

THREAT ASSESSMENT BRIEF

Implications for the EU/EEA on the spread of the SARS-CoV-2 Delta (B.1.617.2) variant of concern

23 June 2021

Summary

Based on the available evidence, the SARS-CoV-2 Delta (B.1.617.2) variant of concern (VOC) is 40-60% more transmissible than the Alpha (B.1.1.7) VOC and may be associated with higher risk of hospitalisation. Furthermore, there is evidence that those who have only received the first dose of a two-dose vaccination course are less well protected against infection with the Delta variant than against other variants, regardless of the vaccine type. However, full vaccination provides nearly equivalent protection against the Delta variant.

Based on the estimated transmission advantage of the Delta variant and using modelling forecasts, 70% of new SARS-CoV-2 infections are projected to be due to this variant in the EU/EEA by early August and 90% of infections by the end of August.

There is a well-documented age-risk gradient for SARS-CoV-2, where older age groups and those with underlying co-morbidities are more likely to be hospitalised or die due to COVID-19. In a scenario of 50% gradual reduction of non-pharmaceutical intervention (NPI) measures by 1 September, SARS-CoV-2 incidence is expected to increase in all age groups, with the highest incidence in those <50 years.

Modelling scenarios indicate that any relaxation over the summer months of the stringency of non-pharmaceutical measures that were in place in the EU/EEA in early June could lead to a fast and significant increase in daily cases in all age groups, with an associated increase in hospitalisations, and deaths, potentially reaching the same levels of the autumn of 2020 if no additional measure are taken.

Risk assessment

Evidence accumulated since the first threat assessment brief on the emergence of the SARS-CoV-2 Delta variant in India, published 11 May 2021, resulted in the Delta variant being upgraded from a Variant of Interest (VOI) to a VOC. The assessment of the risk for infection to unvaccinated and paritally vaccinated individuals from the Delta VOC in the EU/EEA has also increased.

Considering the very high probability of the Delta VOC becoming the dominant variant in the EU/EEA:

- The overall risk of SARS-CoV-2 infection related to the expected increase in circulation of the Delta VOC for the general population is considered to be **low** for fully vaccinated sub-populations and **high-to-very high** for partially or unvaccinated sub-populations.
- The overall risk of SARS-CoV-2 infection related to the expected increase in circulation of the Delta VOC for vulnerable population is considered to be **low-to-moderate** for fully vaccinated sub-populations and **very high** for partially or unvaccinated sub-populations.

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Since ECDC's most recent risk assessment published on 10 June, and given the expected future predominance of the Delta variant, the risk has increased for countries in all epidemiological situations. Without continued application of NPI measures and further rapid rollout of full vaccination, sharp increases in new infections, hospitalisations and deaths may be observed.

Options for response

Full vaccination of all groups at increased risk of severe COVID-19 should be achieved as early as possible to reduce the risk of hospitalisations and deaths. In order to achieve maximum protection in the shortest time possible, it is recommended that individuals at highest risk of severe outcomes for SARS-CoV-2 receive a second vaccine dose in the shortest possible interval following the administration of the first dose.

The continuation of vaccination rollout at current levels is crucial in order to keep the incidence levels at manageable levels, and further acceleration of vaccination rollout, including achieving higher levels of vaccination coverage, could have a substantial impact on decreasing incidence, hospitalisations and deaths, particularly in older age groups.

Non-pharmaceutical interventions should be maintained at a level sufficient to contain community transmission of the Delta VOC until greater shares of the population are fully vaccinated, in order to avoid a resurgence of cases with a possible increase in hospitalisations and mortality.

Genomic surveillance of currently circulating variants (including weekly representative samples of sufficient sample size and targeted samples from special settings and populations) is of high importance for early detection and monitoring of emerging SARS-CoV-2 variants. Member States who require support to reach sequencing targets can use ECDC services for sequencing of SARS-CoV-2.

Introduction

For disease background information, please refer to the ECDC latest evidence on COVID-19 https://www.ecdc.europa.eu/en/covid-19/latest-evidence.

Further information on COVID-19 surveillance in the European Union and European Economic Area (EU/EEA) can be found in the ECDC weekly surveillance reports https://www.ecdc.europa.eu/en/covid-19/surveillance/weekly-surveillance-report and in the ECDC country overview reports https://www.ecdc.europa.eu/en/covid-19/country-overviews.

Information on the vaccination rollout in the EU/EEA can be found on ECDC's dedicated webpage https://covid19-vaccine-report.ecdc.europa.eu.

The European Centre for Disease Prevention and Control regularly assesses new evidence on variants detected through epidemic intelligence, rules-based genomic variant screening, or other scientific sources. As of 22 June 2021, there are five variants designated as variants of concern (VOCs) by ECDC which are under surveillance in the EU/EEA and around the world: Alpha (B.1.1.7), Alpha+E484K (B.1.1.7+E484K); Beta (B.1.351); Gamma (P.1) and Delta (B.1.617.2). Seven other SARS-CoV-2 variants are considered variants of interest (VOIs) by ECDC and additional variants are being monitored. Definitions and updates to the list of VOCs, VOIs and variants under monitoring are available at https://www.ecdc.europa.eu/en/covid-19/variants-concern.

Since the last ECDC threat assessment brief 'Emergence of SARS-CoV-2 B.1.617 variants in India and situation in the EU/EEA' [1] and as further described in the ECDC rapid risk assessment 'Assessing SARS-CoV-2 circulation, variants of concern, non-pharmaceutical interventions and vaccine rollout in the EU/EEA, 15th update' [2], SARS-CoV-2 lineage B.1.617.2 has been added to the list of VOC, based on evidence indicating increased transmissibility and immune escape with a likely impact on the epidemiological situation in the EU/EEA [1].

