133 Molesworth Street
PO Box 5013
Wellington 6140
New Zealand
T+64 4 496 2000

21 February 2025

Erika Whittome

By email: fyi-request-29836-de79a84b@requests.fyi.org.nz
Ref: H2025059434

Tēnā koe Erika

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) to the Ministry of Health – Manatū Hauora (the Ministry) on 22 January 2025 for information regarding COVID-19 science updates. You requested:

> *"I am requesting information from August 2021 until November 2021 which used to be published on your website as "covid science updates" and "Covid Insights" reports*
>
> *For example https://www.health.govt.nz/system/files/documents/pages/csu_03_august_2021_voc_key_info_summary_guillan_barre_syndrome_after_covid-19_vaccination.pdf*
>
> *and COVID-19 Science Updates Science and Insights 19 Oct 2021 "COVID-19 Delta variant secondary" attack rates, August-October 2021.*
>
> *Would you please share all of these "CSU"s and "Insight reports" from Aug 2021 until the end of November 2021"*

The following documents have been identified in scope of your request and are released to you in full:

- 3 August 2021 COVID-19 Science Updates
- 10 August 2021 COVID-19 Science Updates
- 13 September 2021 COVID-19 Science Updates
- 23 September 2021 COVID-19 Science Updates

We apologise for any confusion or loss of information. Our investigation into the matter revealed that the whole Ministry website was updated last year and the page links for these reports broke as a result. We are working to reinstate the page. Please note that the links may be different when the page is reinstated.

I trust this information fulfils your request. If you wish to discuss any aspect of your request with us, including this decision, please feel free to contact the OIA Services Team on: oiagr@health.govt.nz.

Under section 28(3) of the Act, you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Manatū Hauora website at: www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests.

Nāku noa, nā

Dr Kristie Carter
Group Manager, Intelligence Surveillance and Knowledge
Public Health Agency | Te Pou Hauora Tūmatanui

Document 1

SCIENCE & TECHNICAL ADVISORY | RŌPŪ TOHUTOHU I TE PŪTAIAO ME TE HANGARAU

COVID-19 Science Updates

MINISTRY OF HEALTH | MANATŪ HAUORA

CSU 46 **13 September 2021**

1. No evidence that COVID-19 vaccination is associated with increased risk of miscarriage

Evidence that the Pfizer COVID-19 vaccine is safe during pregnancy has been growing. At the same time, it has become clearer that COVID-19 infection during pregnancy is associated with an increased risk of developing severe disease (link). This report reviews the data from two studies (link, link), that evaluate the risk of miscarriage in people who received a COVID-19 vaccine during pregnancy. Both studies show that the rate of miscarriage is similar for vaccinated and unvaccinated pregnant people, and that there is no evidence that the COVID-19 vaccine is associated with an increased risk of miscarriage during pregnancy.

- Shimabukuro *et al*, reported on the safety of receiving the mRNA COVID-19 vaccine for pregnant people (link). The study included 3,958 pregnant people in the US enrolled in the 'v-safe' pregnancy registry. Registry participants had received an mRNA vaccine (Pfizer or Moderna) at some point during their pregnancy. Participants were asked questions relating to pregnancy outcomes, such as pregnancy loss or live birth, and neonatal outcomes such as rate of preterm birth and size for gestational age. Participants were followed for 10-12 weeks post-vaccination.
- The rate for miscarriage, as with most pregnancy outcomes, was evaluated against all completed pregnancies. However, because the Shimabukuro *et al* study reported only 10-12 weeks of follow-up after vaccination, not all the pregnancies evaluated in the study were complete. Therefore, in order to estimate the rate of miscarriage, authors evaluated the outcomes from the completed pregnancies only.
- There were 827 completed pregnancies. Of those, there were 712 births, 104 miscarriages, 1 stillbirth, and 10 other outcomes, e.g., ectopic pregnancy. Therefore, the rate of miscarriage was 104/827 or 12.6%, similar to the background rates for unvaccinated individuals; the background rate for miscarriage for pregnancies in the general population is about 12.5 to 18.7% (link).
- Most of the individuals were vaccinated in the 3rd trimester (86%), however, and it is reasonable to want to estimate the rate of miscarriage for people vaccinated in the first and second trimester. There were 96 (8.5%) miscarriages reported in the 1st trimester, and the remaining 8 (0.5%) occurred in the 2nd trimester.
- An incorrect method for estimating the rate of miscarriage, but one that has circulated on social media, is to count the number of miscarriages among the 127 individuals who were *vaccinated in their 1st or 2nd trimester and who completed their pregnancies within 3 months of that date* (the maximum follow-up time of the study). However, most pregnancies completed within 3 months of the 1st or 2nd trimesters are not full-term births, by definition. The analysis *should* include all women followed to full-term or the end of their pregnancies, and then determine of those who had miscarriages, rather than selecting only those whose pregnancy ended within the study's follow-up period (3 months), as this generates a selection bias to include more miscarriages in the analysis.

