PCR test. Unvaccinated students in exposed cohort: home/lab antigen test or RT-PCR test.	On-site or at home RAT, and two PCR follow-up tests.

Considerations	California ^{11,12}	Kentucky ¹³	Massachusetts ^{14,15}	Utah ^{16,17}	Vermont ¹⁸	France ^{19,20}	Denmark ²¹
Participation	Mandatory for in-person attendance; K-12 staff and students; Unvaccinated asymptomatic close contacts	Mandatory for in-person attendance; K-12 students and staff; Unvaccinated asymptomatic close contacts	Mandatory for in-person attendance; K-12 students and staff; Unvaccinated asymptomatic close contacts	Voluntary, but 60% overall uptake required for in-person learning to continue; K-12; Unvaccinated or partially vaccinated asymptomatic close contacts	Mandatory for in-person attendance; Unvaccinated and asymptomatic students ages 5+ and staff who are close contacts	Mandatory for in-person attendance; Vaccinated and unvaccinated asymptomatic students in middle and high schools (Grades 6-12).	Mandatory for in-person attendance; Unvaccinated and asymptomatic primary school students who are close contacts.
Frequency	Minimum twice weekly for 7 days from exposure.	If RAT: daily for 7 days from exposure. If PCR: every-other day for 7 days from exposure.	Daily for 5 days from exposure.	One-time.	Daily for 7 days from exposure.	Day 0 and Day 7 from identification of COVID-19 case in cohort.	Day 0: RAT or PCR test Days 4 and 6: PCR test
Indicators for school closure	Not reported	Not reported	Not reported	10 days of remote learning for students who choose to not get tested if: <60% of students participate in TTS or percent positivity in TTS > 2.5%.	Not reported	Not reported	Not reported

Considerations	California ^{11,12}	Kentucky ¹³	Massachusetts ^{14,15}	Utah ^{16,17}	Vermont ¹⁸	France ^{19,20}	Denmark ²¹
Direction for asymptomatic high-risk contacts	Close contacts must continue to mask, as required; Undergo at least twice weekly testing for 7 days; Cannot participate in extracurricular activities at school during modified quarantine.	Close contacts must wear a mask indoors during the entire duration of their participation in TTS, even if they test negative.	Isolation not required if close contacts tests negative for five days.	No isolation if contact and case were both wearing masks at time of exposure.	Those who participate in TTS continue to school with daily negative RAT results for 7 days. Unvaccinated close contacts who do not participate in TTS must stay home from school for at least 7 days from the date of exposure.	Students in affected grade are initially sent home and are to be tested on Day 0 and Day 7. Vaccinated students who test negative on Day 0 may return to school on Day 1. Unvaccinated students must quarantine at home for 7 days. If the Day 0 and Day 7 tests are negative, they may return to school on Day 8.	Students who are close contacts with the confirmed case may remain in school if they are asymptomatic and complete negative tests on Days 0, 4 and 6.
Outcomes	Not reported.	Not reported.	Not reported.	13 high schools (Nov 30 2020 to Mar 20 2021): 90 additional cases identified; and 109,752 in-person learning days saved. ¹⁰	Not reported.	Not reported.	Not reported.

Discussion

School-based testing policies and programs like the TTS strategy provide options for the initiation of SARS-CoV-2 testing to decrease the burden of quarantine/self-isolation and facilitate in-person learning when there is a case or cases in a school. Testing is an additional tool to detect SARS-CoV-2, and other layers of prevention should continue to prevent SARS-CoV-2 transmission in schools.

Modelling studies and one real-world trial suggests that TTS for exposed cohorts preserves in-person learning time compared to quarantine of contacts. There is mixed evidence about the effectiveness of such policies in mitigating SARS-CoV-2 transmission in schools over usual quarantine policies. The one real-world trial (prior to Delta) showed no difference in case detection among contacts with TTS, whereas modelling studies (including considerations for increased transmissibility of Delta) have predicted increased case rates and transmission with TTS.⁶ This study was also conducted in a jurisdiction where there was already ongoing asymptomatic screen testing occurring in the participating schools. Additionally, risk tolerance for pediatric cases may be different in the UK and not reflective of risk tolerance in Ontario, as current guidance in this region does not require quarantine of individuals less than 18 years of age who are close contact of confirmed cases.²²