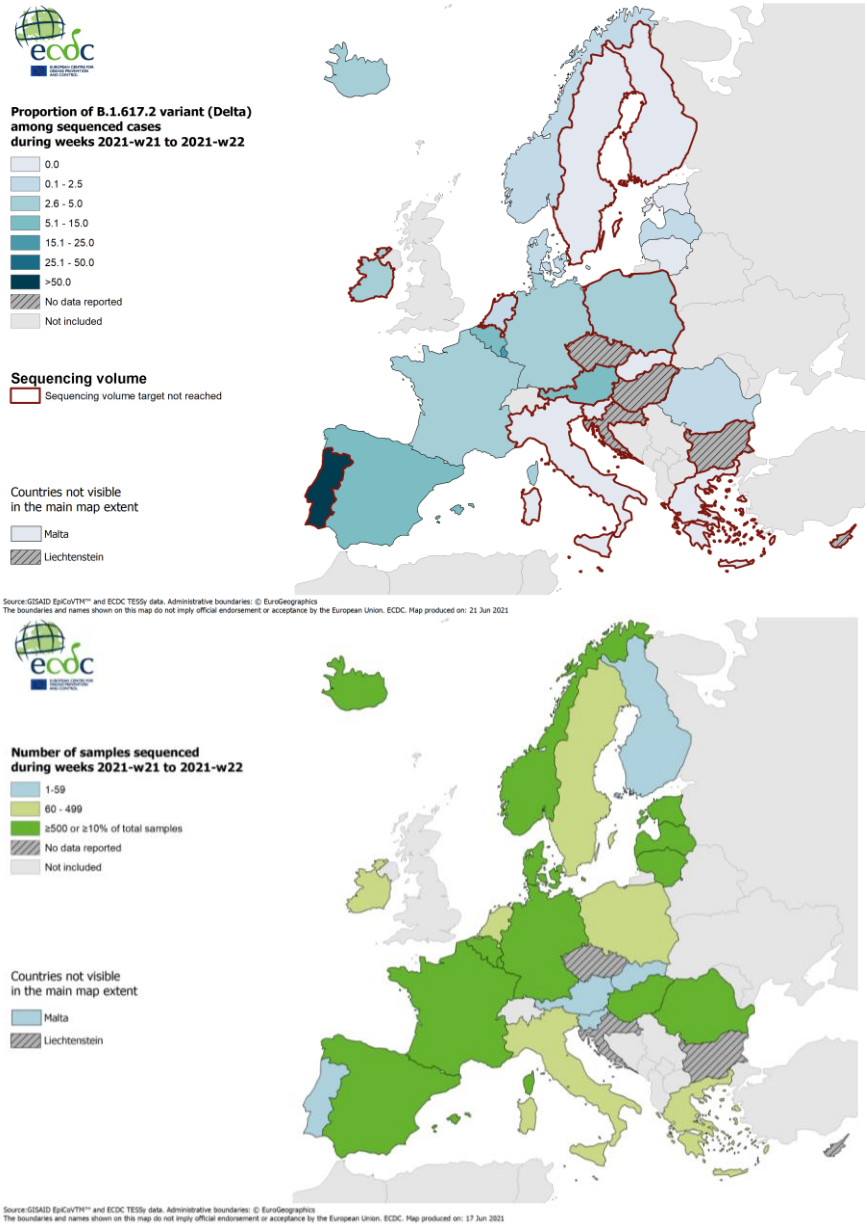
The aim of this threat assessment brief is to assess potential public health implications of the spread of the SARS-CoV-2 Delta VOC for the EU/EEA.

Event background

Since its first detection in India in December 2020 [1], the Delta VOC has been reported by at least 85 countries globally, according to the World Health Organization (WHO) [3]. The variant is dominant among cases in India, the United Kingdom (UK) and Moscow, Russia [4,5]. Early data from the UK public health authorities suggest increased transmissibility compared to wild-type (first wave) virus and a reduction in vaccine effectiveness, especially in individuals having received only one vaccine dose (of a two-dose regimen). On 24 May 2021, the Delta variant was classified by ECDC as a VOC [1].

By 21 June 2021, cases of the Delta VOC have been identified in 23 EU/EEA countries [3,6,7]. Among these, the proportion of Delta VOC among sequenced cases during weeks 21-22, 2021 ranged from 0.0 to 66.2% (Figure 1, top figure), although the sequencing volume varies significantly by country (Figure 1, bottom figure). Among the 12 countries that sequenced at least 10% of their isolates or at least 500 samples during weeks 21-22, the median proportion of Delta VOC detected was 2.4% (range 0.0–18.5%), which represents an increase compared to 0.0% (range 0.0-11.7%) observed in week 20-21. In Luxembourg, the proportion of Delta VOC doubled from 15.4% in week 21 to 30.9% in week 22 [9]. The overall SARS-COV-2 incidence of new cases, however, continued to decrease.

Figure 1. Proportion of Delta VOC among sequenced cases (top figure), and number of samples sequenced (bottom figure), weeks 21-22/2021 (data from GISAID EpiCoV and ECDC TESSy)



Note: For Italy and Estonia, the numbers represent any B.1.617 variant, though the proportion of variants other than B.1.617.2 is considered to be very low.

On 18 June 2021, Public Health England (PHE) reported evidence of detections of B.1.617.2 carrying an additional K417N mutation (38 cases) [4]. The mutation has been suggested to be involved in immune escape and to affect binding of the spike protein to the ACE2 receptor [10]. In the PANGO lineage designations, the mutational profile B.1.617.2+K417N is described by the AY.1 and AY.2 lineages [11]. As of 18 June 2021, the AY.1 lineage has been detected in three EU countries (France, Poland and Portugal), while the AY.2 lineage has been detected in one country (Portugal), according to the GISAID EpiCov data. The proportion of the B.1.617.2 + K417N variant is currently very low in EU/EEA countries.

Transmissibility of the Delta variant

Based on global data submitted to GISAID, the estimated effective reproductive number for the Delta VOC is 55% (95%CI 43-68%) higher than the Alpha VOC and 97% (95%CI 76-117%) higher relative to non-VOC/VOI [12]. Estimates from the UK indicate similarly, that the Delta VOC is 40-60% more transmissible than Alpha [13]. In the UK, the Delta VOC spread rapidly, despite relatively high vaccination coverage. After being first reported in mid-March 2021, the Delta VOC became the predominant variant in the UK by mid-April and, as of 14 June 2021, accounted for 91% of sequenced cases [4].

The UK has observed higher secondary attack rates for Delta VOC than Alpha VOC. For contacts of cases without travel history, the secondary attack rate was 11.4% (95%CI 11.1% to 11.7%) for the Delta VOC compared to 8.0% (95%CI 7.8% to 8.1%) for the Alpha VOC. Secondary attack rates were higher for household contacts of cases compared to non-household contacts [14] and a matched case-control study conducted in the UK suggests that the Delta VOC could be more strongly associated with household transmission than the Alpha VOC. Secondary attack rates for contacts of travel-related cases were higher for the Delta VOC than the Alpha VOC.

Impact on disease severity

In an analysis of surveillance data on all COVID-19 cases reported to The European Surveillance System (TESSy) by ten countries for the period 28 December 2020 to 16 May 2021, the hospitalisation attack rate was 3.3% for cases aged 40-49 years and then nearly doubled with increasing decade of age, reaching 25.3% for those aged 70-79 years and 36.2% for those aged 80 years and over. Over the same period, cases aged 50 years and over accounted for 39% of all cases, but for 83% of cases admitted to hospital (Table 1).

