

# Testing for COVID-19 in school settings

DRAFT TECHNICAL REPORT

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## Background

School settings bring children and young adults of different age groups closely together. They share teaching rooms, and sports and other community facilities. It has been shown that children have a higher number of social contacts than adults which is also related to school settings (1). School staff likewise have a large number of contacts with pupils as well as with other staff. These contacts may result in transmission of infectious diseases. Many countries have closed schools and kindergartens to reduce transmission and mitigate the impact of the COVID-19 pandemic. However, the overall role that children play in transmission and spread of SARS-CoV-2 remains unclear.

Data so far indicate that COVID-19 infections are less frequently observed in children. In Vo' (Italy), two cross-sectional studies, including more than 2 000 people each, showed that none of the 234 children ( $\leq 10$  years of age) tested were infected (4). Among the 11-20 year old inhabitants, 1.2% and 1.0% tested positive in the two surveys compared to the population averages of 2.6% and 1.2%, respectively (4). In a population-based screening programme in Iceland, none of the 848 children under 10 years of age tested positive, in comparison to 0.8% of the whole sample of 13 080 people (5). In a targeted testing of symptomatic people, or high-risk contacts, 38 (6.7%) children under the age of 10 tested positive, in comparison to 13.7% of those who were 10 years or older (5). In the Stockholm Region (Sweden), a cross-sectional study including 707 randomly selected participants (147 were children  $< 15$  years of age) reported an overall positivity rate of 2.8% among children ( $< 15$  years of age), 2.8% in the age group 16-29, 2.6% in the age group 30-59 and 2.0% in the age group 60 or above (6). Sweden also reported that antibody prevalence in children and teenagers was 4.7%, compared with 6.7% in adults age 20 to 64 and 2.7% in 65- to 70-year-olds (7). In UK, the Office for National Statistics conducted a study in mid-April consisting in a pilot survey on COVID-19 infections to estimate the number of people in the population who test positive, with and without symptoms. The findings reported that 0.29% of the sampled 2-11 years old population tested positive compared to 0.31% of the sampled 12-19 years old population (8).

The lower frequency of infection in children might be related to the fact that children are less likely to be tested due to mild disease symptoms or absence of symptoms, and therefore only account for a small proportion of the overall number of COVID-19 cases (2). Asymptomatic infections in children have been reported, e.g. in a large case series study in China, 4.4% of the children which tested positive were asymptomatic (3). Other studies showed that more than 50% of the seropositive children did not report any symptoms, a proportion similar to that recently reported in adults (9-11). The remainder reported mild and non-specific symptoms such as headache, rhino-pharyngitis and shortness of breath. This supports previously published data showing that COVID-19 is less severe in children than in adults (12).

Studies indicate that children are likely infected in their household environment (2). Two studies on household transmission estimated the household secondary attack rate (SAR) to be 16.3% (13) and 13.8% (14). Age-stratified analysis showed that the SAR in symptomatic children was 4.7% compared with 17.1% in symptomatic adults ( $\geq 20$  years of age) (13), and that the odds of infection in children was 0.26 times lower (95%CI 0.13-0.54) compared to elderly people ( $\geq 60$  years of age) (14).

In the investigation of the first outbreak in France, one infected child attended three different schools while being symptomatic and despite 112 contacts identified (including children and teachers), no symptomatic secondary cases were detected (15).

Data on viral load in children are scarce, but suggest that children may have similar levels as adults (16). It is highly likely that children can transmit the SARS-CoV-2 virus even if they are asymptomatic (17). A study by L'Huillier et al (18) showed that the initial viral load at diagnosis in symptomatic children is comparable to those in adults, and that symptomatic children of all ages shed infectious virus in early acute illness. Virus isolation success was largely comparable to that of adults.

## Objective of testing in schools

The current document proposes guidelines for testing for SARS-CoV-2 in schools based on the ECDC surveillance strategy objectives for COVID-19 (19) (20). The following objectives could be considered relevant for testing in school settings:

- to ensure early identification of cases among students and staff in order to conduct contact tracing and initiate prevention and control measures and thus to reduce further transmission.
- to identify infection in students and staff with high risk of developing severe disease due to underlying conditions.
- to support investigations and studies about the role of children in the transmission of COVID-19 and to assess the impact of implemented mitigation measures like school closures.

## Testing guidance

All students and staff with symptoms compatible with COVID-19 should be tested for SARS-CoV-2 virus according to the ECDC testing strategy (19) and current laboratory testing guidance (21). The symptoms include acute respiratory tract infection (sudden onset of at least one of the following: cough, fever, shortness of breath) or sudden onset of anosmia, ageusia or dysgeusia or radiological evidence showing lung lesions compatible with COVID-19.

Contact tracing should be initiated promptly following identification of a confirmed case and should include contacts in the school (students, teachers and other staff), household and other settings as relevant according to ECDC or national guidance (22).

Asymptomatic persons identified as high-risk exposure (close) contacts of cases (Table 1) during contact tracing should also be tested for SARS-CoV-2 virus. This allows for prompt isolation of new potential cases and early contact tracing of the contacts of these new cases. The sampling should be performed at two different time points to reduce possible false negative findings (23). The first sample should be taken no earlier than 3 days after the initial contact with a confirmed case. The second sample should be taken around 3 days after the 1<sup>st</sup> sample.