- In total, there were 2,846 pregnant people who were vaccinated in their 1st and 2nd trimesters, and the vast majority of the pregnancies (96%) were still ongoing at the end of the follow-up period (3 months). The remaining 127 (4%) pregnancies were completed within 3 months following vaccination in the 1st or 2nd trimester. This means that almost no completed full-term births are included in the 127 simply because the study does not have sufficient follow-up time. Hence, it is not surprising that of the 127 pregnancies completed within 10-12 weeks of the first and second trimesters, 104 (82%) were recorded as a miscarriage.
- A second study was performed that was able to follow almost all pregnant people from the 1st and 2nd trimester until completion of the pregnancy, either to full term or other pregnancy outcome. Therefore, this study did not have the bias associated with limited follow-up time. The researchers followed 2,456 pregnant people from vaccination with a COVID-19 vaccine in the first and second trimesters until completion of their pregnancies. All participants in the study received a mRNA COVID-19 vaccine before 20 weeks' gestation (link). The risk of miscarriage from 6–19 weeks' gestation until the completion of the pregnancy was 14.1% (95% CI: 12.1,16.1%), consistent with background rates. This shows that when pregnant people are vaccinated in the first or second trimesters, and we can follow the individuals until we know the outcomes of all the pregnancies, that the rate of miscarriage is no higher or lower than in unvaccinated pregnant people.

Comment: There is no evidence that the COVID-19 vaccine is associated with an increased risk of miscarriage during pregnancy. In general, the benefits of COVID-19 vaccination outweigh the risks from COVID-19.

Document 2

SCIENCE & TECHNICAL ADVISORY | RŌPŪ TOHUTOHU I TE PŪTAIAO ME TE HANGARAU

COVID-19 Science Updates

MINISTRY OF HEALTH | MANATŪ HAUORA

CSU 47 — 23 September 2021

1. Risk of hospitalisation and severe outcomes from COVID-19 in children: Evidence from the Delta wave in the US

On 03 September 2021, the US CDC published two reports on hospitalisation rates in children (link, link). A hallmark feature of the COVID-19 pandemic has been the dramatically higher incidence of severe disease and mortality among older adults, however, COVID-19 still causes severe disease in children, albeit with a much lower incidence. In addition, there is growing evidence that the Delta variant results in a higher rate of hospitalisation than for previous variants (link, link). This CSU characterises the disease burden on children aged 0-17 years old in the US. Note that in the US, children aged 12 and over have been eligible to be vaccinated with the Pfizer COVID-19 vaccine since May 2021.