Table 1. Age distribution of all COVID-19 cases, hospitalised cases and crude hospitalisation rate among cases in ten EU/EEA countries, 28 December 2020 to 16 May 2021

Age group (years)	All cases, n (%)	Hospitalised, n (%)	Hospitalisation rate among cases, % (95% CI)
80+	294 382 (6)	106 457 (28)	36.2 (36.0-36.3)
70-79	352 484 (7)	89 054 (23)	25.3 (25.1-25.4)
60-69	561 287 (11)	71 199 (19)	12.7 (12.6-12.8)
50-59	877 224 (17)	52 042 (14)	5.9 (5.9-6.0)
40-49	879 073 (17)	28 586 (7)	3.3 (3.2-3.3)
30-39	778 931 (15)	17 895 (5)	2.3 (2.3-2.3)
20-29	682 051 (13)	10 125 (3)	1.5 (1.5-1.5)
10-19	524 211 (10)	3 775 (1)	0.7 (0.7-0.7)
<10	349 020 (7)	4 397 (1)	1.3 (1.2-1.3)

Source: case-based data reported to TESSy up to week 23/2021 by Austria, Cyprus, Czechia, Finland, Germany, Italy, Luxembourg, Malta, Poland and Slovakia. The most recent four weeks of data were excluded to eliminate potential bias due to incomplete reporting of severe outcomes.

Regarding the Delta VOC, early data from Scotland showed an increased risk of hospitalisation (HR) (1.85; 95%CI 1.39-2.47; data adjusted for age, sex, poverty index, temporal trend, and comorbidities) among cases infected with the Delta VOC (as detected by PCR S-gene screening positivity), compared with those infected with the Alpha VOC [4]. Similarly, a record linkage study in England found increased risk for hospitalisation among individuals infected with the Delta VOC compared to the Alpha VOC (2.26; 95%CI 1.32-3.89; data adjusted for age, sex, ethnicity, residence, vaccination status) [15].

In the UK analysis, cases infected with the Delta VOC had a case-fatality rate of 0.3% (95%CI 0.2-0.5%) compared to 2.0% (95%CI 1.9-2.0%) for cases infected by the Alpha VOC, after 28 days of follow up. However, this feature should be interpreted with caution given the relatively short follow-up time, particularly for the more recent Delta VOC cases. Furthermore, this is a crude estimate, e.g. not adjusted for age, sex, vaccination status, temporal trend, comorbidities or poverty index.

Potential impact on immune escape (reinfection and *in-vitro* neutralisation studies)

Results from a study monitoring the occurrence of reinfections through PCR testing every two weeks in a cohort of highly vaccinated individuals (95%) in the UK, indicate that during the period that the Delta VOC became prevalent, reinfections remained at very low numbers in individuals previously either PCR positive or seropositive [4].

In a pre-print study, Planas et al. use a vero cell-amplified Delta VOC virus isolated from a symptomatic patient, assessing the sensitivity of Delta VOC to a panel of four clinically approved monoclonal antibodies, bamlanivimab (LY-CoV555), etesevimab (LY-CoV016), casirivimab (REGN10933) and imdevimab (REGN10987). Bamlanivimab lost antiviral activity against B.1.617.2, in line with previous results demonstrating that L452R is an escape mutation for this monoclonal antibody, whereas etesivimab, casirivimab and imdevimab remained active against Delta VOC. They assessed the neutralising ability of sera from PCR-confirmed or seropositive subjects (n=56) experiencing critical, severe, and mild- to-moderate disease six months post infection. For the Delta VOC, neutralising titres were significantly decreased by four to six-fold when compared to D614G and Alpha VOC strains, respectively. A similar reduction in neutralising titres was observed for Beta VOC. They conducted additional analyses of sera collected from PCR-confirmed SARS-CoV-2 infected healthcare workers 12 months after infection (n=48). Of these, 27 were unvaccinated, with neutralising activity of convalescent sera against Delta VOC showing a six-fold decrease when compared to the Alpha VOC. Twenty-one received a single dose of vaccine (Vaxzevria n=9, Comirnaty n=9, COVID-19 Vaccine Moderna n=3) seven to 81 days prior to sampling. Sera from these participants showed a 130-fold increase in median neutralising antibody titres against both Alpha and Delta VOCs suggesting that a single dose of vaccine given to a recovered individuals boosts cross-neutralising antibody responses. They concluded their analyses by assessing the neutralising capacity of vaccine-elicited serum antibodies in individuals that were not previously infected with SARS-CoV-2. Sixteen individuals received the Comirnaty vaccine (sera collected at week 8 [5 weeks after the second dose] n=16; sera collected at week 16, [13 weeks after the second dose] n=13). At week 8, they observed a three-fold and 16-fold reduction in neutralising titres against Delta and Beta VOCs, respectively, when compared to the Alpha VOC. Similar differences between strains were observed at week 16, although titres were lower globally. Serum from 12 individuals receiving only a single dose of the Vaxzevria vaccine (sera collected 10 weeks after a single dose) induced significantly lower levels of antibodies neutralising Delta and Beta VOCs, when compared to D.614G and the Alpha VOC [16].

A pre-print study by Yadav et al. evaluated the neutralising capability of sera collected from cases who had recovered from COVID-19, five to 10 weeks post infection (n=20; 17 with B.1 and 3 with B.1.617.1) and those vaccinated, 28 days after receiving two doses of BBV152 (n=17) against Delta and Beta VOCs, in addition to the prototype B.1 (D614G) variant. They observed a reduction in neutralising titres with sera from COVID-19 recovered cases (4.6-fold and 3.3-fold) and those vaccinated by BBV152 vaccines (2.7-fold and 3.0-fold) against Delta and Beta VOCs, respectively. Whilst a reduction was observed in neutralising titres, the authors conclude that sera from those vaccinated with BBV152 retained similar protective neutralising capacity against both Delta and Beta VOCs [17].

A recently published study on the ability of monoclonal antibodies, convalescent and vaccine sera to neutralise B.1.617.1 and Delta VOC showed that neutralisation of both lineages is reduced when compared with ancestral Wuhan related strains. Although there is a reduction in neutralisation titres using convalescent or vaccine sera (from individuals fully vaccinated with either Comirnaty and Vaxzevria), there is no evidence of widespread escape in this study which suggest that the current generation of vaccines will provide protection against the B.1.617 lineage, although reduced titres may lead to some breakthrough infections. However, Beta and Gamma VOCs sera showed markedly more reduction in neutralisation of Delta VOC suggesting that individuals previously infected by these variants may be more susceptible to reinfection by Delta VOC. In line with other studies, authors found that following a single dose of Comirnaty, neutralisation of Delta VOC is limited (a similar assay was not done with Vaxzevria vaccine in this study). Administration of two doses for those at greatest risk will therefore significantly increase the probability of prevention of infection [18].

Taken together, evidence from pre-print and published literature indicate that emergence of the Delta VOC is not associated with an increase in reinfections amongst recovered individuals infected with previously circulating SARS-CoV-2 strains. Although sera from convalescent and vaccinee sera demonstrate reduced neutralisation capacity against the Delta VOC when compared to ancestral strains, they effectively neutralise the Delta VOC in-vitro.

Potential impact on immune escape (vaccine efficacy studies)

Available evidence indicates that those who have only received the first dose of a two-dose vaccination course are less protected against infection with the Delta VOC than against other variants, regardless of the vaccine type. However, full vaccination provides nearly equivalent protection against the Delta VOC as for the Alpha VOC.

