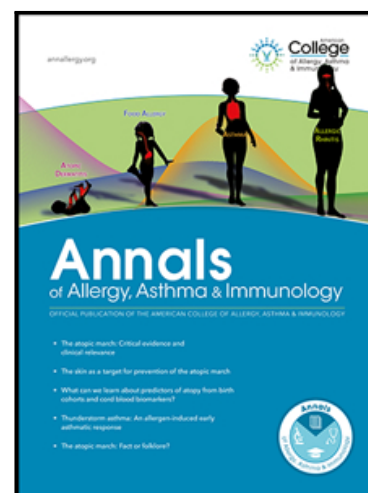


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Sofianne Gabrielli M.Sc. , Jennifer LP Protudjer Ph.D. ,
Gregory Gooding B.A. , Jennifer Gerdtz B.Comm. ,
Moshe Ben-Shoshan M.D., M.Sc.

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Anaphylaxis-related knowledge and concerns in Canadian families during COVID-19

Sofianne Gabrielli, M.Sc.^{a,*}, Jennifer LP Protudjer, Ph.D.^b, Gregory Gooding, B.A.^a, Jennifer Gerds,
B.Comm.^c, Moshe Ben-Shoshan, M.D., M.Sc.^a

^aDivision of Pediatric Allergy and Clinical Immunology, McGill University Health Centre, 1001 blvd.
Decarie, Montreal, Quebec, H4A 3J1, Canada

^bDepartment of Pediatrics and Child Health, Children's Hospital Research Institute of Manitoba,
Winnipeg, Manitoba, Canada

^cExecutive Director, Food Allergy Canada, Toronto, Ontario, Canada

*Corresponding author.

Email: sofiannegabrielli@gmail.com

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Abbreviations:

EAI	Epinephrine autoinjector
ED	Emergency department

Anaphylaxis is a life-threatening condition defined as the involvement of two or more systems after exposure to a possible allergen or hypotension after exposure to a known allergen¹⁻³. The first-line treatment for anaphylaxis is prompt administration of an epinephrine autoinjector (EAI)⁴. Guidelines advise that following epinephrine administration, patients should arrive to the Emergency Department (ED) for assessment and observation^{2,3}. A recent editorial recommends that cases in which symptoms resolve following EAI administration, patients could manage anaphylaxis at home and notify their physician on a nonurgent basis⁵. If symptoms persist or worsen, a second dose of epinephrine should be administered, and patients should be assessed in the ED⁵. The aim of this study is to evaluate knowledge and concerns related to anaphylaxis management among Canadian patients and/or parents of children with food allergies during the COVID-19 pandemic.

We developed a questionnaire to capture participant's knowledge and concerns regarding history of previous severe allergic reactions and willingness to use epinephrine for anaphylaxis during the COVID-19 pandemic. The questionnaire was distributed via email and social media to members of Food

Allergy Canada, the leading national patient organization supporting Canadians affected by food allergy. The study was approved by the McGill University Health Centre ethics board.

Participants were directed to a study information page and a consent disclosure statement. We did not collect any other personal data. Participants were queried on demographics (i.e., age, sex), then progressed through closed- and open-ended questions on food allergy, anaphylaxis, and COVID-19.

Among the 140 participants who began to fill the consent form, 113 (80.7%) completed the questionnaire. Among those filling the questionnaire, 92 (81.4%) answered all questions and were defined as complete responders. Those who did not answer all questions (18.6%) were defined as partial responders. The majority of participants were parents who filled in the questionnaire for children with allergies (n=60, 53.1%). The other participants were adults with allergies (n=53, 46.9%). Half of participants were female (n=59, 52.2%). Almost half of participants (n=53, 46.9%) reported that they or their child had eczema and 44 (38.9%) participants reported that they or their child had asthma. One-fifth of participants (n=21, 18.6%) reported that they or their child had other allergic comorbidities.

Among the 113 participants, the majority (n=82, 72.6%) reported that the patient or caregiver would not have hesitations to use an EAI for an allergic reaction during the COVID-19 pandemic. Among 18 participants (15.9%) reporting hesitations, the most common were COVID-19-related, which included fear of being exposed to COVID-19 with medical staff (n=15, 83.3%), not wanting to spend time monitored in the ED (n=12, 66.7%), and challenges accessing the ED during COVID-19 (n=8, 44.4%). Other hesitations included reaction not severe enough to use EAI (n=7, 38.9%), insufficient knowledge on anaphylaxis and EAI use (n=4, 22.2%), difficulty in getting a new EAI (n=4, 22.2%), and fear of needles (n=1, 5.6%).

Twenty-five patients (22.2%) reported having had anaphylaxis since the start of the COVID-19 pandemic. Among these reactions, 24 participants (96.0%) reported not using an EAI to treat the reaction. Of these 24 participants, the majority (n=18, 75.0%) reported that they would not hesitate to use one. In

this group, the majority were parents with children with allergies (n=17, 70.8%) and six (25.0%) were adults. The use of an EAI for anaphylaxis during the COVID-19 pandemic was significantly lower than the use of an EAI during the participant's or their child's worst anaphylactic reaction of life [4.0% vs. 40.9%, difference: -24.3% (95% Confidence Interval (95%CI), -53.8%, -20.0%), Table 1]. Among the participants who had a reaction during COVID-19 and did not use their EAI, five participants (20.0%) reported not using one due to concerns about going to the ED during COVID-19.

