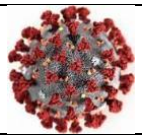
National COVID-19 Science Task Force (NCS-TF)



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Prevention of spread of SARS-CoV-2 in Switzerland in summer 2021, in the context of variants of concern and vaccination

Summary of problem

SARS-CoV-2 transmission in Switzerland is at low levels. The incidence of a new, highly transmissible variant of concern (delta variant) is, increasing, however. Travel within Europe has increased in June 2021, in association with the 2021 European football championships. The proportion of people being vaccinated is increasing, but as of late June 2021, the majority of the population has not been vaccinated and the number of people receiving vaccines is slowing. In view of a major relaxation in population-level measures to prevent SARS-CoV-2 transmission, what strategies are available to maintain low levels of SARS-CoV-2 transmission?

Executive summary

Measures to prevent the spread of SARS-CoV-2 work best in combination and when the number of incident cases is low. The delta variant is more transmissible than the previous alpha variant of concern and may cause more severe illness than the alpha variants. The delta variant of concern has the potential to cause large outbreaks of infection amongst the unvaccinated and partially vaccinated, and could reverse the gains of the roll-out of vaccines, which has reduced transmission, and severe disease and death from COVID-19. To balance the effects of relaxation of population-level non-pharmaceutical interventions such as social distancing, additional public health control measures that can reduce and prevent transmission of the delta variant should be strengthened. These measures include: vaccination; testing; systematic rapid detection of potential variants of concern; whole genome sequencing of all newly detected infections; enhanced contact tracing and continued use of masks and social distancing. Slowing the spread of SARS-CoV-2 delta variant infection will allow the full benefits of vaccination to be realised, keep the pressure off hospitals, and allow time to plan and implement strategies to reduce the impact of an increase in transmission of SARS-CoV-2, influenza and other respiratory infections, which is anticipated later in 2021/22.

Background

Low levels of SARS-CoV-2 infection make it easier to implement the combinations of infection control measures that aim to break chains of transmission[1]. SARS-CoV-2 transmission in Switzerland in summer 2021 is at similar levels to April 2020, with low numbers of diagnosed cases, low test positivity and, as of 21.06.2021, a reproduction number 0.61 (0.51-0.71), averaged over seven days and reflecting infections from 05.06. – 11.06.2021 [2].

Two events make the epidemiological situation in Switzerland in summer 2021 different from that in 2020 and affect the tools available to control the spread of SARS-CoV-2. First, highly efficacious vaccines have

[1] https://sciencetaskforce.ch/en/policy-brief/strategy-to-control-the-epidemic-of-sars-cov-2-in-switzerland/
[2] https://sciencetaskforce.ch/en/overview-and-evolution-of-the-situation-21-june-2021/

been licensed and rolled out in many countries[3]. The vaccines primarily reduce the severity of symptomatic COVID-19, but also prevent SARS-CoV-2 infection, transmission, increasing the level of population immunity. High levels of vaccine coverage in the elderly and in people with co-morbidities have markedly reduced the risk of severe disease and death from COVID-19. Second, however, SARS-CoV-2 variants of concern emerged in late 2020, making it harder to control the spread of infection[4]. The alpha variant (also widely known as B.1.1.7), which is highly transmissible and causes more severe disease than previously circulating variants, started circulating widely in Switzerland in December 2020 and, since April 2021, has accounted for most new SARS-CoV-2 in Switzerland[5]. A new variant of concern, delta (also known as B.1.617.2) is more transmissible and may cause more severe disease than the alpha variant[6,7]. As of June 2021, the delta variant accounts for almost all new SARS-CoV-2 infections in India and the UK and is spreading throughout Europe and the USA[8]. The delta variant was first detected in Switzerland in late March 2021 and accounts for an increasing number of samples that has been fully sequenced: 1.4% (based on 12 positive samples) in week 21, 4.6% (n=27) week 22, 14.7% (n=55) week 23 and 23.1% in week 24 (n=43 positive samples, as of 14.06.2021)[9].

The success in reducing SARS-CoV-2 transmission in 2021, despite the increased transmissibility and pathogenicity of the alpha variant, has allowed relaxations in population-level non-pharmaceutical interventions. On 23.06.2021, the government announced wide-ranging relaxation of social distancing measures, of restrictions on sizes of gatherings and travel, of mask requirements in public spaces, and of working from home Federal Office of Public Health, measures. Vaccines remain effective against the alpha variant and have made an important contribution to the reduced incidence of SARS-CoV-2 and of hospitalisation and death from COVID-19 [3,10]. Full vaccination with mRNA vaccines also appear to give high levels of protection against the symptomatic disease caused by the delta variant, but the effectiveness of a single dose is reduced[10]. The majority of the Swiss population, however, is not fully vaccinated. As of 28.06.2021, 32.3% of the population has received two doses and a further 16.5% has received one dose of an mRNA vaccine[11]. In the UK, where 46% of the population is fully vaccinated and another 17% partially vaccinated, the delta variant spread rapidly, replacing the alpha variant and reversing a strong downward trend in COVID-19 cases. The reproduction number in the UK has increased from below 1 to around 1.2-1.4, as of 25.06.2021 [12]. This change occurred in the context of both circulation of the delta variant and some relaxation in measures, although control measures remain stronger than in Switzerland[13]. Most new COVID-19 cases are in unvaccinated people. The numbers of hospitalisations and deaths from COVID-19 have increased, but more slowly than the number of cases.