A recent preprint study from the UK found a reduction in vaccine effectiveness (VE) after the first dose among individuals with symptomatic Delta VOC infection (VE after single dose 33.5% (95%CI 20.6-44.3) compared to individuals with symptomatic Alpha VOC infection (VE after single dose 51.1% (95%CI 47.3-54.7), with similar results for both Comirnaty and Vaxzevria [19]. After the second dose of either vaccine, only minor reductions in VE were seen, with an effectiveness for Comirnaty going from 93.4% (95%CI 90.4 to 95.5) to 87.9% (95%CI 78.2 to 93.2) and for Vaxzevria from 66.1% (95%CI 54.0 to 75.0) to 59.8% (95%CI 28.9 to 77.3). The study used a test negative case control design and included data on all symptomatic sequenced cases of COVID-19 in England (a total of 12 675 cases of which 11 621 were infected with the Alpha VOC and 1 054 with the Delta VOC.

Vaccine effectiveness against hospitalisation for the Delta VOC was 94% (95%CI 46-99%) after one dose of Comirnaty, which is comparable to the 96% (95%CI 86-99%) observed after two doses, albeit with a wider confidence interval. For Vaxzevria, vaccine effectiveness against hospitalisation due to Delta VOC infection was 71% (95%CI 51-83%) after one dose and 92% (95%CI 75-97) after two doses, which is similar to that described for infections with the Alpha VOC. These findings indicate that protection against hospitalisation for Delta VOC infection remains very high following the administration of one dose of either vaccine.

A study from Scotland using a surveillance platform and a test negative design showed that both Comirnaty and Vaxzevria are highly effective against Delta VOC infections, however, having received two vaccine doses provides stronger protection against the risk of hospitalisation or the risk of infection in the community [14].

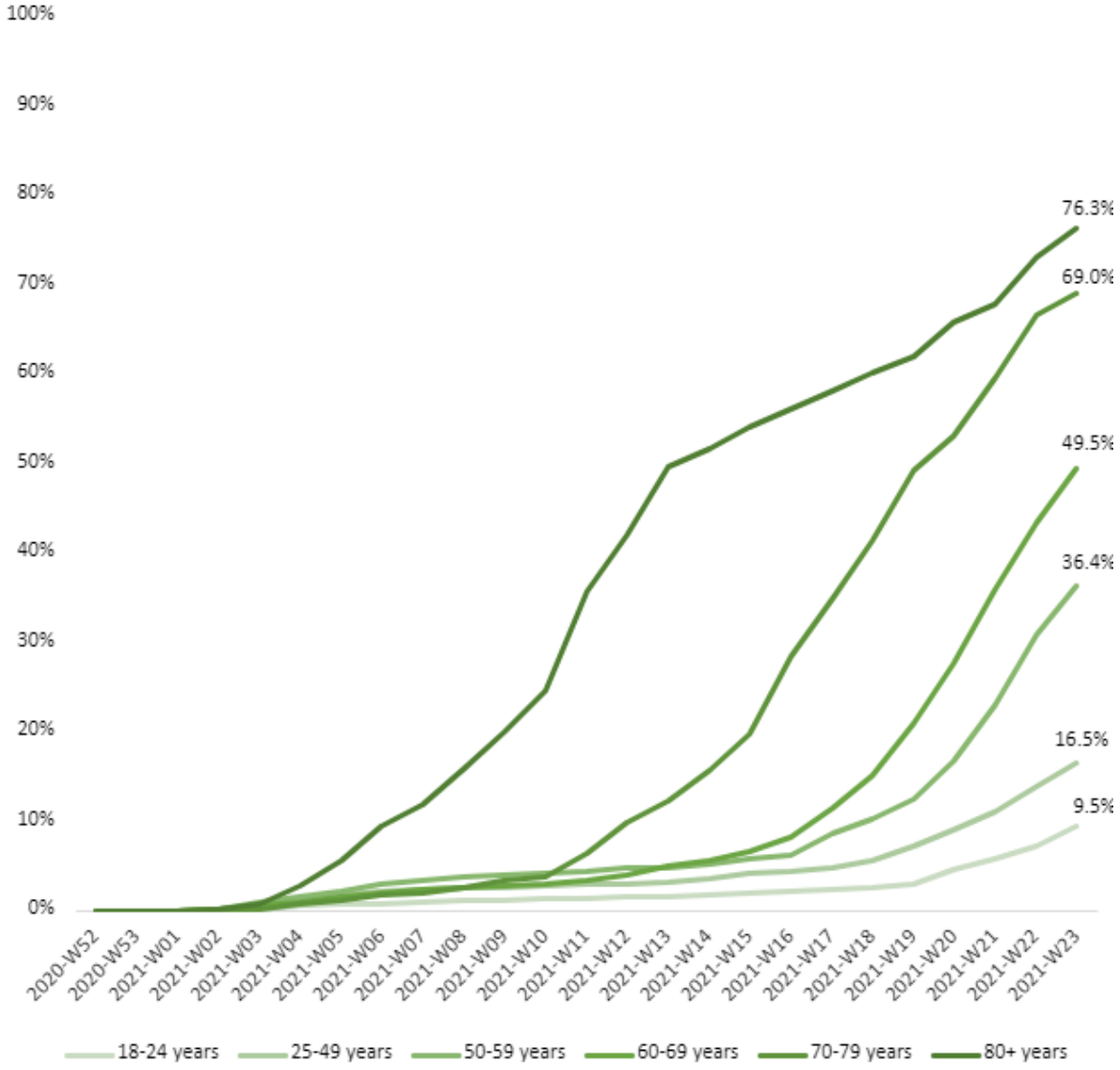
Heterologous prime-boost schedules have often shown a stronger immunogenicity profile (and possibly protection) compared to homologous prime-boost schedules. In terms of COVID-19, there are several studies in the EU/EEA looking at reactogenicity, immunogenicity and safety of heterologous schedules. In a small study from Germany of heterologous prime-boost vaccination, a cohort of 26 individuals with median age 30.5 years received a Vaxzevria prime followed by a Comirnaty boost in an eight-week interval. Results suggest that this heterologous vaccination regimen is at least as immunogenic and protective as homologous vaccinations. The heterologous Vaxzevria/Comirnaty prime-boost vaccination regimen was not shown to be associated with serious adverse events and resulted in a potent humoral immune response and elicited T cell reactivity. Alpha, Beta and Delta VOCs were potently neutralised by sera of all participants in the study [20]. There are no in vivo studies showing the effectiveness of heterologous vaccination against infection with Delta VOC.

