

Teenagers and those with severe reactions are more likely to use their epinephrine autoinjector in cases of anaphylaxis in Canada



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Clinical Implications

- Among patients possessing an epinephrine autoinjector, the device is used in less than 50% of cases of anaphylaxis outside of the health care facility. Educational programs promoting the use of epinephrine outside of the health care facility in young children and adults are required to improve the management of these patients.

TO THE EDITOR:

Anaphylaxis is a severe, life-threatening allergic reaction, involving at least 2 organ systems and/or the presence of hypotension after exposure to a known allergen.¹ According to current guidelines, prompt intramuscular epinephrine administration is the first-line treatment for anaphylaxis regardless of the trigger.¹ The prescription of an epinephrine autoinjector (EAI) by a physician is recommended in patients who have a history of anaphylaxis, in patients with a confirmed IgE-mediated food allergy, and in those with idiopathic, exercise-induced, and venom-induced anaphylaxis.² Numerous studies report the underuse of epinephrine in the treatment of anaphylaxis in the emergency department (ED),³ yet little data exist regarding the use of EAIs during anaphylaxis outside of the hospital and no large-scale studies reporting the use of EAI in individuals who report having their EAI at the time of reaction. We aimed to assess the proportion and predictors of EAI use before arrival to the health care facility for anaphylaxis in patients with known food allergies possessing an EAI.

This was a cross-sectional study conducted in 5 provinces and involving 9 medical centers as part of the Cross-Canada Anaphylaxis Registry (see Table E1 in this article's Online Repository at www.jaci-inpractice.org). Data on patients were collected prospectively, at the time of patient presentation, and retrospectively (see Table E2 in this article's Online Repository at www.jaci-inpractice.org). The treating physician identified cases of anaphylaxis (defined as involvement of 2 organ systems, hypotension in response to an allergen, or both¹), obtained consent, and completed a standardized data entry form documenting symptoms, triggers, and management of anaphylaxis. Data on missed cases that were not recruited at the time of presentation to the ED were collected retrospectively through chart review

according to the *International Classification of Diseases, Revision 10* codes related to allergic reactions/anaphylaxis based on a previously validated algorithm.³ Data were collected from EDs in British Columbia, Alberta, Ontario, and Newfoundland and Labrador. Only prospective and retrospective cases meeting the definition of anaphylaxis as determined by 2 independent reviewers (S.G. and M.B.S.) were included. Given that we aimed to assess specifically the use of EAIs before the arrival to the health care facility, we included data only from those cases who indicated a known food allergy and possession of an EAI at the time of anaphylaxis. Anaphylaxis severity was defined as mild, moderate, and severe as previously published.^{4,5}

All statistical analyses were done using R version 3.2.2. (R Core Team [2013]; R Foundation for Statistical Computing, Vienna, Austria). Percentages with 95% CIs (binomial or multinomial for variables with more than 2 categories) were used to assess patient demographic characteristics, reaction severity, allergic trigger, location, activity during reaction, and management outside of the hospital of all cases of anaphylaxis. Univariate and multivariate logistic regression models were compared to estimate factors associated with epinephrine use outside of the health care facility. The study was approved by the ethics committees of all participating hospitals.

Between November 2010 and December 2017, 483 cases of anaphylaxis among patients who had an EAI at the time of reaction were identified at 9 EDs across Canada. Most cases, 74%, were recruited from the province of Quebec and half of the cases were prospectively recruited (Table I).

Outside of the health care facility, an EAI was administered in 196 (41%; 95% CI, 36%-45%) patients during anaphylaxis. More than half the patients (53%; 95% CI, 48%-58%) were treated with antihistamines, while one-fifth (20%; 95% CI, 17%-24%) did not receive any treatment for the reaction before arriving to the hospital (Table I). Among patients with mild and moderate anaphylaxis, an EAI was administered in 27% (95% CI, 18%-37%) and 43% (95% CI, 38%-48%) of cases, respectively; however, among those with severe anaphylaxis, an EAI was used in 61% (95% CI, 41%-78%) of cases (Table I). Use of an EAI among children aged 0 to 12 years was 39% (95% CI, 33%-44%), among teenagers aged 13 to 19 years was 53% (95% CI, 42%-63%), and among adults older than 20 years was 33% (95% CI, 20%-49%) (see Table E3 in this article's Online Repository at www.jaci-inpractice.org). The highest percentage of EAI use was in Quebec (44%; 95% CI, 39%-49%) and Ontario (45%; 95% CI, 24%-68%) (see Table E4 in this article's Online Repository at www.jaci-inpractice.org).