Tools available to reduce the spread of SARS-CoV-2

[3] European Centre for Disease Prevention and Control. Technical report. Interim guidance on the benefits of full vaccination against COVID-19 for transmission and implications for non-pharmaceutical interventions. 21 April 2021. 2021 Stockholm.

[4] Harvey WT, Carabelli AM, Jackson B, Gupta RK, Thomson EC, Harrison EM, Ludden C, Reeve R, Rambaut A, Consortium C-GU, Peacock SJ and Robertson DL. SARS-CoV-2 variants, spike mutations and immune escape. Nat Rev Microbiol 2021;**19**(7): 409-424. https://www.ncbi.nlm.nih.gov/pubmed/34075212

[5] https://sciencetaskforce.ch/en/overview-and-evolution-of-the-situation-27-april-2021/

[6] https://www.medrxiv.org/content/medrxiv/early/2021/05/24/2021.05.22.21257658.full.pdf.
Public Health England. 25 June 2021 Risk assessment for SARS-CoV-2 variant: Delta (VOC-21APR-02, B.1.617.2). 2021 London.

[7] Public Health England. SARS-COV-2 variants of concern and variants under investigation in England. Technical briefing 17. 2021 London.

[8] World Health Organization. COVID-19 Weekly Epidemiological Update. Edition 41, published 25 May 2021. 2021 Geneva, World Health Organization: 31.

[9] https://cov-spectrum.ethz.ch/explore/Switzerland/AllSamples/AllTimes/variants/json=%7B%22variant%22%3A%7B%22name%22%3A%22B.1.617.2%22%2C%22mutations%22%3A%5b%5d%7D%2C%22matchPercentage%22%3A1%7D

[10] Lopez Bernal J, Andrews N, Gower C, Gallagher E, Simmons R, Thelwall S, Tessier E, Groves N, Dabrera G, Myers R, Campbell C, Amirthalingam G, Edmunds M, Zambon M, Brown K, Hopkins S, Chand M and Ramsay M. Effectiveness of COVID-19 vaccines against the B.1.617.2 variant. MedRxiv 2021. https://www.medrxiv.org/content/10.1101/2021.05.22.21257658v1?rss=1'

[11] https://www.bag.admin.ch/bag/de/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/massnahmen-des-bundes.html

[12] https://www.gov.uk/guidance/the-r-value-and-growth-rate

[13] https://ourworldindata.org/covid-stringency-index

Measures to prevent the spread of SARS-CoV-2 work best in combination and when the number of incident cases is low[1]. When a set of preventive measures is relaxed, alternative means of infection control are needed to counteract the increase in person-to-person contacts and opportunities for virus transmission.

Most of the tools described here to prevent SARS-CoV-2 transmission have been described before, as part of a strategy to keep case numbers low[1]. Vaccination is the newest and single most effective intervention to prevent COVID-19, including that caused by variants of concern. Developments in the national capacity for whole genome sequencing have improved the surveillance and monitoring of variants of concern.

1. Vaccination

Increasing the pace of vaccine roll-out to achieve full vaccination in as high a proportion of all eligible age groups will contribute substantially to reducing the spread of the delta variant. The effectiveness of mRNA vaccines against symptomatic infection caused by the delta variant (87.9%, 95% CI 78.2-93.2%) appears to be only slightly lower than against the alpha variant (93.4%, 95% CI 90.4-95.5%) after two doses[10]. Vaccine effectiveness against the delta variant after a single dose was low, however (33.2%, 95% CI 8.3-51.4%).

Vaccination is progressing, with 50% of the population having received at least one dose, and a peak of 4.06% of the population receiving their first dose during WK23 (7.6-13.6)[14]. An emerging concern is that the proportion receiving a first dose declined in WK24 and WK25 in Switzerland, with a 12% drop and a 34% from the peak, respectively. A further rapid deceleration can be expected during the school summer holiday period unless additional activities to increase uptake are implemented now.

Activities such as advertising campaigns, mobile vaccination units in underserved areas, flexible vaccination hours, vaccination without the need for an appointment and increased numbers of appointments at centres with waiting lists, could all help to increase the accessibility and uptake of vaccination.