Vaccine rollout

Context of vaccine strategy adjustment

As of 13 June 2021, approximately 300 million vaccine doses have been administered in the EU/EEA, including over 25 million in the last week. Based on data available from 29 countries, 85% of the doses distributed in the EU/EEA since the beginning of the rollout have been administered. Since the start of the COVID-19 vaccine deployment in the EU/EEA in December 2020, the cumulative vaccine uptake in the adult population (aged 18 years and older) in the EU/EEA has reached 52.4% for at least one vaccine dose (range 15.2-69.6%) and 29.6% for the full vaccination course (range 12.4-59.3%) (30 reporting countries). Cumulative vaccine uptake is higher in target groups that have been prioritised since the beginning of the vaccine rollout, in particular the elderly and healthcare workers (HCW). In people aged 80 years and above, the median vaccine uptake is 79.8% (range 15.3-100%) for at least one dose, and 72.5% (range 12.1-100%) for the full vaccination course (26 countries reporting). Ten countries have administered the full vaccination course to more than 80% of the population aged 80 years and above [21]. In people aged 60 years and above, the median vaccine uptake as of 21 June 2021 is 78.2% (range 21.6-99.1%) for one dose and 57.3% (range 17.6-83%) for two doses [21].

Figure 2. Median cumulative uptake (%) of full vaccination coverage by age group and reporting week* in EU/EEA countries as of 2021-06-13



**Data from 27 reporting countries (data from the current week are preliminary)*

In order to achieve rapid vaccination rollout and considering the levels of supply of doses, countries have put in place strategies to vaccinate as many people in the groups at high risk of severe COVID-19 as possible in the shortest time possible. This resulted in 64% (16/25) of EU/EEA countries extending the recommended timing between doses for vaccines that have a two-dose schedule [22].

While this approach had the advantage of providing a wider coverage of the most vulnerable with some degree of protection in a shorter time period, it resulted in fewer people being fully vaccinated by the two-dose vaccination regimen [22]. As vaccine supply continues to increase and evidence emerges showing higher transmissibility and lowered vaccine effectiveness of one dose against symptomatic disease from the Delta VOC, some countries are starting to shorten the timing between doses to ensure that the maximum number of vulnerable people are protected more rapidly with full vaccination. Also, approximately half of EU/EEA countries are recommending a single dose of COVID-19 vaccine to those previously infected with SARS-CoV-2 [22]. Among previously infected individuals, studies have shown that vaccination with one dose provides comparable immunogenicity compared to fully vaccinated individuals [22-29]. However, it is still unclear whether this will translate into comparable protection and duration of protection, in particular in the light of emerging immune escape variants. Additionally, a maintained high titer of neutralising antibodies is more likely to provide protection against severe disease caused by VOCs such as Delta.

Modelling scenarios

Many EU/EEA countries are currently implementing or considering the partial lifting of the non-pharmaceutical interventions (NPIs). Lifting of such measures would result in increased opportunities for viral transmission. On the other hand, vaccination rollout is continuing and is reducing SARS-CoV-2 transmission and downstream severe outcomes such as hospitalisation and death. Future case notification rates will depend on the interaction between this increasing immunity and the likely greater contact between people as NPIs are eased. Importantly, it is becoming increasingly likely that the currently dominant Alpha variant will be replaced by the more transmissible Delta variant.

Here, we simulate the projected number of COVID-19 cases, deaths and hospitalisations for the coming summer months. We assume that the vaccination programme continues with its current supply of vaccine doses, its current priority of age groups, and dose spacing. These projections are based on the reported vaccine coverage by age group and dose [31]. We project the changes in NPIs stringency based on the trends in the ECDC-JRC Response Measures Database [32,33] of the past three months, and for the months ahead we assume several scenarios of NPI relaxation. We assume the spread of a new variant with properties mirroring the new Delta variant. We project the proportion of this new variant based on the assumed transmission advantage and assuming the same generation interval as previous variants (a Delta prevalence in the EU/EEA of 70% by beginning of August, 90% by the end of August 2021) [34]. We generate COVID-19 cases by age group, where we assume that case distribution is similar to the one observed during May 2020, taking into account shifted age case distribution due to vaccination. We further estimate projected hospitalisation and deaths based on age-based case-fatality and case-hospitalisation rates observed while wildtype SARS-CoV-2 was dominant (October and November 2020), and we adjust those rates according to evidence of increased severity of the Delta variant as well as current evidence of vaccine protection against severe outcomes by this variant, including for partially and fully immunised. These estimates account for the evolving proportion of the new variant.

We present four different scenarios of NPI relaxation:

- continuation of today's stringency of NPIs (grey);
- a gradual 50% reduction in the stringency of NPIs by 1 July 2021 (green);
- a gradual 50% reduction in the stringency of NPIs by 1 September 2021 (blue);
- a gradual reduction in the stringency of NPIs up to 100% by 1 September 2021 (orange).

Simulations show that there is a large risk associated with rapidly lifting NPIs in the presence of a more transmissible variant. While a fast relaxation of NPI stringency could lead to a fast and significant increase in daily cases, hospitalisations, and deaths, keeping current NPI stringency, while continuing or even accelerating vaccination rollout to those most at risk of severe outcomes, can help keep them low. Under different scenarios and unless NPI measures are maintained, a high increase in both hospitalisations and deaths is possible (green and orange scenario in Figures 3, 5, 6), potentially reaching levels of last autumn if no additional measures are taken. Furthermore, entering autumn with such high incidence could pose an additional risk as school re-opening and associated adult contact patterns together with climate factors, are expected to further increase transmission rates.

Examining the age structure of infections, we see that the younger age groups (<25 and 25-49 years) are projected to be most prevalent over the course of the summer, with those over 60 years of age presenting the least number of new daily cases. Additionally, the vaccine rollout has a large impact on both hospitalisation and death rates, due to at-risk groups having a relatively high vaccination coverage. This indicates that the continuation of vaccination rollout at current levels is crucial in order to keep the incidence levels at manageable levels, and that further acceleration of vaccination rollout, including achieving higher levels of vaccination coverage, could have a substantial impact on decreasing incidence, hospitalisations and deaths, particularly in older age groups.

Figure 3. Estimation of possible changes in daily COVID-19 incidence in the EU/EEA according to four NPI relaxation scenarios 24 May – 31 August 2021, with a variant with 50% higher transmissibility, but no reduction in vaccine efficacy against disease