Several jurisdictions in the US and Europe have school testing programs or policies in place that allow students to take a RAT (+/- PCR test) after exposure as an alternative to quarantine. While these testing programs are all voluntary, testing is a requirement for in-person learning. No outcome data was available for the TTS strategies for exposed students and no information provided on implementation, testing uptake, or impact on students not participating in the required testing. In addition, there was limited information on the rationale for choice of PCR versus antigen in these jurisdictions, which may have been driven by test availability and feasibility considerations. PCR testing is more sensitive than rapid antigen testing and its use at the start or end of quarantine would increase the likelihood of identifying cases, potentially reducing transmission risk compared to antigen testing alone. Furthermore, PCR tests are required to be reported to public health units which allows for appropriate case and contact management and tracking of transmission within cohorts (versus antigen results which may or may not be accurately reported if done at home).

Only one jurisdiction reported on the use of a TTS program to prevent whole school dismissal based on a school based trigger. This jurisdiction required that at least 60% of the school participate in a one-time rapid antigen testing initiative and that the positivity be less than 2.5% for the school to remain open for in-person learning. The use of repeat antigen testing in this scenario has not been evaluated.

School-based metrics may also be used as a trigger for the initiation of asymptomatic screen testing programs. But, it is important to distinguish TTS strategies from asymptomatic screen testing programs, where testing is voluntary, without consequences at the individual or school level for not participating. The TTS strategies discussed in this summary have a requirement for testing either at the individual or school level (percentage uptake) in order for in-person learning to continue. As voluntary programs may be associated with low uptake, a more targeted approach and associated requirements of sufficient testing may be necessary to improve uptake. Given that school cases reflect community prevalence, a school-based trigger (e.g. increased cases and/or multiple cohorts affected) that indicates potential spread in the school and need for enhanced testing measures could be considered as an alternative approach to community-based thresholds to initiating the TTS to prevent whole school dismissal.

Implications for Practice

Test-to-Stay Scenarios

Factors and considerations related to implementation of TTS strategies are explored below using case scenarios 1) exposed cohorts and 2) prevention of whole school dismissal based on school-based triggers. For both TTS scenarios, there are significant resource requirements above what is required for voluntary asymptomatic screen testing, given the need for test verification at individual level and at school aggregate level, respectively. Given the gaps in evidence on these approaches in the context of the SARS-CoV-2 Delta VOC, operational considerations in the Ontario context, and potential unintended consequences, further consultation with critical stakeholders (e.g., education, local public health and testing partners) is required. A well-designed pilot should be considered with appropriate resources and an evaluation plan prior to broader implementation. Furthermore, it is important to consider the anticipated timeline with respect to vaccine approval and availability for the 5-11 age group as the summarized evidence for TTS relates to unvaccinated populations.

SCENARIO A: EXPOSED COHORT

There are several logistical and operational considerations for TTS for exposed cohorts, including the need for advanced communication and education among school administration, staff, students and families/caregivers, prompt and appropriate initiation of testing upon case identification, and processes and resources for reporting and verifying test results. There are also important considerations around equity in access to learning when students who do not participate in TTS and cannot access in-person learning. Specifically, access to remote learning for partial class cohorts in elementary schools is typically not available, and therefore may result in complete lack of learning during quarantine for those not participating in TTS in an exposed cohort.

Key considerations are summarized below:

- Requires engagement and consultation with public health decision-makers, including local public health units, as well as key testing and education partners (e.g., in relation to risk tolerance, acceptability, roles and resources).
- Need for advanced communication and role clarity between public health, school boards, teachers, staff and students for the purposes of reporting and verifying test results.
- Requires immediate and easy access to both PCR (for antigen confirmation, +/- as an additional more sensitive test) and antigen testing for the cohort over the post-exposure period, and education on these modalities in advance.
- Requires decisions around the need for PCR testing as an additional, more sensitive test to increase case detection. The use of PCR testing also requires reporting to allow for appropriate case and contact management and to monitor transmission within cohorts, an important consideration given the limited data with Delta VOC.
- Testing location: onsite testing would facilitate testing verification, but resources required to support sample collection and testing, and a process for consent would be required. Home collection would allow for implied consent, but communication and education would be required on appropriate sampling technique and a process developed for test completion verification.

