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When the restrictions are worse than the pandemic

PERSPECTIVES

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Stricter infection controls and school closures to tackle COVID-19 are regularly called for in the public discourse on the pandemic. However, restrictions on schooling and

leisure activities can have negative consequences. Norwegian and international data appear to support the argument to keep schools and day-care centres open, with good infection control measures, and that closing them should be a last resort.

The European Centre for Disease Prevention and Control (ECDC) has recently updated its risk assessment of SARS-CoV-2 infection in schools and day-care centres (1). The ECDC maintains that the risk of secondary transmission among younger children is low. However, all countries report that outbreaks can occur in schools and day-care centres, and that infection control measures are needed to keep schools open.

Incidence and morbidity in children

The reported incidence of COVID-19 among children may have been artificially low due to the low testing rates in the youngest age groups, particularly in the early stages of the pandemic. However, population-based screening studies with polymerase chain reaction testing (PCR) suggest that younger children do actually have a lower incidence rate than older children and adults (1, 2). Several recent serological studies support this finding, although the results may have been impacted by infection control measures and the scope of self-isolation in children and adults (1, 3, 4). Children and adolescents generally experience mild symptoms, and 20–35 % are asymptomatic (1, 3). The proportion of asymptomatic adults appears to be around 20 % (5).

Children are substantially under-represented in COVID-19 cases with severe outcomes. In Norway, 41 out of 10 000 (0.4 %) people below the age of 20 with a confirmed infection were hospitalised in 2020, according to weekly reports from the Norwegian Institute of Public Health. Rare cases of Paediatric Inflammatory Multisystem Syndrome (PIMS) have been seen in children, including in Norway (6), but a literature review reports the mortality from the condition to be less than 2 % (7).

Norwegian schools in 2020

Since the two-month closure of schools at the start of the pandemic, one of the government's goals has been to spare children from the most stringent measures to the greatest extent possible. In the autumn of 2020, however, quarantine was a frequent occurrence for pupils and staff in some parts of the country. In November, the month when the most schools were affected, 11 % of schools had pupils or staff with a confirmed infection, but less than 1 % had more than nine cases (8). Upper secondary schools were hit harder than primary and lower secondary schools. Only one of the country's 5730 day-care centres had more than ten infected children within the same time period – less than 2 % of the centres had children or staff with a confirmed infection.

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After the infection peak in the week starting 1 November, the incidence rate among adolescents fell by almost 60 % within four weeks. This happened while most schools were open. In areas with high infection rates, red tier control measures entailing blended learning were imposed on upper secondary schools. The reduction in infection rates indicates that the traffic light model for infection control in schools is working as intended. Another important observation is that infections among adolescents increased by 125 % between week 51 (the last week of school before Christmas) and week 1 (the first week of school after the New Year). This increase during the school holidays suggests that social contact outside the school setting may have a greater impact on transmission than the contact in schools.

Children's role in transmission

Most studies provide limited opportunity to assess the direction of the infection, whether it is transmitted between children, between children and adults or between adults. A systematic review of 18 studies on transmission showed that the risk of being the primary source of infection is lower for the under 20s than for those over 20 (relative risk 0.56, 95 % confidence interval 0.37 to 0.85) (3). This risk was also lower in younger children compared with adolescents. In a new large-scale study, the incidence of antibodies was three times higher in parents compared to younger children (aged 1–10) (9). This is contrary to the idea that children are a significant source of transmission within families.

Modelling studies have often been used to justify the closing of schools. However, many of the models are based on what now appears to be the incorrect assumption that children are as contagious as adults.

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A recent study of COVID-19 in children describes the infection situation under current infection control rules in Norway (10). The first publication from the study included 13 children aged 5–13 from the counties of Oslo and Viken. The children were the first at their respective schools to be diagnosed with SARS-CoV-2 (index cases), and they had been at school for the 48 hours prior to symptoms showing and confirmation of infection. Nine were asymptomatic during this period, and the remaining four had mild symptoms. Diagnosis was followed by mass testing of all the children's contacts, i.e. children and adults in the same cohort, at the start and end of the quarantine period. Among 234 children tested, two new cases were found, while one in 58 adult school contacts (a total of 3) were diagnosed with SARS-CoV-2. All three had a

positive test at the start of the quarantine period, and only one of the cases was traced to an asymptomatic child. These findings suggest there is limited potential for transmission by asymptomatic children.

Schools and outbreaks

Although the number of index cases in the recent study of COVID-19 in children is low and must be interpreted with caution, such studies provide far more accurate information on where transmission occurs than prevalence studies. Three studies from countries with similar infection control measures to Norway found a low risk of infection transmission in schools and day-care centres (3). Mass testing during local outbreaks in Oslo has also provided a basis for study. Unpublished data from six schools in the districts with the highest infection rates and a total of 3740 students and staff members revealed that 12 (0.3 %) non-close contacts were infected (Frode Hagen, chief infection control officer in Oslo, personal communication). However, there are also examples of major outbreaks, mostly among older pupils.