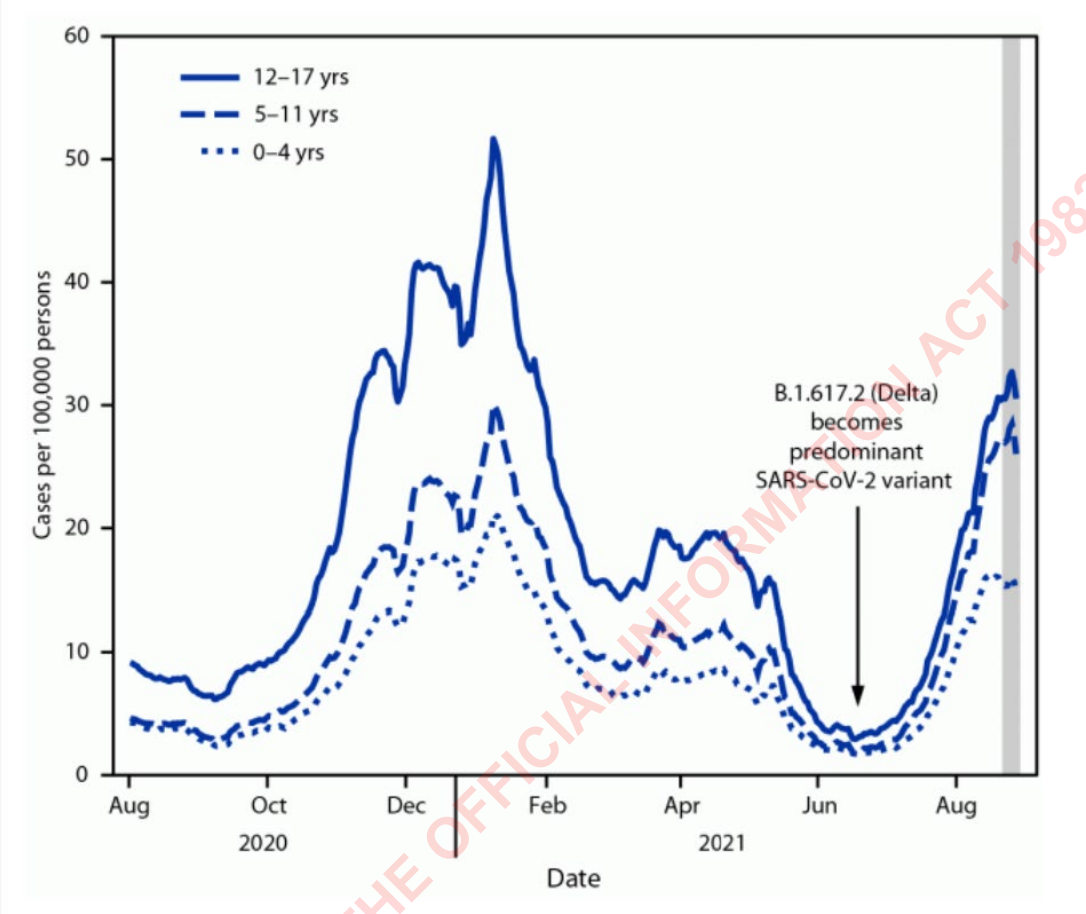
The first analysis (link) was based on the Coronavirus Disease 2019 – Associated Hospitalization Surveillance Network (COVID-NET), a consortium of over 250 hospitals in the US that conducts population-based surveillance for laboratory-confirmed hospitalisations of COVID-19. Medical charts for all COVID-19 paediatric admissions were abstracted by trained reviewers.

- Authors found that from 01 March, 2020–14 August, 2021, the overall cumulative incidence of COVID-19–associated hospitalisations was 49.7 per 100,000 children and adolescents aged 0-17 years. Unlike adults, the risk was 'U-shaped' with respect to age: the risk was highest for 0-4 year olds (69.2 admissions per 100,000) and 12-17 year-olds (63.7), but lower for 5-11 year olds (24.0).
- The rise in prevalence of the Delta variant coincided with an increased number of hospitalisations. The weekly COVID-19-associated hospitalisation rates rose from 0.3 hospitalisations per 100,000 in 0-17 year-olds in the weeks 12 June-03 July, to 1.4 per 100,000 in the week ending 14 August.
- Mechanical ventilation and in-hospital mortality (but not ICU admission) tended to increase as Delta became prevalent: based on 3,116 paediatric admissions for which there were complete clinical data, the risks of mechanical ventilation and in-hospital mortality were 6.1%, and 0.7%, respectively, from 01 March to 19 June, and increasing to 9.8%, and 1.8%, for the period 20 June to 31 July. The proportion of ICU admissions remained fairly stable over the same time periods, comprising 26.5% and 23.2% of hospital admissions, respectively.
- There were 68 adolescents (12-17 year-olds) for whom vaccination status was available. Of those, only 9 were partially or fully vaccinated. Unvaccinated adolescents were more likely to be hospitalised, however, meaningful conclusions cannot be drawn from such a small sample.

A second study (link) compared the incidence of COVID-19 and COVID-19 outcomes in 0-17 year-olds prior to the introduction of Delta (August 2020 – June 2021), and during the current Delta wave (July-August 2021).