To our knowledge this is the first study to assess EAI use hesitancy during the COVID-19 pandemic. Although our results show that the majority of participants indicated that they would not hesitate to use an EAI for an allergic reaction during COVID-19, the vast majority of cases did not use their EAI. Among those reporting hesitations, fear of exposure through interactions with staff and challenges accessing the ED during COVID-19 were among the most common reasons. These findings are in line with other studies in Canadian children with food allergy reporting fear of EAI use and underutilization of EAI^{4, 6}, as well as with recent systematic review and meta-analysis conducted by our group revealing that less than 25% of children and less than 10% of adults will use their EAI⁷. Our findings suggest that COVID-19 contributes to increased hesitancy in EAI use.

Some potential limitations are that our sampling population was comprised of Food Allergy Canada members only, therefore our results may not be generalizable to the rest of the population. Although our questionnaire asked about anaphylaxis, we did not ask specific symptoms nor severity of anaphylaxis to decrease questionnaire length. Hence, we could not determine the severity of anaphylaxis. Furthermore, we were not able to determine the cause for the high percentage of individuals that did not respond to certain questions. Current studies suggest that response rates for surveys are generally less than 50%, unless an incentive is used⁸. Given that the highest number of non-responses to a question in our survey was 19%, our percentage of partial and complete responders are in line with other studies⁸.

In conclusion, our survey may provide an explanation on EAI underutilization for anaphylaxis during the COVID-19 pandemic. In general, pre-hospital EAI is underused⁹, however, additional concerns have been demonstrated by our participants as 20% indicated hesitations to using an EAI and only one participant among 25 used their EAI during the pandemic, despite experiencing anaphylaxis. As per a recent editorial recommending at-home management of anaphylaxis with epinephrine, it may be beneficial to incorporate these recommendations into current anaphylaxis management guidelines⁵. It is important to encourage the use of EAI given reduced accessibility to the ED during the pandemic¹⁰. Implementation of home management for anaphylaxis into current guidelines will likely contribute to increased EAI use during the COVID-19 pandemic.

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None

Conflict of Interests

None

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Table 1. Allergic reaction since the start of the COVID-19 pandemic, $n=113$

Variable	n (%)
Epinephrine Autoinjector Use for Worst Reaction <u>in Life</u>	
Symptoms experienced during worst reaction ($n=113$)	
Skin	84 (74.3%)
Respiratory	59 (52.2%)
Gastrointestinal	36 (31.9%)
Drop in blood pressure	22 (19.5%)
Other	14 (12.4%)
Anaphylaxis ($\geq$ two systems involved)	66 (58.4%)
EAI used for worst reaction ($n=113$)	
Yes	32 (28.3%)
No	65 (57.5%)
No response	16 (14.2%)
Among cases of anaphylaxis ($n=66$)	27 (40.9%)

Epinephrine Autoinjector Use During COVID-19 Pandemic	
Person or caregiver with hesitation to use EAI during COVID-19	
Yes	
No	18 (15.9%)
No response	82 (72.6%)
	13 (11.5%)
Type of hesitation ¹ (<u>n</u> =18)	
COVID-19-related hesitations:	
Fear of being exposed to COVID-19	15 (83.3%)
Did not want to spend 4-6 hours being monitored	12 (66.7%)
Challenge accessing ED during COVID-19	8 (44.4%)
Other hesitations:	
Reaction not severe enough to use an EAI	7 (38.9%)
Concerned that a replacement EAI would be difficult to get	4 (22.2%)
Unclear signs and symptoms of anaphylaxis	3 (16.7%)
Fear of needles	1 (5.6%)
Did not know how/not confident to use EAI	1 (5.6%)
Other	2 (16.7%)
<u>Anaphylactic</u> reaction since the start of COVID-19 (<u>n</u> =113)	
Yes	25 (22.1%)
No	70 (61.9%)
No response	18 (15.9%)
<u>EAI used for this reaction (n=25)</u>	
<u>Yes</u>	<u>1 (4.0%)</u>

<u>No</u>	<u>24 (96.0%)</u>
If EAI not used, part of decision due to concerns about going to ED during COVID-19 pandemic (<u>n</u>=25) Yes No No response	5 (20.0%) 19 (76.0%) 1 (4.0%)
Type of concern¹ (<u>n</u>=5) COVID-19-related concerns: Fear of being exposed to COVID-19 by medical staff Did not want to spend 4-6 hours being monitored Challenges accessing ED during COVID-19 Other concerns: Reaction not severe enough to use EAI Concerned that a replacement EAI would be difficult to get Unclear signs and symptoms of anaphylaxis Fear of needles Did not know how/not confident to use EAI Other	3 (60.0%) 3 (60.0%) 2 (40.0%) 3 (60.0%) 0 (0.0%) 1 (20.0%) 0 (0.0%) 1 (20.0%) 0 (0.0%)
Was a member of your household diagnosed with COVID-19? Yes No I don't know Prefer not to answer/No response	1 (0.9%) 91 (80.5%) 0 (0.0%) 21 (18.6%)

¹Categories not mutually exclusive

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