Use of an EAI outside of a health care facility was more likely in teenagers (adjusted odds ratio [aOR], 1.17; 95% CI, 1.04-1.31) and among those with severe reactions (aOR, 1.25; 95% CI, 1.04-1.51) while adjusting for sex, presence of asthma, location of reaction, and regular treatment with beta-blockers. The use of an EAI during anaphylaxis was less likely in patients treated with antihistamines outside of the health care facility (aOR, 0.89; 95% CI, 0.82-0.98) and in patients living in the province of Alberta (aOR, 0.63; 95% CI, 0.47-0.85) (Table II).

Our study is the first and largest describing the use of EAI in individuals who report having an EAI during reaction. EAI

TABLE I. Characteristics of patients with prescribed EAI presenting to the emergency department with anaphylaxis

Variable (N = 483)	No. of patients, n (%)	95% CI
Province		
Newfoundland	3 (0.6)	0.0%-4.6%
Quebec	357 (73.9)	70.2%-77.9%
Ontario	20 (4.1)	0.4%-8.1%
Alberta	11 (2.3)	0.0%-6.2%
British Columbia	92 (19.0)	15.3%-23.0%
Prospectively recruited	241 (49.9)	45.4%-54.4%
Age (median, interquartile range)	7.3 (3.4-13.6)	
Teens (13-19-y-olds)	89 (18.4)	15.1%-22.2%
Sex (% males)	273 (56.5)	52.0%-61.0%
Severity		
Mild*	94 (19.5)	15.7%-23.4%
Moderate†	361 (74.7)	71.0%-78.6%
Severe‡	28 (5.8)	2.1%-9.7%
Trigger§		
Food	442 (91.5)	89.4%-93.9%
Peanut	91 (20.6)	17.0%-24.7%
Tree nut	98 (22.2)	18.4%-26.4%
Milk	47 (10.6)	8.0%-14.0%
Egg	33 (7.5)	5.3%-10.4%
Fish	13 (2.9)	1.6%-5.1%
Shellfish	10 (2.3)	1.2%-4.3%
Insect	3 (0.6)	0.0%-3.0%
Drug	8 (1.7)	0.0%-4.1%
Other	5 (1.0)	0.0%-3.5%
Unknown	25 (5.2)	3.1%-7.6%
Location (N = 449)		
Home	215 (47.9)	43.2%-52.6%
Work	70 (15.6)	10.9%-20.3%
School/Daycare	11 (2.4)	0.0%-7.1%
Restaurant	34 (7.6)	2.9%-12.3%
Other	38 (8.5)	3.8%-13.1%
Unknown	81 (18.0)	13.4%-22.7%
Activity during reaction (N = 416)		
Exercise	17 (4.1)	2.2%-6.3%
Normal activity	390 (93.8)	91.8%-96.0%
Alcohol	0 (0.0)	0.0%-2.3%
Cold exposure	0 (0.0)	0.0%-2.3%
Other	9 (2.2)	0.2%-4.4%
Treated outside of health care facility		
Epinephrine	196 (40.6)	36.2%-45.1%
Antihistamines	256 (53.0)	48.4%-57.5%
Antacids	6 (1.2)	0.5%-2.8%
Beta-agonists	41 (8.5)	6.2%-11.4%
Corticosteroids	9 (1.9)	0.9%-3.6%
IV Fluids	0 (0.0)	0.0%-1.0%
Other	29 (6.0)	4.1%-8.6%
No treatment	96 (19.9)	16.5%-23.8%
Unknown	9 (1.9)	0.9%-3.6%
Epinephrine use outside of the health care facility		
Mild cases (N = 94)	25 (26.6)	18.3%-36.9%
Moderate cases (N = 361)	154 (42.7)	37.5%-48.0%