- The incidence increased for all age groups from June to August 2021 (see Figure 1)

Figure 1. Average daily COVID-19 case incidence among persons aged 0–17 years, by age group — United States, 01 August, 2020–27 August, 2021 (Source: CDC's case-based COVID-19 surveillance system, accessed August 30, 2021. https://www.cdc.gov/nndss/action/covid-19-response.html)



- Regions with low vaccination coverage in the general population tended to have higher rates of COVID-19-related emergency department (ED) visits and hospital admission in 0-17 year-olds, compared to regions with high coverage. For example, the region with the lowest vaccination coverage in the general population (with coverage of 49.9%) had 3.4 times the COVID-19 ED visits and 3.7 times the rate of COVID-19 hospital admissions in 0-17 year-olds as the region with highest vaccination coverage (coverage of 72.2%). However, there are other confounding factors in that the states with the lowest vaccination coverage also tend to be located in the southern US, have lower socio-economic indicators, and poorer health outcomes generally.
- With regard to severity, the proportion of hospitalised cases in 0-17 year olds that were admitted to the ICU was 10-25% prior to Delta (August 2020 to June 2021) and 18-20% in July and August 2021. Based on 1,790 hospitalisations with data on disease severity, in-hospital mortality was 0.4% (8 deaths). Median length of stay in the ICU for 0-17 year olds was 2-3 days. Of the 63 ICU admissions in children in July-August 2021, 27% were aged 0-4, 27% were 5-11, and 46% were 12-17 years.

- Authors commented that the increased risk of hospitalisation during the Delta wave may be due to more severe disease associated with Delta (as has been suggested by UK and Danish data, but not supported in a study from Norway) or due to increased overall transmission from Delta, i.e., that more transmission results in a greater number of hospital admissions overall.
- Authors also noted that testing rates in children and adolescents are lower than for adults, and therefore COVID-19 cases tend to be underreported in this age group.

Comment:

Children can experience severe outcomes from COVID-19 including hospitalisation and ICU admission. As with adults, vaccination of both the eligible adolescents and coverage in the wider population can reduce those risks. The Delta variant appears to increase both the rate of COVID-19 overall and the risk of hospitalisation, although once hospitalised, the proportion requiring ICU admission appeared to remain static (23-26%) as Delta became prevalent. Notably, the risks from COVID-19 appear to be age-dependent within children and adolescents: very young children (0-4 years) and older children (12-17 year olds) are at higher risk of hospitalisation compared to 5-11 year olds. Vaccines for children aged 5-11 may be available in the US in late 2021 or early 2022, with Pfizer announcing on 20 September that they will be submitting their phase 2/3 clinical trial data for children aged 5-11 'as soon as possible'. Other factors, such as the capacity of the healthcare systems and better recognition of early signs of deterioration may also factor into changing rates of hospitalisation over time, independent of the variant.

Document 3

SCIENCE & TECHNICAL ADVISORY | RŌPŪ TOHUTOHU I TE PŪTAIAO ME TE HANGARAU

COVID-19 Science Updates

MINISTRY OF HEALTH | MANATŪ HAUORA

CSU 44

03 August 2021

1. Summary of key information from recent weekly Variants of Concern Updates

The Science and Technical Advisory team within the COVID-19 Directorate of the Ministry produces a weekly review of evidence on Variants of Concern (VOC) and Variants Under Investigation (VUI) in the weekly Variants of Concern Update. All updates are publicly available on the COVID-19 Science News (link) webpage on the Ministry of Health website.

Summary of key information from the recent updates:

- The ongoing active global pandemic gives the virus opportunities to replicate and mutate: while there is an active pandemic globally, the opportunity for the emergence of new variants exists.
- Variants of concern (VOC) are variants that pose a greater threat to peoples' health and management of the pandemic, due to increased transmissibility, causing more severe disease, and/or ability to evade immune responses or vaccines. Variants with preliminary evidence suggesting that they may become a VOC, are initially designated a Variant Under Investigation (VUI) while they are being evaluated.
- In the previous six weeks there has been a continuous increase in the global spread of the Delta (B.1.617.2) variant, which has a transmission advantage over other variants. A notable exception is some South American countries (Peru, Chile) where the VUI Lambda (C.37) has overtaken other circulating lineages, including Alpha (B.1.1.7) and Gamma (P.1) as the dominant variant.
- The Delta variant with the added mutation K417N is known informally as "Delta plus". Mutation K417N is potentially associated with immune escape. Public Health England (PHE) has reported a very small number of cases with "Delta plus" as of 23 July. Of note, data on this variant is generally not collected separately but included along with Delta.
- WHO expect Delta to continue to displace other variants and to become the dominant VOC worldwide in the coming months.
- In Aotearoa New Zealand, Delta is the predominant VOC identified in cases at our border in recent weeks.

