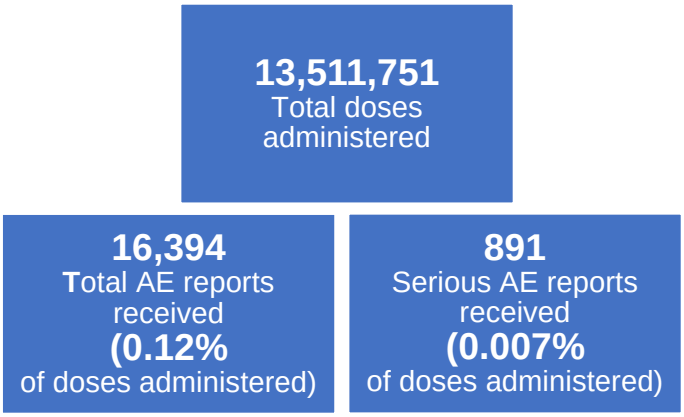
HSA's COVID-19 Vaccine Safety Update #11
(30 December 2020 – 28 February 2022)

Key statistics for mRNA vaccines: Pfizer/Comirnaty vaccine and Moderna/SpikeVax vaccine (as of 28 February 2022)



This is HSA's 11th safety update of the COVID-19 vaccines covering the period from the roll-out of the vaccines on 30 December 2020 to 28 February 2022. It provides an overview of the reports by healthcare professionals of ***suspected* adverse events[1] (AEs)** associated with COVID-19 vaccines to the Health Sciences Authority (HSA) and our current assessment of these AEs. **HSA has assessed that the reporting rate of AEs and serious AEs of 0.12% and 0.007% of administered doses, respectively, have remained stable since the roll-out of the COVID-19 vaccines and the overall benefits of the COVID-19 vaccines in preventing COVID-19 and serious complications associated with COVID-19 far outweigh any currently known AEs.**

2 Vaccination is the most effective way to reduce deaths and severe illness from COVID-19 infection. A national immunisation programme has been underway since December 2020. HSA has authorised two mRNA COVID-19 vaccines (Pfizer-BioNTech/Comirnaty Vaccine and Moderna/Spikevax Vaccine), an inactivated COVID-19 vaccine (Sinovac-CoronaVac Vaccine) and a protein-based COVID-19 vaccine (Nuvaxovid Vaccine) for use in Singapore. The Pfizer-BioNTech/Comirnaty vaccine has been converted from Pandemic Special Access Route (PSAR) interim authorisation to full registration since 10 December 2021. The Moderna/Spikevax Vaccine, Sinovac-CoronaVac Vaccine and Nuvaxovid Vaccine are authorised under PSAR. Nuvaxovid Vaccine has not yet been supplied to the population as the stocks are not yet available.

3 As with all other vaccines, HSA closely monitors the safety of the COVID-19 vaccines and actively encourages healthcare professionals to report AEs to HSA. This is the most intense safety monitoring ever conducted by HSA and the relevant measures are taken to ensure that the vaccines remain safe for use. HSA reviews the submitted AE reports, in consultation with our expert panels[2]. It is important to note that the AEs reported do not necessarily mean that the vaccine has caused these AEs as they may be related to an underlying or undiagnosed disease or the natural progression of an underlying disease. It may

[1] An adverse event is any untoward medical occurrence in a patient administered a pharmaceutical product (including vaccines) but does not necessarily have a causal relationship with this treatment/vaccination.
[2] HSA has appointed five Expert Panels to adjudicate neurological AEs, cardiac AEs, thromboembolic and haematological AEs, renal AEs and severe hypersensitivity reactions such as anaphylaxis.

be coincidental that the event occurred around the same time when the vaccine was given but is not caused by the vaccine. The type and number of reports received for the different COVID-19 vaccines are not directly comparable as the vaccines may have been used in the vaccination programme for different lengths of time, and may have been administered to different numbers of people with different underlying medical conditions and across different settings.

