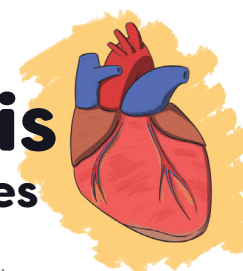


UPDATED: April 20, 2022

FREQUENTLY ASKED QUESTIONS

Myocarditis and Pericarditis

After COVID-19 Infections and COVID-19 Vaccines



We used information from the National Advisory Committee on Immunization (NACI), the Canadian Paediatric Society (CPS), the U.S. Centers for Disease Control and Prevention (CDC), Public Health Ontario (PHO), and published research to make this guide.

+ What are myocarditis and pericarditis?

Myocarditis is inflammation of the heart muscle (the myocardium). Pericarditis is inflammation of the sac (the pericardium) that goes around the heart. Health care professionals know about these conditions, and how to treat them.

+ What causes myocarditis and pericarditis?

These conditions can occur when the immune system is activated because of infections, injuries, medications, or other health problems.¹ Myocarditis and pericarditis can be caused by Covid-19 infections.²⁻⁶ These conditions have happened after mRNA Covid-19 vaccines (Moderna or Pfizer-BioNTech).³⁻¹¹

+ What are the symptoms of myocarditis or pericarditis?

Symptoms can include chest pain (most common), feeling short of breath, and fluttering or pounding of the heart.¹ When these conditions occur after a Covid-19 vaccine, symptoms usually start in the first 7 days.^{1,3-14} In general, vaccine side effects tend to happen within 6 weeks.

+ How often do myocarditis and pericarditis happen after a Covid-19 infection?

Myocarditis and pericarditis happen **more often after a Covid-19 infection** than after Covid-19 vaccines.^{2-6,11} A recent study from the United States found that this is true for all age groups (see Table 1).^{3,6} Another American study of people of all ages found that the risk of myocarditis was **16 times higher** in people who were hospitalized with Covid-19 infections compared to people hospitalized for other reasons.²

Covid-19 is very contagious. It continues to spread across Canada. Vaccines protect people from getting Covid, and from severe illness and death.¹¹⁻¹⁴

Table 1. Myocarditis and pericarditis after Covid-19 **infections**, National Patient-Centered Clinical Research Network, United States, January 1, 2021 - January 31, 2022 (n = 814,524)

Sex	Age (years)	Rate of myocarditis and pericarditis in the 21 days after a Covid-19 infection per 1 million (%)	Sex	Age (years)	Rate of myocarditis and pericarditis in the 21 days after a Covid-19 infection per 1 million (%)
Female	5-11	108 (0.0108%)	Male	5-11	176 (0.0176%)
	12-17	357 (0.0357%)		12-17	649 (0.0649%)
	18-29	195 (0.0195%)		18-29	1006 (0.1006%)
	30+	617 (0.0617%)		30+	1140 (0.1140%)

(Source: Centers for Disease Control and Prevention, 2022)²





♦ How are myocarditis and pericarditis diagnosed and treated?

Blood tests and an electrocardiogram (ECG) can be used to quickly diagnose myocarditis and pericarditis.¹ It is important to have these tests done while you have symptoms. The usual treatments are rest and anti-inflammatory medications.¹ Some people with these conditions may need more tests and treatment in hospital.¹ Experts believe that most people who have these conditions after a Covid-19 vaccine will make a full recovery.¹

♦ How often do myocarditis/pericarditis happen after a Covid-19 vaccine in teens and adults?

Between December 13, 2020 and November 21, 2021 the rate of myocarditis and pericarditis in Ontario, Canada was 15.1 per 1 million doses of the Pfizer vaccine (0.0015%) and 31.2 per 1 million doses of the Moderna vaccine (0.0031%) (see Table 2).⁷ These conditions are most common in males.^{1,3-9} They are most common in people younger than 30.^{1,3-9} They happen more often after dose 2.^{1,3-9} The risk seems to be higher after the Moderna vaccine.^{1,3-9} NACI currently recommends the Pfizer vaccine for people 29 years old and younger.^{5,6} NACI has advised 8 weeks between dose 1 and 2.^{5,6} This spacing may lower the risk of myocarditis and pericarditis.^{5,6} We are still learning about myocarditis and pericarditis after booster vaccine doses.