What do we know about Delta?

Transmissibility

- Epidemiological evidence from secondary attack rates, household transmission studies, and growth rate modelling all support increased transmissibility.
- The basic reproductive number R_0 for Delta is estimated to be at least 5.5-6.5, meaning that on average each person transmits Delta to another 5-6 people.

- An outbreak study in Guandong China indicated that Delta is associated with very high viral loads – 1000 times higher on the first PCR positive test compared with the previously dominant variant in that region -- and a shorter median incubation time of 4 days, compared to approximately 6 days for the prior variant.

Severity of Disease

- PHE data estimated that Delta is associated with 2.3 times the risk of hospitalisation compared to Alpha. Fortunately, PHE data indicate that the case fatality rate for Delta remains low (0.2%). Data reported for risk of death with Alpha varies: PHE's most recent case fatality rate for Alpha is approximately 1.8%, noting that this data is based on the wave from December 2020.

Vaccine effectiveness (VE)

- The Pfizer vaccine is effective against symptomatic Delta infection when two doses are given: PHE reported 33% protection after one dose, 88% protection after two doses against symptomatic infection. Similar results have been reported in Denmark and Canada. In contrast, Israel's Ministry of Health reported a vaccine effectiveness against symptomatic disease of 64%. This result was reported in a press release, but the difference may be due to a methodological differences that do not fully account for the confounding in the observational data.
- The AstraZeneca vaccine is less effective against symptomatic Delta infection when two doses are given compared to Pfizer but still provides protection: Public Health England reported 30% protection after one dose, 67% protection after two doses against symptomatic Delta infection.
- A separate analysis from Public Health England (but typical of other estimates) showed two doses of the Pfizer vaccine offered 96% protection against hospitalisation due to the Delta variant. The AstraZeneca vaccine provided 92% protection against hospitalisation due to the Delta variant in the same Public Health England analysis.

Horizon scanning

- Recent data from England shows infection rates in healthcare workers are increasing. The cause is unclear but contributing factors may include one or more of: waning immunity for AstraZeneca and/or Pfizer vaccines; immune escape properties of variants; increasing prevalence of COVID-19 in England due to Delta. Further updates will continue to report on this as data emerges.

Comment:

The predominant variant of SARS-CoV-2 is Delta and looking ahead it is prudent to plan for outbreaks assuming Delta will be the variant responsible. Delta has increased transmissibility compared to the previously dominant Alpha variant. It also appears to have higher viral loads, a shorter incubation period, and shows some degree of immune escape (even though mRNA vaccines appear to largely maintain their effectiveness against symptomatic disease) compared to previous variants. The shorter incubation period has implications for the contact tracing timelines and the speed with which public health measures.

2. Guillan Barré Syndrome after COVID-19 Vaccination

Events of Guillain-Barré syndrome (GBS) have been observed after vaccination with AstraZeneca and Johnson and Johnson (J&J)/Janssen COVID-19 vaccines internationally. On 13 July 2021, the US Food and Drug Administration (FDA) added a warning regarding GBS for the J&J vaccine. The European Medicines Agency (EMA) added a similar warning to the AstraZeneca vaccine and is continuing to assess GBS with regard to the J&J vaccine, as of 14 July 2021. GBS is a rare autoimmune neurological disorder affecting the peripheral nervous system.