- Equity in access and logistical considerations around learning for students who do not participate in the TTS program (e.g. remote learning modalities, synchronous and asynchronous learning opportunities) to prevent greater loss of learning compared to an entire cohort switching to remote learning for the quarantine period.
- Considerations for students cohorts with mixed vaccination status, and protection of privacy of vaccination status.
- Development of additional public health management guidance (e.g., individual with a RAT positive result with PCR pending/not available in a high risk contact; when to discontinue TTS and dismiss, e.g., if an outbreak is detected in an exposed cohort).

SCENARIO B: PREVENTION OF WHOLE SCHOOL DISMISSAL

Similar to the exposed cohort TTS, there are several logistical and operational considerations for the use of TTS for the prevention of whole school dismissal. This testing is differentiated from the whole school testing recommended in the outbreak guidance by having a required uptake to support ongoing in-person school attendance, with the option for repeat testing at frequent intervals for a defined period of time after the school-based trigger.

Key considerations are summarized below:

- Requires engagement and consultation with public health decision-makers, including local public health units, as well as key testing and education partners (e.g., in relation to risk tolerance, acceptability, roles and resources).
- Roles and responsibility and capacity of schools, school boards, public health units to address logistics, including reporting of positive RAT and either confirmation of negative test before school entry or confirmation of sufficient testing at the school aggregate level.
- Requires immediate and easy access to both PCR and antigen testing, and education on these modalities in advance.
- Testing location: on-site testing may be feasible as a one-time test, but requires significant coordination between PHU, testing partner, school administration and school community. This process may be familiar for PHUs that have had experience with school-wide testing during the pandemic. Delay may be seen with testing initiation, and in result notification (and subsequent access to in-person learning) if the initial test method is PCR. Repeat testing is not likely to be sustainable on-site. Home collection would require a process to confirm testing was completed and verify required testing uptake achieved.
- Consideration of a pre-specified student population threshold to continue in-person learning should be a key motivating factor for students and families to participate in the testing strategy.
- Considerations for vaccinated students or those previously infected would need to be addressed
- There would be challenges with mandating testing outside of an outbreak or exposure, in addition to logistical considerations including cohort process/logistics, reporting of positive RAT, and confirmation of negative test before school entry (if required) or confirmation that aggregate school uptake has been achieved.

- Public health units have discretion to recommend a whole school dismissal for public health management purposes based on their investigation. Timeliness of TTS operationalization in this context may influence the potential to identify infected individuals early, quarantine close contacts and avoid a whole school dismissal. The potential for TTS to help limit the extent or duration of closures may merit further consideration.
- Implications for current School Outbreak Guidance regarding whole school testing and whole school dismissal considerations.

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Appendix A – Summary of Test-to-Stay Strategies

United States

CALIFORNIA

In California, local school boards and administrators follow a three-step process for forming a testing strategy in their school community: 1) Prepare capacity to test; 2) Review the four testing options in the state (keep track of COVID-19, prevent school outbreaks based on community transmission level, close contacts in response to a school outbreak, or testing close contacts to keep them in school); and 3) Choose one or more testing options for their school.^{11,12} For the purposes of this document, we will focus on the testing option related to testing exposed students to keep them in school.