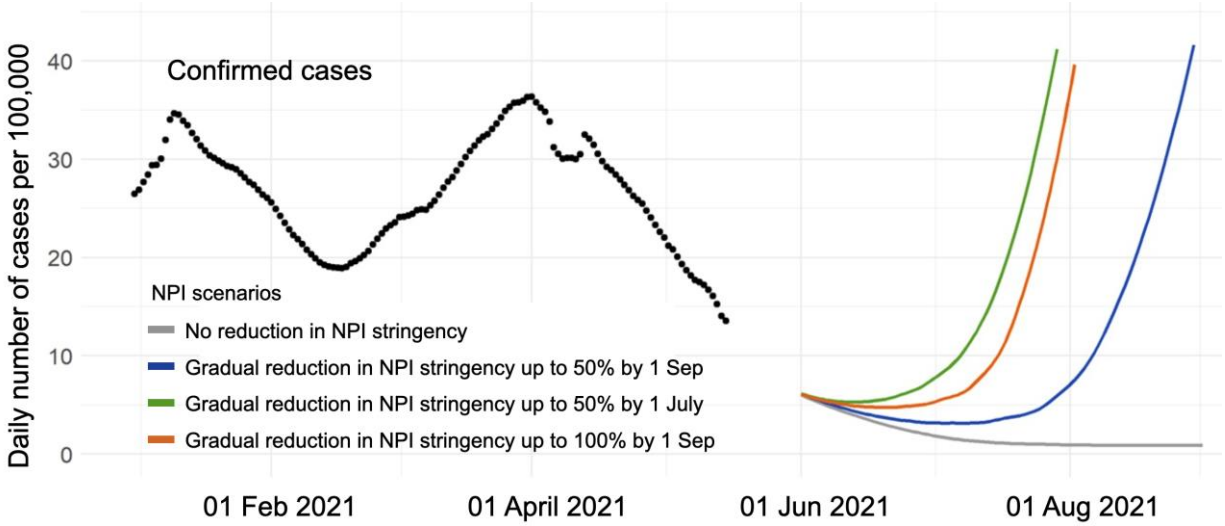


Figure 4. Estimation of possible changes in daily COVID-19 incidence in the EU/EEA across different age groups under a more conservative 50% reduction in the stringency of NPIs by 1 September 2021

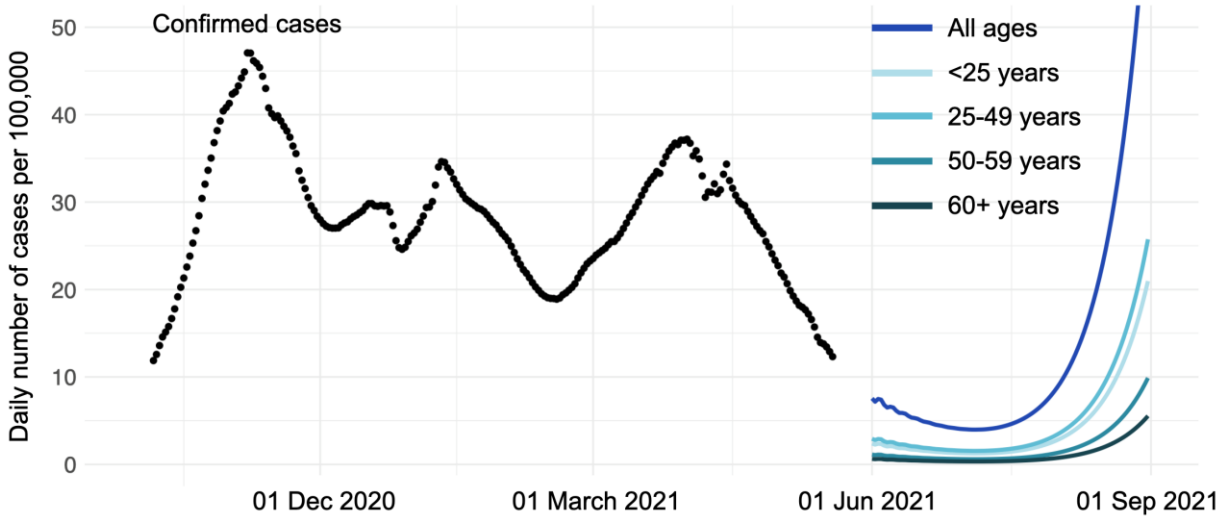


Figure 5. Estimation of possible changes in daily COVID-19 hospitalisation in the EU/EEA according to four NPI relaxation scenarios

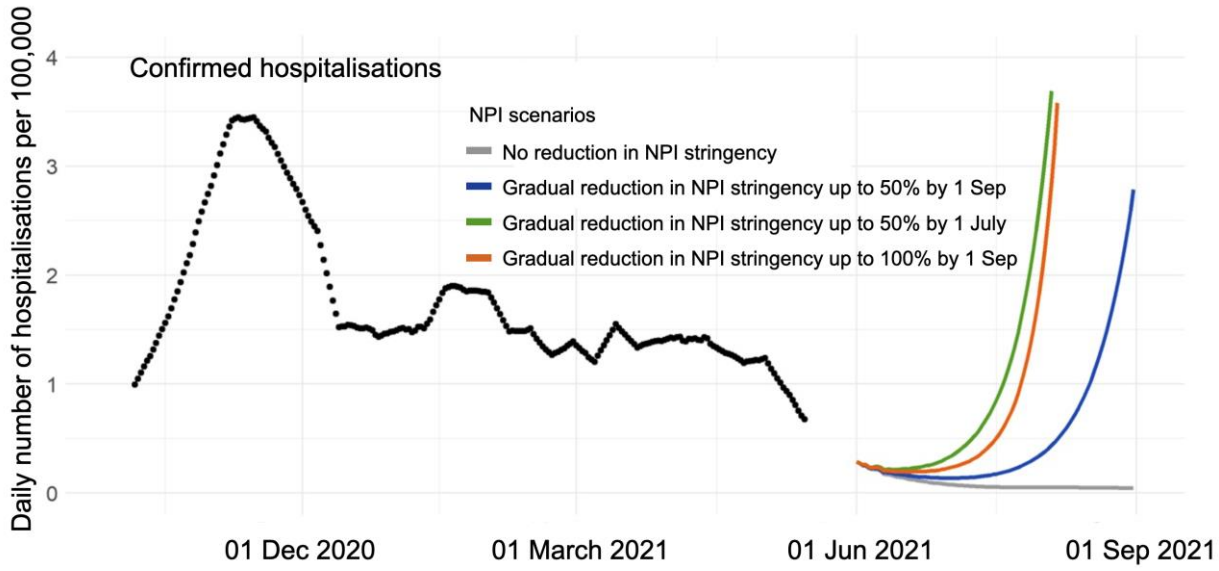
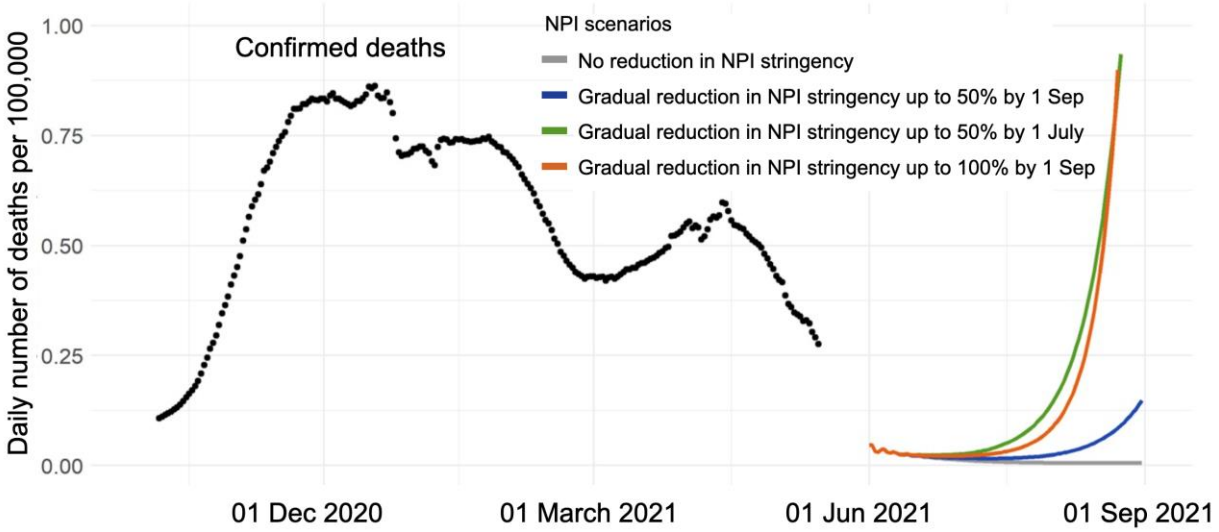