- GBS can range from a very mild case with brief weakness to complete paralysis and death. Most people recover from even the most severe cases of GBS but some may be left with residual weakness. The most common precipitating cause is a respiratory or gastrointestinal viral infection.
- The background risk of GBS increases with age from a rate of approximately 0.9 per 100,000 person-years for 18 – 29 year-olds, to 2.3 per 100,000 person-years for those 65 years and over (link and Table 1)
- The US CDC's Advisory Committee on Immunization Practice (ACIP) analysed 100 preliminary reports, reported to the VAERS (Vaccine Adverse Event Reporting System) up to 30 June 2021. During the data collection period, approximately 12.2 million doses of the J&J vaccine were administered in the US, for a crude rate of 8.1 per million doses (link). Of these 100 cases, 95% were serious, 61% occurred in males, and there was one death attributed to GBS. When stratified by age, the risk was significantly elevated for those over the age of 30: people aged 30-39 had approximately 4 times the risk of GBS post-vaccination with the J&J vaccine; people aged 40-49 and 50-64 years had approximately 7 times the risk of GBS (see Table 1)

Table 1 Background rates, expected numbers of cases and observed numbers of cases of GBS by age (ACIP)

O/E analysis assuming 42-day risk window FDA

Age (years)	Cases	Vaccine doses administered*	Person-years (PY)**	Background Rate per 100,000 PY***	Expected Cases	Rate Ratio, 95% CI
18 – 29	4	2,138,259	226412.5	0.88	1.99	2.01 (0.55; 5.14)
30 – 39	10	2,071,932	219389.4	1.07	2.348	4.26 (2.04; 7.83)
40 – 49	21	2,174,362	230235.3	1.29	2.97	7.07 (4.38; 10.81)
50 – 64	47	3,918,413	414906.6	1.63	6.76	6.95 (5.11; 9.24)
65+	16	1,933,012	204679.6	2.34	4.79	3.34 (1.91; 5.43)

* From CDC data as of 06/28/2021
** Person- Years was based on number of vaccine doses administered within the age group; see slides 19 – 20 for statistical methods.
*** Sejvar JJ, Baughman AL, Wise M, Morgan OW. Population incidence of Guillain-Barré syndrome: a systematic review and meta-analysis. Neuroepidemiology. 2011;36(2):123-33.

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- The rate of GBS in those receiving the Pfizer or Moderna mRNA vaccines was approximately 8 times lower than the rate for Janssen (see Table 2).

Table 2 Crude reporting rates of GBS for mRNA vaccines and Janssen vaccine in the US (ACIP)

Crude comparison with mRNA vaccines

COVID-19 Vaccine	VAERS reports with GBS screening*	Doses administered	Crude** VAERS GBS reporting rate per million doses administered
Janssen	100	12,235,978	8.1
Moderna	162	134,076,668	1.21
Pfizer-BioNTech	190	181,347,436	1.05

VAERS reports processed through June 30, 2021

- The EMA's Pharmacovigilance Risk Assessment Committee (PRAC) reviewed 227 reported cases of GBS through 27 June 2021, after administration of the AstraZeneca vaccine (link). Approximately 51.4 million doses of AstraZeneca vaccine had been administered through 20 June, for an approximate rate of 4.4 per million doses.
- As of 27 June 2021, 15 cases of GBS after vaccination with the J&J COVID-19 vaccine were reported from the EU/EEA to the Eudravigilance database (link). Approximately 7 million doses were administered in the EU/EEA in a similar period, through 20 June 2021, which corresponds to a crude rate of 2.1 per million doses.
- The WHO released a statement (link) regarding the risk of GBS after COVID-19 vaccination on 25th July 2021, which is consistent with comments made by the US and EU agencies. The WHO recommend that individuals receiving the Janssen or AstraZeneca COVID-19 vaccine are made aware of the possible association with GBS, but that there is no evidence that GBS is associated with mRNA vaccines.

Comment: There is some previous evidence to suggest that influenza vaccination is linked to GBS. For example, researchers found that over the 2010-2011 influenza season in Italy, there was a 2-fold relative increase in the risk of GBS for vaccinated compared to unvaccinated individuals (link). However, an association has not been reported for other vaccination programs. It is possible that because the enormous size of the COVID-19 vaccination, which has no precedent, and the increased safety monitoring associated with COVID-19, researchers are able to identify associations between vaccination and extremely rare events. Interestingly, the pathophysiology of GBS is based on the development of auto-antibodies (against the myelin sheath of the peripheral nervous system), which is similar to the proposed mechanism for the vaccine induced thrombocytopaenic thrombosis (VITT), observed after vaccination using adenoviral vector vaccines; VITT is associated with platelet-activating antibodies against platelet factor 4 (PF4). However, it is important to keep in mind that the risk of these potential complications from the vaccine is tiny compared to the benefits of vaccination in preventing disease and death from COVID-19.