- **Threshold for initiating TTS:** No community rate threshold; unvaccinated students who are close contacts (more than 15 minutes over a 24-hour period within 0-6 feet) may undergo a modified quarantine.^{11,12}
- **Description of testing (modality, location):** On-site RAT or PCR (or other rapid molecular tests). At-home testing is being evaluated for close contacts.^{11,12} If an asymptomatic individual tests positive a confirmatory PCR test is required.
- **Frequency of testing:** Students exposed to a confirmed COVID-19 case in school can keep attending school in-person if they undergo twice weekly testing during the 7 day period after their close contact with the COVID-19 case. Close contacts can end their modified quarantine if they test negative test after Day 7.^{11,12}
- **Participation:** Voluntary for asymptomatic unvaccinated close contacts, testing required at least twice weekly for in-person learning during the 7 day period following close contact with a COVID-19 case in school.^{11,12}
- **Indications for school closure:** Not reported. California Department of Public Health guidance states that schools will make this decision with local health officials.^{11,12}
- **Direction for asymptomatic high-risk contacts:** Asymptomatic, close contacts do not have to move to remote learning if they test negative; they must continue to wear their mask, self-screen for symptoms, and cannot participate in any extracurricular activities at school.^{11,12}
- **Outcomes:** Not reported.
- **Additional considerations:** Local school administrators should prepare for testing by seeking parental consent prior to implementing the testing strategy.^{11,12}

KENTUCKY

Below are the considerations for a “test to stay” strategy in Kentucky which allows unvaccinated individuals who are exposed to COVID-19 at school to continue with in-person instruction with repeated negative COVID-19 testing.¹³

- **Threshold for initiating TTS:** When a close contact is notified of their possible exposure at school.¹³
- **Description of testing (modality, location):** At the school or off-site RAT or PCR test accessible to students at no cost. Performed by licensed healthcare provider or trained personnel.¹³

- **Frequency of testing:**
 - RAT: each day that the student is in-person at the school, starting as soon as possible after the last day of exposure (day 0) through day 7.
 - PCR: at minimum every-other day that the student is in-person at the school, starting as soon as possible from the last day of exposure (day 0) through day 7. If testing does not occur over the weekend, testing should occur on both Fridays and Mondays.¹³
- **Participation:** Voluntary for unvaccinated, asymptomatic close contacts; testing required to continue in-person learning. A close contact is someone who was within 6 feet of an infectious person for a cumulative total of 15 minutes in a 24-hour period.
 - In the K-12 indoor classroom setting, the close contact definition excludes students who were at least 3 feet away from an infected student if both students correctly and consistently wore well-fitting masks the entire time and other K-12 COVID-19 prevention strategies were in place. This exception does not apply to teachers, staff, or other adults in the indoor classroom setting.¹³
- **Indications for school closure:** Not reported.
- **Direction for asymptomatic high-risk contacts:** To be eligible to participate in Kentucky's TTS program, the close contact must wear a mask indoors during the entire duration of their participation in TTS (days 0 through 7) when at school even if they test negative. Where possible, exposed students should refrain from riding a school bus or riding with other non-household members to school.¹³
- **Outcomes:** Not reported.
- **Additional considerations:** Not reported.

MASSACHUSETTS

The Massachusetts "Test and Stay" strategy is one of three testing programs for schools in Massachusetts: Symptomatic testing, "Test and Stay" (close contact testing) and routine pooled testing. The "Test and Stay" (close contact testing) strategy will be summarized below.^{14,15}

- **Threshold for initiating TTS:** When a student or staff member is identified as a school-based close contact of a confirmed COVID-19 case. Close contacts are defined as individuals who have been within 6 feet of a COVID-19 positive individual while indoors, for at least 15 minutes during a 24-hour period.^{14,15}
- **Description of testing (modality, location):** RAT or approved diagnostic test.^{14,15}
- **Frequency of testing:** Daily testing on school days for at least five days following last exposure; modified quarantine ends after Day 7.^{14,15}

- **Participation:** Voluntary for asymptomatic, unvaccinated school-related close contacts of a confirmed positive case; testing required to continue in-person learning. Close contacts defined as individuals who have been within 6 feet of a COVID-19 positive individual while indoors, for at least 15 minutes during a 24-hour period.^{14,15}
- **Indications for school closure:** Not reported.
- **Direction for asymptomatic high-risk contacts:** Asymptomatic close contacts can remain in school if they receive a negative result on an individual rapid antigen test each school day (for at least 5 days).^{14,15}
- **Outcomes:** Not reported.
- **Additional considerations:** Not reported.