4 Based on the local AE reports received, most of the AEs are largely expected with vaccination and reflect what has been reported globally. Overall, based on the data to date, the benefits of the Pfizer-BioNTech/Comirnaty, Moderna/Spikevax and Sinovac-CoronaVac COVID-19 vaccines continue to outweigh the known risks when used in a pandemic. HSA and MOH will continue to monitor the safety profile of the COVID-19 vaccines closely, take the necessary regulatory actions and update members of the public of any significant safety concerns detected with the vaccines.

5 As 95% of the eligible population has completed the primary series of vaccination and the incidences of the reported AEs have stabilised, HSA has simplified the safety report. Going forward, HSA will publish this COVID-19 vaccine safety report on a quarterly basis (i.e., every 3 months). HSA will issue ad-hoc updates if there are any significant safety issues detected in between the quarterly reports.

Key Updates (As at 28 February 2022)

mRNA COVID-19 Vaccines

Table 1. Overview of vaccination data and no. of suspected AE reports reported by healthcare professionals for mRNA COVID-19 vaccines

	Pfizer-BioNTech/Comirnaty	Moderna/Spikevax	Total
No. of persons who have received the first dose	3,971,895	1,040,451	**5,012,346**
No. of persons who received two doses*	3,884,126	908,162	**4,792,288**
No. of persons who received booster doses	2,613,285	1,093,832	**3,707,117**
Total no. of doses administered	10,469,306	3,042,445	**13,511,751**
No. of suspected AE reports	13,433 (0.13% of doses administered)	2,961 (0.10% of doses administered)	**16,394 (0.12% of doses administered)**
No. of suspected serious[3] AE reports	728 (0.007% of doses administered)	163 (0.005% of doses administered)	**891 (0.007% of doses administered)**

*The primary vaccination regimen for Pfizer-BioNTech/Comirnaty and Moderna/Spikevax COVID-19 vaccines comprise 2 doses. The no. of persons who received two doses includes those who had received the first dose.

- **The incidences of AEs and serious AEs have remained stable at 0.12% and 0.007% of administered doses, respectively. The reporting rate of AEs and serious AEs have**

[3] An adverse event is classified as serious when the event resulted in hospitalisation/extended stay in hospital, resulted in a significant reduction in functioning level/disability, resulted in a life-threatening illness (e.g. anaphylaxis) or death, resulted in birth defects or is a medically important event.

remained stable since April 2021. A total of 13,511,751 doses of the Pfizer-BioNTech/Comirnaty and Moderna/Spikevax mRNA vaccines have been administered, out of which 16,394 suspected AE reports were received. The vast majority of reported AEs are not serious, with only 891 reports (5% of all AEs) assessed as serious.

- **Similar to other vaccines, the COVID-19 vaccines can cause AEs and the most commonly reported AEs generally resolved within a few days.** To date, these AEs (e.g., muscle aches, allergic reactions, fever) are consistent with those typically observed following vaccination, such as with the flu vaccine.

- **In the age group of 5 to 11 years, the incidence rates of AEs and SAEs are similar to those observed in adolescents and adults at 0.14% and 0.005% of administered doses, respectively**. Five hundred and seventy-five AE reports were received (0.14% out of 417,138 administered doses), out of which only 22 were assessed as serious.

- **The AEs reported for booster doses of the mRNA vaccines are similar to those following Dose 1 and Dose 2 of the vaccines and there was no observed increase in frequency of events**.

- Rare instances of anaphylaxis, a severe life-threatening allergic reaction, have occurred after administering the COVID-19 vaccines. The local incidence rate of anaphylaxis reported with mRNA vaccines has remained low and stable at an estimated 0.67 per 100,000 doses administered.