Figure 6. Estimation of possible changes in daily COVID-19 deaths in the EU/EEA according to four NPI relaxation scenarios



Non-pharmaceutical interventions

After intensive measures implemented throughout the course of the pandemic and continuing through spring 2021, most EU countries are in the process of relaxing NPIs to a greater or lesser extent, following the decline in disease trends observed in the past weeks.

Detailed up-to-date information on the public health measures implemented at national level are available in the Weekly COVID-19 country overview. In addition, a repository with all current and past NPIs for each EU/EEA country is publicly available by ECDC and the Joint Research Centre (JRC) at https://covidstatistics.jrc.ec.europa.eu/RMeasures.

Risk assessment question

Based on current vaccination coverage and plans for partial relaxation of NPIs in the EU/EEA, what is the risk related to the expected increase in circulation of the Delta VOC for the general and vulnerable populations?

ECDC risk assessment for the EU/EEA

The probability that SARS-CoV-2 Delta VOC becomes rapidly dominant in the EU/EEA is considered **very high.** Based on the estimated transmission advantage of the Delta variant, 70% of new SARS-CoV-2 infections in the EU/EEA as of early August are projected to be due to this variant. As a consequence, based on available evidence, there is a **very high** probability that there will be a surge of SARS-CoV-2 infections in the community.

This assessment is based on information available to ECDC at the time of publication and the assessment of risk refers to the risk that existed at the time of writing. It follows the ECDC rapid risk assessment methodology, with the overall risk determined by a combination of the probability of an event occurring and its consequences (impact) for individuals or the population [35].

The current assessment of the risk posed by the spread of SARS-CoV-2 Delta VOC is stratified by two population groups (**general population** and **vulnerable population)** and within these groups by two sub-groups (fully vaccinated and partially vaccinated or unvaccinated) and is based on the following elements:

- Available evidence of Delta VOC characteristics indicative of:
  - increased transmissibility [4,11-13],
  - higher hospitalisation risk/increased severity [4,15],
  - low vaccine effectiveness for symptomatic disease after partial vaccination (eg, one dose for two dose vaccines) [19];
- Data on current vaccination coverage in EU/EEA countries [21];
- Indications for plans for partial relaxation of NPIs by most EU/EEA countries.

Considering the very high probability of the Delta VOC becoming the dominant variant in the EU/EEA:

- The overall risk of SARS-CoV-2 infection related to the expected increase in circulation of the Delta VOC for thr general population is considered to be **low** for fully vaccinated sub-populations and **high-to-very high** for partially or unvaccinated sub-populations.
- The overall risk of SARS-CoV-2 infection related to the expected increase in circulation of the Delta VOC for the vulnerable population is considered to be **low-to-moderate** for fully vaccinated sub-populations and **very high** for partially or unvaccinated sub-populations.

Table 2. Probability and impact of infection with the Delta VOC in the general population and vulnerable populations by vaccination status. Results of the risk assessment using the ECDC algorithm [35]

	Probability	Impact	Overall risk
General population			
Fully vaccinated	Low	Low	**Low**
Partially vaccinated or unvaccinated	Very high	High	**High to very high**
Vulnerable population			
Fully vaccinated	Moderate	Moderate	**Low to moderate**
Partially vaccinated or unvaccinated	Very high	Very high	**Very high**

There is a **moderate** probability of infection for fully vaccinated individuals in the vulnerable population, while it is considered **low** in the general population. This difference takes into account that a large part of the fully vaccinated sub-population in the vulnerable population are older and it is assumed that in this group vaccine effectiveness is reduced compared to the general population (Table 1) [36].

Since the first threat assessment brief on the emergence of SARS-CoV-2 B.1.617 in India published on 11 May 2021 [1], the Delta VOC was upgraded from a VOI to a VOC. As a result of increasingly available evidence on increased transmissibility, higher hospitalisation risk/increased severity and lower vaccine effectiveness for symptomatic disease after partial vaccination, the assessment of the risk for infection from the Delta variant in the EU/EEA has increased. Since ECDC's most recent risk assessment, published on 10 June [2] and given the expected future predominance of the Delta variant, the risk has increased for countries in all epidemiological situations. Without continued application of NPI measures and further rapid rollout of vaccination and rapid administration of the second vaccine dose to individuals at risk of severe COVID-19, sharp increases in new infections, hospitalisations and deaths may be observed.

Options for response

The following range of risk control measures should be considered in response to the spread of the Delta VOC in the EU/EEA.

Vaccination

The emergence of variants with potential immune escape like the Delta VOC requires the continuation of a rapid rollout of COVID-19 vaccines with the target of reaching full vaccination of all groups at increased risk of severe COVID-19 in the shortest time possible. In order to achieve this target, the interval between first and second dose should be reduced to the minimum interval as indicated in the manufactuers' summary of products information and supported by available evidence from clinical trials and observational studies. For Vaxzevria and COVID-19 Vaccine Moderna, the shortest recommended interval is currently four weeks, as per the summary of products information [37,38]. For Comirnaty, three weeks is the recommended dosing interval, which in many Member States have been extended to six to eight weeks due to supply limitations [22,39]. In the presence of vaccine shortages and of logistical limitations, prioritisation in achieving full vaccination for those most at risk may imply deprioritisation of vaccination for population groups at low risk of severe COVID-19.

In the absence of evidence on the vaccine efficacy of one vaccine dose in previously-infected individuals against the predicted dominance of the Delta VOC with potential for immune escape, ECDC advises the administering a full course of vaccination to everyone at increased risk of severe COVID-19, independent from previous infection.

