


LETTER TO THE EDITOR

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Protection against MIS-C outweighs the risk of myocarditis after Covid-19 vaccination in children

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Abstract

From March 2020 to July 2022, in Liguria region (North-West Italy) incidence of MIS-C among pediatric patients infected by SARS-CoV-2 was 38.7/100.000, which is higher than that of myocarditis after COVID-19 vaccination. In our opinion severity of MIS-C-related cardiac disease outweigh the risk of myocarditis after COVID-19 vaccine.

Keywords: Vaccine, BNT162b2, Children

Main text

To the editor.

A number of studies have reported an increased rate of myocarditis among subjects who received mRNA vaccination against COVID-19. The highest incidence was seen in young male adolescents and adults (16 to 29 years of age), with 8.62 excess events per 100,000 persons (95% confidence interval, 2.82 to 14.35 [1]). Symptoms of myocarditis developed most frequently within a few days after the second dose of vaccine [2, 3]. However, the clinical presentation was generally mild, with resolution of myocarditis in most cases and a relatively short length of hospital stay [3]. Although the mechanism of vaccine-induced myocarditis is not known, it may be related to the active component of the vaccine, the mRNA sequence that codes for the spike protein of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), or to the immune response that follows vaccination [3].

The risk of myocarditis is one of the reasons for the mistrust regarding the safety of COVID-19 vaccines in

children. However, on June 23rd 2021, the Center for Disease Control (CDC)'s Advisory Committee on Immunization Practices (ACIP) reviewed the available data and concluded that the benefits of COVID-19 vaccination to the individual persons and the population outweighs the risk of myocarditis and recommended the continued use of the vaccine in subjects aged ≥ 12 years [2]. In a multinational, placebo-controlled trial of the BNT162b2 COVID-19 vaccine in adolescents 12 to 15 years of age, the vaccine was found to have a favorable safety and side-effect profile, with mainly transient mild-to-moderate reactogenicity (predominantly injection-site pain, fatigue, and headache). Through an up to 1-month follow-up after the second dose, no case with myocarditis was observed [4]. In a subsequent randomized trial, 1517 children aged 5 to 11 years were given two doses of the BNT162b2 vaccine administered 21 days apart. After a median follow-up of 2.3 months, no vaccine-related adverse events, including myocarditis, were noted [5].

One of the main benefits of preventing SARS-CoV-2 infection in children and adolescents include the protection against the multisystem inflammatory syndrome in children (MIS-C), which is the most serious and worrying complication of COVID-19 in the pediatric age group [6]. This condition is thought to be caused by a

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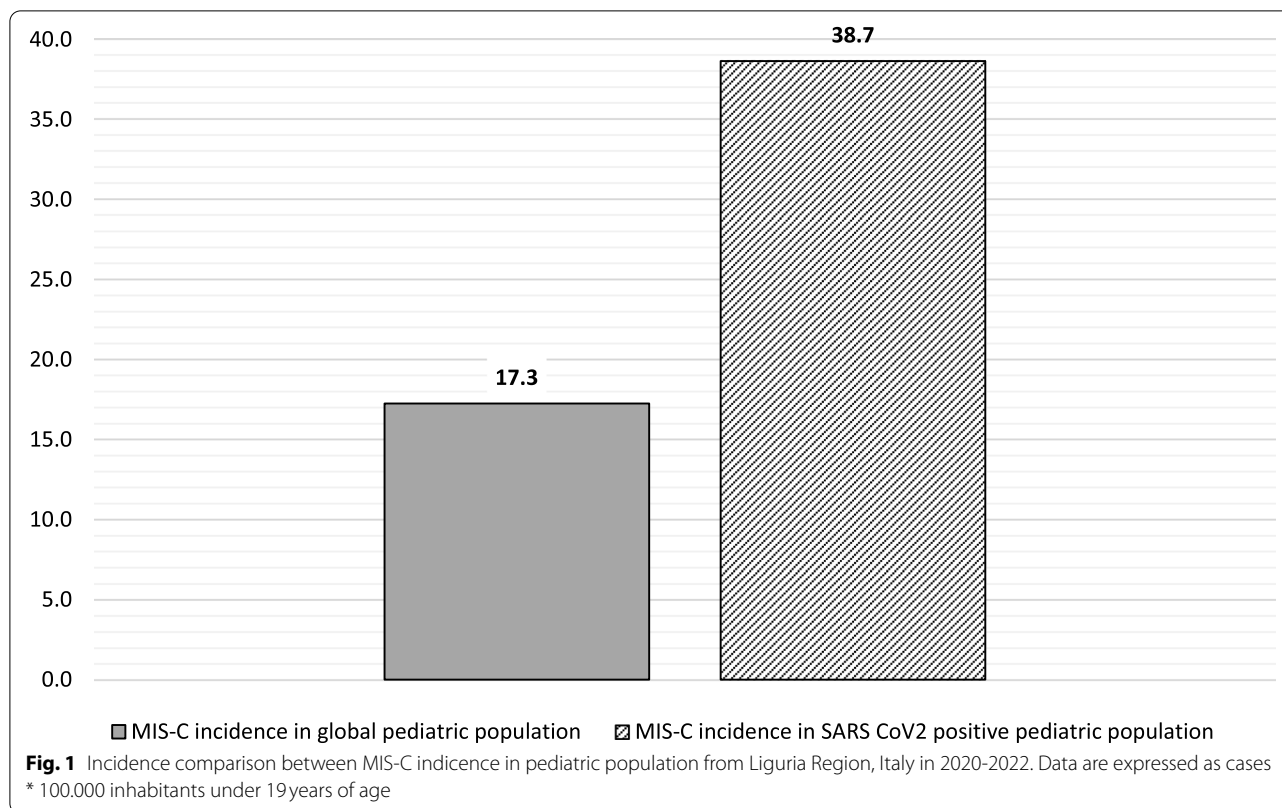
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Table 1 Clinical characteristics of MIS-C population hospitalized between March 2020 and July 2022 at Istituto Giannina Gaslini