Document 4

SCIENCE & TECHNICAL ADVISORY | RŌPŪ TOHUTOHU I TE PŪTAIAO ME TE HANGARAU

COVID-19 Science Updates

MINISTRY OF HEALTH | MANATŪ HAUORA

CSU 45 **10 August 2021**

1. COVID-19 Mortality in Children

The risk of death from COVID-19 is low for children compared to adults, but not zero. Here we review several estimates for the risk of mortality from COVID-19 for children, reported in countries that have experienced large numbers of COVID-19 cases in children: the US, England and the EU (see Table 1).

Table 1 Mortality rates for COVID-19 cases for children and adolescents (case fatality rate is the proportion of cases that result in death; infection fatality rate is the proportion of SARS-CoV-2 infections that result in death). Rates are cumulative from the start of the pandemic in each country

Source	Gender	Age (years)	Deaths	Cases	Mortality Risk, Deaths per 10,000 Cases[a]	Methodology
US CDC (link) *Cited 07 August 2021*	All	0-4	175	619,091	2.8	An estimate of case fatality rate (CFR), i.e., the risk of death for children with COVID-19. Data updated 07 August 2021. Reporting methodology for cases differs by state.
		5-11	128	1,186,893	1.1	
		12-15	139	1,069,780	1.3	
		16-17	99	735,032	1.3	
Public Health England (link) *Cited 08 August 2021*	Male	0-4	4	56,739	0.7	[a]Estimates of mortality risk for the English data are given as the infection fatality rate (IFR), i.e., the risk of death for children infected with SARS-CoV-2; The CFR was not provided. IFR was calculated using number of deaths within 28 days of positive test. Numerator includes any individual with at least one positive COVID-19 test result, either lab-reported or lateral flow device. Positive rapid lateral flow tests not confirmed with PCR test are not included. Data updated 08 August 2021.
		10-14	5	142,653	0.4	
		15-19	27	207,112	1.3	
	Female	0-4	6	53,907	1.1	
		10-14	8	143,000	0.6	
		15-19	10	228,668	0.4	
ECDC (link) *Cited 01 August 2021*	Male	<10	<5	7,635	1.3-5.2*	Estimate of case fatality rate (CFR). *Range of values based on N=1-4 cases possible where the exact number of cases was not available. Data period ending 01 August 2021.Reporting methodology varies by country.
		10-19	<5	13,833	0.7-2.9*	
	Female	<10	<5	6,983	1.4-5.7*	
		10-19	0	14,562	0	

Context and disclaimer. *This update contains topical talking points, science advice and research – it is intended as a high-level overview. The topics herein are assembled 'at pace' often under urgency and may be based on reports that are not peer-reviewed. Both the content and 'comment' components of this briefing represent science commentary at a single point in time – information herein may or may not align with Ministry of Health positions or priorities.*

- The mortality risk for children with COVID-19 (CFR) ranges from approximately 1-3 in 10,000 for most subgroups. As expected, the IFR is lower; the IFR estimates from England range between about 0.4-1.3 deaths per 10,000 infections.
- Furthermore, a recent study in England reviewed all deaths in children (<18 years) who had reported a positive test for SARS-CoV-2 infection from March to February 2021 (link). After clinical review, COVID-19 was determined to be the cause of death in 25 children. Of those, 15 had a pre-existing life-limiting health condition. However, the study did *not* report the case or infection fatality rate (and so cannot be compared to the estimates in the Table). Instead, using the total population aged <18 years in England, the authors estimated that the overall mortality risk due to SARS-CoV-2 infection was approximately 2 per million.

Comment:

In children, death due to COVID-19 is rare: approximately 1 to 3 deaths occur per 10,000 COVID-19 cases in children. These estimates do not account for hospitalisation or comorbidity due to COVID-19. Also, these rates are cumulative throughout the entire pandemic, and do not account specifically for the Delta variant, which appears to be associated with more severe disease. Mortality risk is important for evaluating the benefit-risk calculation involved in the decision to immunise children. Based on Pfizer's clinical trial data for 12-15 year-olds (N=1,131 randomised to vaccine and 1,129 to placebo), the vaccine efficacy for symptomatic disease was 100%. As with adults, the personal protection from vaccination should be considered in addition to any population protection via a reduction in overall transmission.