The ECDC report also shows a strong association between community transmission and the number of cases reported in schools, (1) as has been the case in Norway. Genotyping can provide precise information about whether cases in a school originate from a common source and likely transmission in the school setting, or whether the virus is spread in the family/community in several independent clusters with different genotypes. An outbreak at Sagdalen school in Lillestrøm was found to stem from two or three different virus introductions (11). Several infection clusters at schools in Norway have been shown to belong to the same family (Petter Elstrøm, contact tracing team, Norwegian Institute of Public Health, personal communication).

Whether staff in schools are exposed to unnecessary risk is a constant source of debate. In a non-peer-reviewed publication, the absolute risk of COVID-19 for staff in schools and day-care centres – and for hairdressers and doctors – was about 2/1000 higher compared with the population average (12). The high figures were seen in these occupational groups in Oslo, but not in the rest of the country. In Denmark, the risk among school and day-care centre staff was similar to the risk in other occupational groups (1).

Effect of closing schools

When schools were closed in March 2020, various measures were implemented simultaneously across the country, which made it impossible to assess the effect of this or any other single measure. The same thing happened in most countries. There is a lack of randomised studies, but a recently published German study used a quasi-randomised design to generate new knowledge (13). Schools in the southern states of Germany have their summer holiday several weeks later than in the north. In all states, the infection rate in 2020 increased in the last weeks of the holiday and fell in the first weeks after the

schools returned. Similarly, the infection rate in the autumn holiday in October/November, which was much higher than in the summer, showed no indication that closing schools had any impact on the general transmission rate. The authors conclude that keeping schools and day-care centres open has little bearing on community transmission.

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The traffic light model, with green, yellow and red tiers, takes into account the local transmission rate and expert advice on restrictions. The Ministry of Education and Research has allowed greater use of home schooling for reasons other than infection control, despite heavy criticism being levied at the consultation proposal. In a pressured situation during a local outbreak, the perplexity of local politicians and local authority chief executives and their need to delve deep into their arsenal is understandable. Contrary to the advice of the district medical officers, some local authorities have closed all schools and day-care centres, even though there are no confirmed cases of infection in the relevant age group. We believe that in order to avoid major variations in the local response, such decisions should be based on the district medical officers' assessments in consultation with government infection control authorities.

The media's role

The media play an important role during a pandemic and provide important and, for the most part, balanced information. A critical press facilitates open debate on the relationship between the burden of restrictions and the burden of disease. However, more precise reporting would have been preferred in relation to 'school outbreaks', a term that is used arbitrarily even in reference to isolated cases of infection with no onward transmission. The extent of the outbreak is often magnified by focusing on the number of people in quarantine, despite evidence that the risk of secondary transmission is low. This can incorrectly give the impression of mass transmission in schools, which can influence the decisions of those in charge.

The way forward

The winter will give rise to new national and local outbreaks of COVID-19, and the risk of restriction fatigue and low compliance levels could increase if the measures are not perceived as proportionate. Infection control is not a theoretical exercise; measures only help if they are practised. At the New Year, seven out of ten municipalities had few or no infection cases, and the introduction of red tier restrictions at a national level was considered

unreasonable in many parts of the country. We therefore believe that the level of restrictions in day-care centres and schools must be adapted to the local infection situation and the different age groups.

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The new British mutation is assumed to be a more contagious variant of the virus, but a recent review of data suggests that children and adolescents are still less likely to be infected than adults (14). Nevertheless, we must be prepared for the fact that new mutations may push up transmission rates and that more stringent infection control measures may be needed.

A new report examines the effects of the pandemic on the health of children and adolescents (15). The report shows that vulnerable groups may suffer more during the pandemic than young people in general, which is a concern for the Norwegian Ombudsperson for Children, Save the Children and the Norwegian Directorate for Children, Youth and Family Affairs. Both the pandemic itself and the infection control measures are considered to be contributory factors.

> ***«More active testing should also be considered in order to reduce the quarantine period for schools»***

The current quarantine rules are challenging. Data show that there is little risk of secondary transmission in schools and day-care centres, and that the risk of infection from non-close contacts is low. For migrant workers, the mandatory quarantine period has recently been reduced for those who test negative for COVID-19 at the end of the period. More active testing should also be considered in order to reduce the quarantine period for schools. Alternatively, consideration can be given to limiting quarantine to pupils who have been sitting near the infected pupil in the classroom, as opposed to the entire cohort. In the current situation, schools should only be physically closed for short periods in the event of complex local outbreaks. In order to create an evidence base for future infection control, we also need planned measures that can be compared systematically.

Conclusion

Almost a year into the pandemic, we now know that the virus can be transmitted in day-care centres and schools and that it is more common in adolescents than younger children. So far, however, adolescents account for just a small proportion of infections. The increase in transmission rates in Europe in the autumn of 2020 cannot be attributed to the reopening of schools, and closing schools alone has little effect on limiting the spread of the virus (1). Very few young people become seriously ill, but the indirect consequences of stringent measures are a cause for concern.

When history reflects on the pandemic, it will not only look at infection rates and the number of hospital admissions and deaths, but how society protected its young.

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