UTAH

In Utah, Senate Bill 107 requires by law that all K-12 schools conduct a “Test to Stay” (TTS) event when a specified outbreak threshold is met (see below). The program aims to allow students and staff to continue participation in in-person learning while lessening the burden of quarantine and school closures.^{16,17}

- **Threshold for initiating TTS:** A TTS event must occur in K-12 schools with 1,500 or more students that have 1% of their students test positive for COVID-19 within the previous 14 days, and schools with fewer than 1,500 students that have 30 students test positive for COVID-19 within the previous 14 days.^{16,17}
- **Description of testing (modality, location):** School-wide on-site RAT, PCR may be offered depending on resource availability.^{16,17}
- **Frequency of testing:** One-time testing event when the school meets the TTS threshold.^{16,17}
- **Participation:** Voluntary for both unvaccinated and partially vaccinated (1-dose of 2-dose schedule or 2-doses with under 14 days since second dose) high school students.^{16,17} If school participation exceeds 60%, asymptomatic individuals who did not participate in one-time testing event and were not high-risk contacts can continue in-person learning.
- **Indications for school closure:** Public health recommends school closure to in-person learning for at least 10 days if: <60% of students in the school participate in the testing event, or test positivity among those who participated in the testing event (called percent positivity) >2.5%.^{16,17}
- **Direction for high-risk contacts:** Close contacts do not have to isolate if both they and the person who tested positive were at school and were both wearing masks at the time of the exposure while at school. The person who tested positive will still need to isolate for at least 10 days.^{16,17}
- **Outcomes:** From November 30, 2020 to March 20, 2021, TTS was implemented in 13 high schools; 90 additional cases were identified and an estimated 109,752 in-person learning days were saved.¹⁰

- **Additional considerations:** On March 24, 2021, the TTS testing strategy was incorporated into Utah Senate Bill 107 on the prioritization of in-person instruction. The bill indicates that “Test to Stay” is required in K-12 schools.²³ Remote learning is offered to students who do not wish to participate in the testing. UDOH provides training to schools as well as on-site assistance, however, schools conduct the testing and parental permission is required prior to testing.^{16,17}

VERMONT

The agency of Education in the State of Vermont provide “Test to Stay” (TTS) guidance applicable to all unvaccinated and asymptomatic students ages 5 and up in the event any member of the school is identified as a COVID-19 case and has been present in the school during their infectious period. This is connected to guidance for symptom-based testing of staff and students in schools, which is out of scope of this brief.¹⁸

- **Threshold for initiating TTS:** When a student or staff with COVID-19 is present in school during their infectious period, contact tracing is initiated to identify all close contacts.¹⁸
- **Description of testing (modality, location):** RAT, completed at home.
- **Frequency of testing:** Daily until seven days have passed since the last exposure to the case.¹⁸
- **Participation:** Voluntary for unvaccinated, asymptomatic students (ages 5 and up) and staff who are close contacts of a positive COVID-19 case.¹⁸ Testing required to continue in-person learning.
- **Indications for school closure:** Not reported
- **Direction for asymptomatic high-risk contacts:**
 - When a case is identified, unvaccinated students and staff close contacts can finish the school day as usual.
 - The next day, unvaccinated close contacts who participate in TTS can attend school, but must be tested before beginning the school day for seven days and wear a mask while in school.
 - Unvaccinated close contacts who do not participate in TTS must quarantine (stay home from school) for at least seven days from the date of exposure.¹⁸
- **Outcomes:** Not reported.
- **Additional considerations:**
 - Students and staff participating in TTS should quarantine while outside of school, including over the weekend.
 - If a student is a close contact due to an exposure outside of the school setting, they cannot participate in TTS, must follow current guidance and quarantine at home.¹⁸

France

In middle and high schools (Grades 6 to 12), there is a testing strategy in place similar to TTS to limit student time quarantining at home based on vaccination status, previous COVID-19 infection and adherence to COVID-19 testing. Details are described below.^{19,20}