Table 2. Myocarditis and pericarditis after mRNA Covid-19 vaccines in Ontario, Canada December 13, 2020 to November 21, 2021 (n = 423)⁷

Sex	Age	Dose 1 Rate of myocarditis and pericarditis per 1 million doses (%)		Dose 2 Rate of myocarditis and pericarditis per 1 million doses (%)	
		Pfizer 	Moderna 	Pfizer 	Moderna 
Female	12-17	16.9 (0.0017%)	N/A*	17.7 (0.0018%)	N/A*
	18-24	11.3 (0.0011%)	16.8 (0.0017%)	5.8 (0.0006%)	63.3 (0.0063%)
	25-29	5.7 (0.0006%)	10.7 (0.0011%)	14.5 (0.0015%)	13.3 (0.0013%)
	30-39	7.3 (0.0007%)	5.4 (0.0005%)	14.6 (0.0015%)	23.7 (0.0024%)
	40+	3.5 (0.0004%)	8.0 (0.0008%)	6.7 (0.0007%)	4.4 (0.0004%)
Male	12-17	44.1 (0.0044%)	N/A*	107.5 (0.0106%)	N/A*
	18-24	38 (0.0038%)	14.5 (0.0015%)	72.5 (0.0073%)	333.9 (0.0334%)
	25-29	31.5 (0.0032%)	44.3 (0.0044%)	22.6 (0.0023%)	104.9 (0.0105%)
	30-39	12.4 (0.0012%)	4.9 (0.0005%)	22.4 (0.0022%)	67.9 (0.0068%)
	40+	7.9 (0.0008%)	13.6 (0.0014%)	11.0 (0.0011%)	18.1 (0.0018%)

(Source: Public Health Ontario, 2022)⁷

*The Moderna vaccine was not used in this age group.

♦ How often do myocarditis and pericarditis happen after a Covid-19 vaccine in children?

Myocarditis and pericarditis after a Pfizer Covid-19 vaccine is even less common in 5 to 11-year-old children than in teens and adults.³ In the United States, there were 8 cases of myocarditis after the first 7.1 million doses of the Pfizer vaccine for children aged 5 to 11.¹⁰ The rate of myocarditis in children was 1.12 cases per 1 million doses (0.0001%).¹⁰ On March 17, 2022, the Moderna vaccine was approved in Canada for children aged 6 to 11. There were no cases of myocarditis in the Moderna vaccine trials in children.¹⁴ Experts think that the risk of myocarditis may be higher with the Moderna vaccine. NACI recommends the Pfizer vaccine for 5 to 11-year-old children at this time.^{13,14}

On March 23, 2022, Moderna reported that a lower-dose vaccine for children aged 6 months to 6 years was effective and safe in trials.¹⁵ The Moderna vaccine is not yet approved for this age group in Canada.

♦ **If someone notices symptoms of myocarditis and pericarditis what should they do?**

If symptoms are **mild**, they should see a healthcare provider within 24 hours. If symptoms are **severe**, get in the way of normal activities, or are getting worse, they should see a healthcare provider right away.

People with heart problems do not seem to be at higher risk of these conditions. However, people with heart or lung disease can become very sick with myocarditis or pericarditis. **Anyone with heart or lung disease who has these symptoms should see a healthcare provider right away.**

♦ **When can someone who had myocarditis or pericarditis after a Covid-19 vaccine get their next vaccine dose?**

Speak with your healthcare team for advice if you or your child had myocarditis or pericarditis after a Covid-19 vaccine. Most people who were diagnosed with **myocarditis** within 6 weeks of a Covid-19 vaccine should not have any more doses at this time.^{12,13} People who had **pericarditis** after a Covid-19 vaccine should wait at least 90 days to get another dose.^{12,13} People with prior myocarditis or pericarditis should speak to their healthcare team for advice.¹³

NACI's Recommendations on the Use of Covid-19 Vaccines are updated often. You can find the most recent guidelines here: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-26-covid-19-vaccine.html>

¹ <https://cps.ca/documents/position/clinical-guidance-for-youth-with-myocarditis-and-pericarditis>

² <https://www.cdc.gov/mmwr/volumes/70/wr/mm7035e5.htm>

³ <https://www.cdc.gov/mmwr/volumes/71/wr/pdfs/mm7114e1-H.pdf>

⁴ <https://www.bmj.com/content/375/bmj-2021-068665.long>

⁵ <https://www.nejm.org/doi/full/10.1056/nejmoa2110475>

⁶ <https://www.nature.com/articles/s41591-021-01630-0>

⁷ https://www.publichealthontario.ca/-/media/documents/ncov/epi/covid-19-myocarditis-pericarditis-vaccines-epi.pdf?sc_lang=en

⁸ <https://www.cdc.gov/mmwr/volumes/70/wr/mm7027e2.htm>

⁹ <https://jamanetwork.com/journals/jama/fullarticle/2788346>

¹⁰ <https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-12-16/05-COVID-Su-508.pdf>

¹¹ <https://cps.ca/en/documents/position/covid-19-vaccine-for-children-and-adolescents>

¹² <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/rapid-response-recommendation-use-covid-19-vaccines-individuals-aged-12-years-older-myocarditis-pericarditis-reported-following-mrna-vaccines.pdf>

¹³ <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-26-covid-19-vaccine.html>

¹⁴ <https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/recommendations-use-moderna-spikevax-covid-19-vaccine-children-6-11-years-age.html>

¹⁵ <https://investors.modernatx.com/news/news-details/2022/Moderna-Announces-its-COVID-19-Vaccine-Phase-23-Study-in-Children-6-Months-to-Under-6-Years-Has-Successfully-Met-Its-Primary-Endpoint/default.aspx>

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