If testing capacity is limited, the following groups should be prioritised for testing:

- Symptomatic students and staff that are of high risk of developing severe disease due to age or pre-existing conditions (e.g. such as lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, hypertension, diabetes, and immunocompromising conditions) (21);

- Symptomatic students and staff in regular contact with persons who are at high risk of developing severe disease due to age, living in long-term care facilities or having the aforementioned pre-existing conditions (19).

In a situation where a nasopharyngeal or other upper respiratory specimen is not acceptable and/or to increase the acceptance for children to be tested, saliva could be considered as an alternative specimen (24, 25).

## Contact tracing

Contact tracing (22, 26) is a public health measure which aims at rapid identification of persons who have been in contact with a case. The purpose of identifying and managing the contacts of probable or confirmed COVID-19 cases is for rapid identification of secondary cases, which may arise after transmission from the primary known cases, in order to intervene and interrupt further onward transmission. This is achieved through:

- the prompt identification of contacts of a confirmed case of COVID-19;
- providing contacts with information on self-quarantine, proper hand hygiene and respiratory etiquette measures, and advice around what to do if they develop symptoms;
- timely laboratory testing for SARS-CoV-2 detection in all contacts with symptoms and asymptomatic high-risk exposure (close) contacts.

A contact of a COVID-19 case is any person who has had contact with a COVID-19 case within a timeframe ranging from 48 hours before the onset of symptoms of the case to 14 days after the onset of symptoms. If the case had no symptoms, a contact person is defined as someone who has had contact with the case within a timeframe ranging from 48 hours before the sample, which led to confirmation was taken, and until case was isolated, at most to 14 days after the sample was taken.

The associated risk of infection depends on the level of exposure (Table 1), which will in turn determine the type of management and monitoring.

**Table 1. Classification of a contact based on level of exposure (22)**

High-risk exposure (close contact)	Low-risk exposure
<p>A person:</p> <ul style="list-style-type: none"> <li>• having had face-to-face contact with a COVID-19 case within two metres for more than 15 minutes;</li> <li>• having had physical contact with a COVID-19 case;</li> <li>• having unprotected direct contact with infectious secretions of a COVID-19 case (e.g. being coughed on);</li> <li>• who was in a closed environment (e.g. household, classroom, meeting room, hospital waiting room, etc.) with a COVID-19 case for more than 15 minutes;</li> <li>• travelling together with a COVID-19 case in any mode of transport for more than 15 minutes.</li> </ul>	<p>A person:</p> <ul style="list-style-type: none"> <li>• having had face-to-face contact with a COVID-19 case within two metres for less than 15 minutes;</li> <li>• who was in a closed environment with a COVID-19 case for less than 15 minutes;</li> <li>• travelling together with a COVID-19 case in any mode of transport for less than 15 minutes.</li> </ul>

*Longer duration of contact is assumed to increase the risk of transmission; the 15-minute limit is arbitrarily selected for practical purposes. Public health authorities may consider some persons who had a shorter duration of contact with the case as having had high-risk exposure, based on individual risk assessments.*

In the context of school settings, high-risk exposure (close) contacts are defined as follows:

- Students and staff who have shared a classroom with the confirmed case.
- Other students and staff with whom the confirmed case has spent time with, according to the definition in Table 1 – High risk exposure (e.g. friends with whom they stay close during breaks or sport activities).
- Students and staff in boarding schools/residential schools: also those sleeping in the same room or sharing common kitchen, social space and/or bathroom.

Low-risk exposure contacts are defined as follows:

- Other students and staff with whom the confirmed case had contact with, according to the definition in Table 1 – Low-risk exposure.
- Public health authorities may consider some children with a low-risk exposure to a case as having had high-risk exposure, based on individual risk assessments.

Public health authorities should define contacts in these circumstances in conjunction with the school authorities and ensure that any decisions are clearly translated and understood by staff, students and guardians.

## Contact identification and follow up

Contact tracing should begin immediately after a confirmed case has been identified to avoid any delays in reducing transmission through public health action. Contact tracing should be conducted by local public health authorities, which may need to work closely with school authorities when the contact tracing involves a school. Contacts should be managed based on exposure category as outlined in the ECDC guidance on contact tracing, which includes quarantine for high-risk exposure contacts [21]. Information should be given to parents about what symptoms to look out for in the children as well as where to access testing and medical advice. If symptoms of illness occur in contacts they should immediately be isolated and provided with medical attention and promptly tested.

Children who live in a household where someone has been confirmed to have COVID-19 should quarantine and not attend school.

- If the household case is isolated or managed in hospital, quarantine for the child should be for 14 days since last exposure of the child to the case.
- If the case is managed at home and not isolated, the 14 days quarantine for the child should be counted from the day when all three of the following criteria are met for the case: eight days after the onset of symptoms AND resolution of fever AND clinical improvement of other symptoms for at least for three days (27).

## Consulted experts (in alphabetical order)

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