- **Threshold for initiating TTS:** A COVID-19 case is identified in a middle or high school student cohort. All students in the exposed cohort are first automatically sent home to quarantine on the day the case is identified (Day 0).^{19,20}
- **Description of testing (modality, location):**
 - Fully vaccinated students in the exposed middle or high school cohort are considered moderate risk and must complete a self-conducted antigen test with a saliva sample, an antigen test in a pharmacy or a lab-based RT-PCR test.^{19,20}
 - Unvaccinated students in the exposed cohort are considered high risk and must complete an antigen test in a pharmacy or a RT-PCR test, as self-conducted tests are not considered sufficient for higher risk exposures.^{19,20}
 - Students with evidence of a COVID-19 infection in the previous two months, regardless of vaccination status, are considered low risk and are not required to complete a COVID-19 test if they do not have any symptoms.^{19,20}
- **Frequency of testing:** The day the COVID-19 case is identified (Day 0), and seven days after cohort exposure to that case (Day 7).^{19,20}
- **Participation:** Voluntary for asymptomatic vaccinated and unvaccinated students in middle and high schools (Grades 6-12) to shorten their respective quarantine times.
 - Proof of negative test result is mandatory for students without a proven recent COVID-19 infection to return to in-person learning prior to the usual 10 day quarantine period required for case contacts. If test results are not provided, a student must continue to quarantine at home until the test result is provided, or an additional seven days of quarantine at home are observed for a maximum 14 days of quarantine.^{19,20}
- **Indications for school closure:** Not reported.
- **Direction for asymptomatic high-risk contacts:**
 - Students with a documented COVID-19 infection in the previous two months who do not have any symptoms are considered low risk, and may return to in-person learning on Day 1 without a COVID-19 test, and remain in school as long as no symptoms develop.
 - Fully vaccinated students are considered at moderate risk, and with a negative Day 0 test may return to in-person on Day 1 and must also demonstrate a negative test results on Day 7 to remain in school.
 - Unvaccinated students and students who are vaccinated but severely immunocompromised are considered at high risk and must complete a negative test on Day 0 and observe a mandatory quarantine at home for seven days. A negative test on Day 7 allows these students to return to in-person learning on Day 8 while wearing a mask for seven additional days in class.

- If test results are not provided, a student must continue to quarantine at home until the test result is provided, or an additional seven days of quarantine at home are observed for a maximum of 14 days quarantine.
- A positive test at any time requires the student to isolate at home for 10 days, unless after 10 days a fever persists, in which case they must isolate for 48 hours after the fever resolves.^{19,20}
- **Outcomes:** Not reported.
- **Additional considerations:** Last updated in September 2021. For all grades K-12, identification of a COVID-19 case in a teacher does not require the automatic dismissal of a cohort, contacts are not considered at risk because teachers are required to wear masks.^{19,20}

Denmark

There is limited detail available in English related to Denmark's testing strategy. Similar to TTS, it is intended to limit loss of in-person learning for primary school students. Available information indicates as of September 6, 2021, confirmed COVID-19 cases in school are required to isolate at home, but asymptomatic children in primary schools who are close contacts of a COVID-19 case in school are no longer required to self-isolate at home if they complete COVID-19 testing.²¹

- **Threshold for initiating TTS:** When a primary school student is identified as a school-based close contact of a confirmed COVID-19.²¹ All children in a similar group division (i.e., in a tribal class, on a team) are by definition close contacts to an infected person.
- **Description of testing (modality, location):** Initial RAT on-site at school or at home (Day 0), and PCR follow up tests (Days 4 and 6).^{21,24}
- **Frequency of testing:** Three tests, the first conducted immediately upon learning of the positive COVID-19 case (Day 0), and two follow up tests on Days 4 and 6 after the last close contact with the positive case.²¹
- **Participation:** Voluntary, unvaccinated and asymptomatic students in primary school who are close contacts of a confirmed COVID-19 case in school.²¹ Testing is required to continue in-person learning.
- **Indications for school closure:** Not reported.
- **Direction for asymptomatic high-risk contacts:** Close contact students may stay in school as long as they are asymptomatic and have negative test results on Days 0, 4 and 6 after exposure to the COVID-19 case.²¹
- **Outcomes:** Not reported.
- **Additional considerations:** A media article indicates RATs will be available for use on-site at schools.²⁴

Citation

Ontario Agency for Health Protection and Promotion (Public Health Ontario). “Test-to-Stay” SARS-CoV-2 rapid antigen testing strategies in K-12 schools. Toronto, ON: Queen's Printer for Ontario; 2021.

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