IPCRG practice driven answers on COVID-19 and respiratory questions

What is the risk of developing myocarditis or pericarditis following a SARS-CoV-2 mRNA based vaccination?

What the research says

The rates of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the tissue surrounding the heart – the pericardium) are higher following COVID-19 illness than following mRNA-based SARS-CoV-2 vaccination overall, and among both males and females (Patone et al 2021). There appears to be some increase in the risk of myocarditis following mRNA-based SARS-CoV-2 vaccination, particularly among males following the second dose of the Moderna mRNA-based SARS-CoV-2 vaccine (mRNA-1273) (Patone et al 2021).

Myocarditis extra cases and risk in a UK-based study of 38 million adults (Patone et al 2021)	
Extra cases of myocarditis in the 28 days following:	
A SARS-CoV-2 positive test	**40 extra cases**
A SARS-CoV-2 mRNA-based vaccination	1–10 extra cases
Increased risk (IRR [95% CI]) of myocarditis in **males** during the 28 days following:	
SARS-CoV-2 positive test	**9.06 (6.51, 12.62)**
First dose SARS-CoV-2 mRNA-based vaccine[a]	1.16 (0.84, 1.61)
Second dose SARS-CoV-2 mRNA-based vaccine[a]	1.39 (0.96, 2.02)
First dose SARS-CoV-2 viral vector-based vaccine[b]	3.79 (1.59, 9.04)
Second dose SARS-CoV-2 viral vector -based vaccine[b]	12.27 (2.77, 54.37)
Increased risk of myocarditis in **females** during the 28 days following:	
SARS-CoV-2 positive test	**11.00 (7.12, 16.99)**
First dose SARS-CoV-2 mRNA-based vaccine[a]	1.54 (1.08, 2.20)
Second dose SARS-CoV-2 mRNA-based vaccine[a]	1.25 (0.81, 1.95)
First dose SARS-CoV-2 viral vector-based vaccine	–[c]
Second dose SARS-CoV-2 viral vector -based vaccine	–[c]

[a]BNT162b2 mRNA vaccine; [b]mRNA-1273 vaccine; [c]not applicable.

CI, confidence interval; IRR, Incidence rate ratio.

What is the risk of developing myocarditis or pericarditis following a SARS-CoV-2 mRNA based vaccination?

Reported cases of myocarditis or pericarditis following mRNA-based SARS-CoV-2 vaccination by age group (WHO 2021)[a]	
Fully vaccinated individuals aged 12–29 years	
Males	40.6 cases
Females	4.2 cases
Fully vaccinated individuals aged >30 years	
Males	2.4 cases
Females	1.0 cases

[a]Data from the USA as of 11 June 2021.

There is an apparent causal link between mRNA-based SARS-CoV-2 vaccines and rare cases of myocarditis and pericarditis. This is particularly among younger males (aged 12–29 years) where the reported number of cases among males was 10 times that for females in the US to June 2021 (WHO 2021).

However, the benefits of mRNA vaccines against SARS-CoV-2 greatly outweigh the risk of myocarditis and pericarditis (WHO 2021). CDC recommend that patients who experience myocarditis or pericarditis following the first dose of an mRNA vaccine should not receive a second dose of another mRNA-based SARS-CoV-2 vaccine (CDC 2022).

Symptoms of myocarditis and pericarditis typically occur within a few days of vaccination with mRNA vaccines and may include new and persisting chest pain, shortness of breath, racing/pounding heartbeat. The symptoms are usually mild and self-limiting and most people recover completely with conservative treatment (non-steroidal anti-inflammatory drugs [NSAIDs], rest) with no lasting symptoms.

What this means for your clinical practice

- Continue to offer mRNA vaccines per National guidelines, including to those patients with a history of myocarditis/pericarditis unrelated to mRNA SARS-CoV-2 vaccination if the episode has resolved completely and there is no evidence of ongoing heart inflammation or sequelae
- Where possible, young adults aged 12 to 29 years for whom an mRNA vaccine is to be offered should preferentially receive the Pfizer-BioNTech mRNA vaccine, especially for the second dose as per the Canadian National Advisory Committee on Immunization (2021)
- Be vigilant for emergent symptoms suggestive of myocarditis or pericarditis such as persisting chest pain, shortness of breath, racing/pounding heartbeat, especially in younger males

Useful links and supporting references

Canadian National Advisory Committee on Immunization. Summary of the National Advisory Committee on Immunization (NACI) rapid response of December 3, 2021. Available at: https://www.canada.ca/content/dam/phac-aspc/documents/services/immunization/national-advisory-committee-on-immunization-naci/rapid-response-recommendation-use-covid-19-vaccines-individuals-aged-12-years-older-myocarditis-pericarditis-reported-following-mrna-vaccines/summary.pdf. Accessed April 2022.

CDC. Vaccines & Immunizations. Interim Clinical Considerations (January 2022). Available at: https://www.cdc.gov/vaccines/covid-19/clinical-considerations/covid-19-vaccines-us.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fvaccines%2Fcovid-19%2Finfo-by-product%2Fclinical-considerations.html. Accessed February 2022.

Patone M, et al. Risks of myocarditis, pericarditis, and cardiac arrhythmias associated with COVID-19 vaccination or SARS-CoV-2 infection. Nature Medicine 2021. Available at: https://www.nature.com/articles/s41591-021-01630-0. Accessed February 2022.

WHO. COVID-19 subcommittee of the WHO Global Advisory Committee on Vaccine Safety (GACVS): updated guidance regarding myocarditis and pericarditis reported with COVID-19 mRNA vaccines. July 2021. Available at: https://www.who.int/news/item/09-07-2021-gacvs-guidance-myocarditis-pericarditis-covid-19-mrna-vaccines. Accessed February 2022.

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