(continued)

TABLE I. (Continued)

Variable (N = 483)	No. of patients, n (%)	95% CI
Severe cases (N = 28)	17 (60.7)	40.7%-77.9%
Asthma	96 (19.9)	16.5%-23.8%
Eczema	67 (13.9)	11.0%-17.4%

IV, Intravenous.

*Symptoms include urticaria, erythema, angioedema, oral pruritus, nausea, nasal congestion, sneezing, rhinorrhea, or throat tightness.⁴†Symptoms include crampy abdominal pain, diarrhea, recurrent vomiting, dyspnea, stridor, cough, wheeze, or "light-headedness."⁴‡Symptoms include cyanosis, hypoxia, respiratory arrest, hypotension, dysrhythmia, confusion, or loss of consciousness.⁴

§Although all patients were prescribed an EAI because of food allergies, some patients reacted to venom and/or drugs at time of recruitment.

||Patients reported reactions to cat, exercise, modeling clay, and immunotherapy for environmental allergies.

underuse is reported in other smaller studies.⁵ The low rate of EAI administration could be explained by patients' inability to rapidly recognize symptoms of anaphylaxis or by anxiety associated with injection, such as needle phobia or fear from adverse secondary events.⁶ A greater percentage of the reactions in our study were treated with antihistamines outside of the health care facility. Although antihistamines are useful for the symptomatic treatment of urticaria, angioedema, and pruritus, they are not the first-line treatment of immediate life-threatening reactions, and their use can lead to delayed administration of epinephrine.

Our study reveals that teenagers possessing the EAI at the time of anaphylaxis are more likely to use it. Previous studies have suggested that adolescents are more likely to have accidental reactions because they are less vigilant about allergen avoidance.⁷ However, our results suggest that although there is a higher risk for accidental reactions, teenagers are also more likely to use their EAI in cases of reactions. This is similar to a recent study by Robinson et al⁸ in which adolescents aged 13 to 17 years were among the group more likely to receive epinephrine before arrival to an ED.⁸ The higher use of EAIs among teenagers may be due to better recognition of anaphylaxis symptoms in teenagers and higher confidence in taking risks such as administering their EAI. In addition, teenagers are more likely to use epinephrine as they administer their EAI themselves, whereas younger children often rely on a caregiver, who can be more reluctant to administer the device. Given that EAI use is similar as reported by other studies,⁸ we believe that our results can be generalized to populations outside of Canada.

We report higher EAI use among those individuals with severe reactions and lower use in the province of Alberta. These findings are in line with studies suggesting that patients experiencing severe reactions, which can include respiratory and shock symptoms, are more likely to take any medications during an episode of anaphylaxis.⁹ Differences between provinces in Canada can be a result of different approaches in the recommendations by allergists practicing in different provinces.

Our study has potential limitations. Our cohort has been limited to include patients diagnosed with food allergy who had an EAI; hence, our findings could not be generalized to other triggers of anaphylaxis requiring an EAI, such as venom. However, numerous studies suggest that the major cause of anaphylaxis is food⁵ and consequently, food-allergic individuals are the majority of cases requiring epinephrine before arrival in a health

TABLE II. Factors associated with use of EAI outside of health care facility

Variable	OR (95% CI)	
	Univariate	Multivariate*
Teenager (13-19-y-olds)	1.16 (1.03-1.30)	1.17 (1.04-1.31)
Sex (males)	1.03 (0.94-1.12)	1.01 (0.92-1.11)
Province of Alberta	0.66 (0.49-0.88)	0.63 (0.47-0.85)
Severe reaction	1.24 (1.03-1.49)	1.25 (1.04-1.51)
Asthma	0.99 (0.88-1.10)	0.95 (0.85-1.07)
Reaction occurring at home	0.99 (0.90-1.08)	0.98 (0.89-1.07)
Reaction occurring during exercise	0.99 (0.79-1.27)	—
Received antihistamines outside of health care facility	0.89 (0.82-0.97)	0.89 (0.82-0.98)
Regular treatment with NSAIDs	1.81 (0.92-3.59)	—
Regular treatment with beta-blockers	0.67 (0.25-1.75)	0.63 (0.24-1.62)

NSAID, Nonsteroidal anti-inflammatory drug.