	0-11 months			1-5 years			6-10 years			11-18 years			total	
	n	% on total		n	% on total		n	% on total		n	% on total		n	%
Sex														
Male	1	2,7		8	21,6		6	16,2		8	21,6		23	62,2
Female	0	0,0		8	21,6		3	8,1		3	8,1		14	37,8
Total	1			16			9			11				
Hospital stay														
Days	20			13,5			17			20				
Symptoms upon hospitalization														
Fever > 38 °C	1	100		15	93,8		9	100		11	100		36	97,3
Cough	0	0		1	6,3		1	11,1		2	18,2		4	10,8
Fatigue	1	100		9	56,3		7	77,8		6	54,5		23	62,2
Rhinitis	1	100		16	100,0		9	100		11	100		37	100,0
Nausea/vomiting	1	100		9	56,3		5	55,6		6	54,5		21	56,8
Abdominal pain	1	100		7	43,8		6	66,7		7	63,6		21	56,8
Hypotension	0	0		0	0,0		4	44,4		4	36,4		8	21,6
Respiratory distress	0	0		0	0,0		0	0		1	9,1		1	2,7
Feeding difficulties	0	0		7	43,8		4	44,4		4	36,4		15	40,5
Rash	1	100		12	75,0		7	77,8		3	27,3		23	62,2
Myalgia	0	0		2	12,5		2	22,2		1	9,1		5	13,5
Laboratory tests upon arrival														
Leucocytes count/mm ³	10,540			10,275	6683-11,805		10,690	6510-14,390		8400	5645-13,185			
Lymphocytes count/mm ³	3860			1945	1443-3280		1170	890-1640		680	400-1500			
CRP (mg/dl)	15,1			9,62	6,87-16,2		7,1	4,24-13,4		19,4	16,1-22,2			
D-dimer (ug/ml)	//			2,45	1,62-4,65		4,73	2,73-6,34		2,31	1,67-2,88			
NT-pro BNP (pg/ml)	//			1479	1056-2684		1524	833-2024		806	266-7311			
Therapy														
Immunotherapy (steroids, immunoglobulin, anakinra)	1	100		15	93,8		9	100		11	100			
Anticoagulants	1	100		15	93,8		8	88,9		10	90,9			



post-infectious inflammatory process and manifests clinically with signs and symptom similar to those of Kawasaki disease (KD), but is also marked by clinical manifestations unusual in KD, particularly gastrointestinal complaints and myocarditis, often leading to myocardial failure and shock [7]. The severity of cardiac involvement often requires admission to the intensive care unit, a long hospital stay, and an aggressive therapeutic approach [8, 9]. Thus far, the risk of long-term sequelae to the heart is unknown but is being investigated. As of November 1, 2021, a total of 5526 patients meeting case definition for MIS-C have been reported to the CDC, 48 of whom had died [10].

Istituto Giannina Gaslini is a third-level pediatric hospital acting as referral center for SARS CoV2-related diseases in Liguria Region (North-West Italy). From March 2020 to July 2022, MIS-C was diagnosed in 37 patients with a median age of 6 years (25th-75th centile: 3-11 years).

Clinical and population characteristics are resumed in Table 1: more than 97% of MIS-C patients had fever >38°C; rash and fatigue were present in 62% of cases. Other common symptoms were abdominal pain and nausea or vomiting, recorded in more than 50% of cases.

No patient died, but all needed hospitalization for more than 10 days in children of 1-5 years and of more

than 15 days in other ages. Immunotherapy (intended as immunoglobulins, steroids or anakinra) was administered in more than 90% of patients as well as anticoagulants.

Meanwhile, a total of 95.693 subjects aged <19 years were diagnosed with COVID-19 in Liguria, making an incidence of MIS-C among pediatric patients infected by SARS-CoV-2 of 38.7/100.000, which is higher than that of myocarditis after COVID-19 vaccination (Fig. 1).

The incidence of MIS-C on COVID-19 positive pediatric population is therefore about two times higher compared to incidence we already documented on global regional pediatric population [11].

In our view, the higher incidence of MIS-C after COVID-19 infection and the much greater severity of MIS-C-related cardiac disease outweigh the risk of myocarditis after COVID-19 vaccine and their prevention represent important reasons for performing the vaccination in children and adolescents.

Abbreviations

COVID-19: Corona Virus Disease 19; MIS-C: multisystem inflammatory syndrome in children.

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Authors' contributions

MM performed statistical analysis and data interpretation, RC, AC, GB, CS, MG performed data collection and interpretation, EC performed study design, data interpretation and draft revision, AR performed coordination activity study design and wrote manuscript draft. The authors read and approved the final manuscript.

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Availability of data and materials

Datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations**Ethics approval and consent to participate**

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors have no other relevant financial or non-financial interests to disclose.

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