Non-pharmaceutical interventions

Non-pharmaceutical interventions (such as physical distancing, hand and respiratory hygiene, use of face masks, etc.) to reduce SARS-CoV-2 transmission are essential elements of the public health response to COVID-19 [40]. Therefore, these measures should continue to be in place, complied with, and adjusted to the local epidemiological situation, the vaccination coverage in the general population, and the prevalence of VOCs. Countries should consider tailoring NPI layers according to their epidemiological situation, considering that the prompt and rigorous introduction of NPIs is most effective in controlling upsurges of cases.

Most EU/EEA countries are currently in the phase of relaxing or planning to relax NPIs, particularly physical distancing measures. However, taking into account the above evidence regarding the properties of Delta VOC, the relatively low proportion of fully-vaccinated individuals, as well as the fact that the Delta VOC is already circulating in the EU/EEA, lifting NPIs should be carefully weighed against the risk of disease resurgence. Strict NPIs should be maintained in healthcare settings including long-term care facilities (LTCF).

Since younger adults and children are currently not targeted for vaccination, it is expected that the Delta VOC will circulate more extensively in these age groups as observed in the UK [41]; although this finding could be biased because school outbreaks are prioritised for investigation and contact tracing in the UK. ECDC advises to maintain and strengthen physical distancing and other NPIs, such as wearing face masks in indoor and crowded outdoor settings, including in areas where adolescents and young adults gather, to reduce the risk of clusters and outbreaks of COVID-19.

Travel measures

Introduction of SARS-CoV-2 variants by international and domestic travel-related cases can play a role in triggering increased community transmission of COVID-19 and its variants, particularly when levels of transmission in the receiving locality are low.

ECDC travel advice included in the last rapid risk assessment, 'Assessing SARS-CoV-2 circulation, variants of concern, non-pharmaceutical interventions and vaccine rollout in the EU/EEA' [2] is still valid. Taking into consideration the above evidence for the Delta VOC, countries should assess their vulnerability considering COVID-19 vaccine uptake in individuals at highest risk of severe outcomes for SARS-CoV-2, to decide on the need to implement measures for incoming travellers, which may include:

- Request of proof of negative pre-departure test or test upon arrival, and quarantine for five to seven days with a negative test before release. This measure should also be implemented for people who have not received their full vaccination course, but can be waived for fully vaccinated individuals;
- Quarantining of incoming travellers for 14 days without test, if testing capacity is not sufficient;
- Enhanced contact tracing upon identification of a positive case related to travel.

According to the latest Council Recommendation on a coordinated approach to the restriction of free movement and the regulation of the Digital COVID Certificate [42], waiving travel measures like testing or quarantine can be considered for fully vaccinated and recovered individuals [43].

Testing and sequencing capacity

Genomic surveillance of currently circulating variants (including regular representative samples and targeted samples from special settings and populations) is of high importance for early detection of the presence and epidemiological trends of specific VOCs, VOIs and variants under monitoring, or the emergence of novel variants with concerning characteristics.

General considerations regarding testing strategies, diagnostic assays, sequencing and antigenic characterisation with relevance for circulating SARS-CoV-2 variants are provided in the latest ECDC rapid risk assessment [2] update and in the ECDC guidance for representative and targeted genomic SARS-CoV-2 monitoring [44].

A representative sample with a sufficient sample size (optimally each week) and targeted samples from special settings or populations (e.g. all travel-related cases, a representative sample of outbreak cases, cases with unusual clinical presentation) of PCR-positive specimens should be sequenced according to the recommendations of the ECDC guidance for representative and targeted genomic SARS-CoV-2 monitoring [44]. This allows for early identification and monitoring of emerging variants or of known variants with novel mutations that may have potential impact on phenotypic characteristics of the virus. Furthermore, Member States with the need for support to reach sequencing targets can use ECDC services for sequencing of SARS-CoV-2 samples by writing an email to typing@ecdc.europa.eu.

Methods for detection and differentiation of B.1.617 variants are available in the ECDC threat assessment brief published on 11 May 2021 [1]. ECDC has published a document that presents the available methods (screening and sequencing) for detection and identification of circulating SARS-CoV-2 VOCs Alpha, Beta and Gamma [45]. An early sign of an increase in the prevalence of variants other than Alpha can be a decrease of S-gene target failure (SGTF) among PCR-positive specimens, as this target failure is mainly observed with the Alpha variant among currently circulating SARS-CoV-2 variants. While this strategy will fail to differentiate between different S-gene target positive variants, it can be used to signal the need for partial or whole-genome sequencing of SARS-CoV-2 RNA or for performing other specific mutation RT-PCR assays (e.g. Single-Nucleotide-Polymorphism (SNP) assays), to identify specific variants, including Delta. Depending on the type of genotyping assay used, targets may need to be adapted to identify currently circulating VOCs.

S-gene target positivity as a proxy for Delta VOC has been used in the surveillance of this variant and for epidemiologic analyses (growth rate and disease severity) in the UK, where in recent weeks, mostly two variants (Alpha and Delta) co-circulated [4].

Contact tracing

Contact tracing remains a key tool to break transmission chains. For countries with high transmission, contact tracing will complement other measures and contribute to reducing transmission. For countries with lower levels of transmission, contact tracing is a key tool in outbreak management and controlling transmission. Contact tracing in the context of cases suspected to be infected with a VOC can help prevent the establishment of the VOC in the country. Countries should follow the latest ECDC contact tracing guidance [46]. Additionally, enhanced contact tracing measures related to VOC can be found here [47]. These enhanced measures are most effective during the phase when the variant is not yet widely circulating but should be continued if possible. Additional information on contact tracing related to vaccination can be found here [48].

Limitations

This assessment is undertaken based on facts known to ECDC at the time of publication.

So far, there are only a few studies that have looked at effectiveness of COVID-19 vaccines Comirnaty and Vaxzevria against the Delta VOC. Vaccine effectiveness estimates should be interpreted with caution as there is currently limited follow-up time following completed vaccination.

Key information that will improve the understanding and characterisation of the risk posed by Delta VOC includes:

- Further epidemiological characterisation of Delta VOC, particularly for non-travel related cases;
- Improved transmissibility estimates, including information on the mechanism for increased transmissibility such as differences in viral load, viral shedding or duration of infection;
- Clinical characterisation of cases;
- In vitro studies of neutralisation to assess immune escape potential using convalescent serum and serum from vaccinated individuals;
- Investigation and monitoring of reinfection and breakthrough infections.

ECDC is not in the position to assess the risk at country level due to significant variations of detection capacity and testing strategies among countries. Countries who do not have sequencing capacity to the level required, should contact ECDC at typing@ecdc.europe.eu to receive additional sequencing capacity support.

Source and date of request

ECDC internal decision, 18 June 2021.

Consulted ECDC experts

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Disclaimer

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This report was written with the coordination and assistance of an Internal Response Team at the European Centre for Disease Prevention and Control. All data published in this risk assessment are correct to the best of our knowledge at the time of publication. Maps and figures published do not represent a statement on the part of ECDC or its partners on the legal or border status of the countries and territories shown.

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