- Rare cases of myocarditis and pericarditis have been reported with various COVID-19 vaccines both overseas and locally. They are caused by inflammation of the heart muscles and outer lining of the heart, respectively. The overall incidence for the primary series has remained stable, at 1.10 per 100,000 doses. HSA has received 127 AE reports of myocarditis and pericarditis following more than 13.5 million doses of mRNA vaccines administered. Out of the 127 reports, 24 were reported following the booster dose (0.6 per 100,000 doses administered). As with other countries, these events occur more frequently in younger males below 30 years old, and more often with Dose 2. Most cases are mild, with individuals reported to have recovered or are recovering. One case of myocarditis was reported in the 5 to 11 age group, and the patient recovered well and was discharged from the hospital within a day. **COVID-19 infection is also known to be associated with myocarditis. In one study, the extra myocarditis events in the month following vaccination was estimated to be between 1 and 10 per million persons, which is substantially lower than the 40 extra events per million persons observed following COVID-19 infection.**[4]

- Very rare cases of cerebral venous thrombosis (CVT) have been reported with the Pfizer-BioNTech/Comirnaty and Moderna/Spikevax COVID-19 vaccines, both overseas and locally. CVT is a very rare type of blood clot occurring in the veins of the brain which can happen naturally regardless of whether people have been vaccinated. The incidence of CVT has stabilised and remains very rare. HSA has received 13 suspected reports of CVT with the mRNA vaccines, out of more than 12.7 million doses that has been administered. Although HSA's analysis found a small increase in incidence of CVT with mRNA vaccines (about 1 additional case of CVT per million doses), the risk of CVT after COVID-19 infection is much higher than CVT after mRNA vaccination (about 30 cases per million

[4] Patone, M., Mei, X.W., Handunnetthi, L. *et al.* Risks of myocarditis, pericarditis, and cardiac arrhythmias associated with COVID-19 vaccination or SARS-CoV-2 infection. *Nat Med* (2021). https://doi.org/10.1038/s41591-021-01630-0

infected persons), and the benefits of vaccination continue to outweigh the small increased risk of CVT.

Sinovac-CoronaVac Vaccine

- Three hundred and twelve suspected AEs (0.08% of doses administered) were reported following the administration of 392,122 doses of Sinovac-CoronaVac COVID-19 vaccine. These included 24 serious AEs (0.006% of doses administered), out of which there were 13 reports of anaphylaxis (all had occurred in individuals who had previous allergic reactions with the mRNA vaccines or had multiple drug allergies) and 1 report of myocarditis.

Sinopharm COVID-19 Vaccine (supplied via HSA's Special Access Route)

- Forty-three suspected AEs (0.04% of doses administered), including 7 serious AEs (0.007% of doses administered), were reported with Sinopharm COVID-19 vaccine after 100,449 doses were administered.

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Interpretation of the data

AEs are reported by healthcare professionals to HSA when they suspect that the AEs may be associated with the vaccine. This does not necessarily mean that the vaccine has caused the AEs. In some instances, these AEs are related to an underlying or undiagnosed disease or the natural progression of an underlying disease. It may be coincidental that the event occurred around the same time when the vaccine was given but is not caused by the vaccine. The causality based on isolated cases of individual events usually cannot be established as many illnesses cause the same symptoms and signs, and there are generally no confirmatory tests for diagnosing an AE. Hence, AEs are assessed and interpreted in the context of background incidence rates of such occurrences (i.e., historical rates in our general population unexposed to the COVID-19 vaccines). While each individual report is carefully reviewed, the totality of data from all sources (e.g., mechanistic actions, clinical assessments of local AE reports from healthcare professionals, public self-reported AEs, epidemiological studies, literature and overseas reports) has to be considered before drawing any evidence-based conclusions on the safety of the vaccine.

The type and number of reports received for the different COVID-19 vaccines are not directly comparable as the vaccines may have been used in the vaccination programme for different lengths of time, and may have been administered to different numbers of people with different underlying medical conditions and across different settings. Similarly, the AE numbers or rates between countries should not be directly compared as the usage of the vaccines may be different and the AE reporting systems are often also different.

The description of suspected AEs in this update reflects the available information known at the time by HSA. These data may undergo changes as more information on individual reports becomes available through follow-up, and as more data are reported and evaluated.