2. Test Trace Isolate Quarantine (TTIQ)

The TTIQ strategy can be adapted and improved to increase its effectiveness in a situation with low COVID-19 case numbers, widely available options for testing, new digital notification technologies, such as the NotifyMe app and molecular tests to detect variants of concern.

2.1. Testing

Testing for SARS-CoV-2 is easier than ever before. Identifying infections in asymptomatic people through regular testing in businesses and schools, increased testing of contacts and of those with minimal symptoms means that contact tracing can start sooner. The symptoms of infection with the delta variant might differ from those with other variants, with more 'cold-like' symptoms.

The number of tests is <20,000 per day as of late, and lower than in April and May 2021, so there is plenty of capacity for increasing the number of tests.

All positive rapid diagnostic test results should be confirmed by PCR for two reasons: first to exclude false positives, which become more frequent as the incidence declines (low positive predictive value), even when test specificity is high. Second, a swab sample can be tested for the presence of mutations by PCR and can be sent for whole genome sequencing.

All positive test results should undergo immediate reflex PCR testing to detect mutations that are present in the delta variant. Even though there will be false positives (because some mutations are also present in other variants, rapid detection of a possible case of delta variant infection allows contact tracing to start more quickly (see 2.2).

All PCR-positive samples should be sent to a laboratory that conducts whole genome sequencing and results of phylogenetic analysis should be linked with epidemiological data about the likely location of exposure. Genomic surveillance gives the most accurate information about the places from which delta

[14] https://www.covid19.admin.ch/en/epidemiologic/vacc-persons?geoView=table

variant infections are being imported and can enhance information about countries with limited genomic surveillance. Whole genome sequencing also allows rapid detection of other new, potentially more serious, variants of concern. With the current low caseload there is sufficient capacity to conduct whole genome sequencing on all newly detected SARS-CoV-2 infections.

2.2. Contact tracing

There is sufficient capacity to conduct enhanced contact tracing for all people with newly diagnosed SARS-CoV-2 infection and to treat each of these new index cases as though they might be infected with the delta variant. Speed is of the essence in contact tracing of people infected with a variant of concern. If the diagnosis has been made on a result from a rapid test, intensive contact tracing can begin, even before results of reflex PCR testing or whole genome sequencing are received. The principles underlying contact tracing for COVID-19[15] and recommendations to increase contact tracing capacity have been published[16].

Enhanced contact tracing includes:

- Mapping the contacts and locations of all newly diagnosed cases. Determine which new cases are linked epidemiologically to an existing known case – this means that a transmission chain has been broken. An absence of identifiable links to an existing case means that the source of infection needs to be found and isolated.

- Forward contact tracing to find, test and quarantine people exposed to the new index case in the last 48 hours. Then, finding the close contacts of these contacts as quickly as possible.

- Backward contact tracing for 10 days to find the potential source of infection. The potential sources are identified from a list of high-risk events, adapted from guidance used in Japan[17]. Contact tracers can ensure that as many people as possible at those locations are tested as quickly as possible.

- Proactive offer to help people identified as contacts take up the offer of vaccination, if necessary.

2.3 Digital proximity tracing

Use of the SwissCovid and NotifyMe apps will further speed up the identification of unknown contacts.

2.3. Prevention of imported SARS-CoV-2 variants of concern

Active measures at the border for detection of SARS-CoV-2 infection should aim to minimise the risk of new SARS-CoV-2 outbreaks arising from undetected imported infection, particularly from new variants of concern and from countries with limited capacity for genomic surveillance. The European football championships have been associated with increased numbers of COVID-19 cases caused by the delta variant, for example in Denmark and Finland[18]. The origin and destination of incoming travellers should be able to be tracked. A travel history should be documented for all people with newly diagnosed SARS-CoV-2 infection and their contacts. The precautionary principle should be applied when the characteristics of a new variant of concern have not been fully determined (e.g. transmissibility, severity of disease, reduction in vaccine effectiveness against transmission, infection or disease). Measures to reduce arrival of people from countries in which the variant of concern is circulating widely, and enhanced measures for testing, and for isolation or quarantine on arrival can delay the introduction and allow time to develop appropriate measures for prevention and surveillance.

2.4 Additional public health measures as part of combination prevention

[15] https://sciencetaskforce.ch/en/policy-brief/contact-tracing-strategy-2/

[16] https://sciencetaskforce.ch/en/policy-brief/scalability-and-efficacy-considerations-for-test-trace-isolate-quarantine-ttiq/

[17] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8167834/pdf/41579_2021_Article_573.pdf.
Japan National Institute of Infectious Diseases. Guide on Active Epidemiological Investigation for Public Health Nurses In Response to COVID-19 in Japan. 2020.

[18] https://www.ecdc.europa.eu/en/publications-data/communicable-disease-threats-report-20-26-june-2021-week-25

Continued adherence to mask-wearing in indoor spaces, increased indoor ventilation, maintenance of safe distances between people is required to reduce the risk of transmission of SARS-CoV-2.

References