*Adjusted odds ratio.

care facility. The greatest percentage of anaphylactic reactions in our study were from the province of Quebec compared with less than 5% from Ontario, Alberta, and Newfoundland. This large difference is likely because Quebec has the greatest number of centers in our study, has bigger EDs that can accommodate a larger number of patients, and is the location of the inception of our study. Finally, given that we did not ask who administered the EAI, we cannot distinguish if the EAI was used by the patients themselves or a caregiver.

In conclusion, our findings reveal the suboptimal use of EAIs for the management of anaphylaxis. Education programs promoting the use of EAIs in young children and adults across Canada, regardless of anaphylaxis severity, are required to improve the management of these patients.

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REFERENCES

1. Sampson HA, Munoz-Furlong A, Campbell RL, Adkinson NF Jr, Bock SA, Branum A, et al. Second symposium on the definition and management of anaphylaxis: summary report—Second National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network symposium. *J Allergy Clin Immunol* 2006;117:391-7.
2. Lieberman PL. Recognition and first-line treatment of anaphylaxis. *Am J Med* 2014;127:S6-11.
3. Asai Y, Yanishevsky Y, Clarke A, La Vieille S, Delaney JS, Alizadehfar R, et al. Rate, triggers, severity and management of anaphylaxis in adults treated in a Canadian emergency department. *Int Arch Allergy Immunol* 2014;164:246-52.
4. Brown SGA. Clinical features and severity grading of anaphylaxis. *J Allergy Clin Immunol* 2004;114:371-6.
5. Lee AY, Enarson P, Clarke AE, La Vieille S, Eisman H, Chan ES, et al. Anaphylaxis across two Canadian pediatric centers: evaluating management disparities. *J Asthma Allergy* 2017;10:1-7.
6. Simons FE, Clark S, Camargo CA Jr. Anaphylaxis in the community: learning from the survivors. *J Allergy Clin Immunol* 2009;124:301-6.
7. Monks H, Gowland MH, MacKenzie H, Erlewyn-Lajeunesse M, King R, Lucas JS, et al. How do teenagers manage their food allergies? *Clin Exp Allergy* 2010;40:1533-40.
8. Robinson M, Greenhawt M, Stukus DR. Factors associated with epinephrine administration for anaphylaxis in children before arrival to the emergency department. *Ann Allergy Asthma Immunol* 2017;119:164-9.
9. Ye YM, Kim MK, Kang HR, Kim TB, Sohn SW, Koh YI, et al. Predictors of the severity and serious outcomes of anaphylaxis in Korean adults: a multicenter retrospective case study. *Allergy Asthma Immunol Res* 2015;7:22-9.

ONLINE REPOSITORY

TABLE E1. Setting of Cross-Canada Anaphylaxis Registry (C-CARE) study

Hospital	Province	Approximate no. of annual ED visits	Period of recruitment	Patients recruited	Type of recruitment
Montreal Children's Hospital	Quebec	80,000	April 2011 to December 2017	Children	Prospective and retrospective
Hôpital Sainte-Justine	Quebec	82,000	October 2013 to December 2017	Children	Prospective
Royal Victoria Hospital	Quebec	86,000	November 2010 to October 2011	Adults	Retrospective
Montreal General Hospital	Quebec	40,000	March 2011 to February 2012	Adults	Retrospective
Hôpital Sacré-Coeur	Quebec	60,000	May 2012 to December 2017	Children and adults	Prospective and retrospective
Children's Hospital at the London Health Sciences Centre	Ontario	36,000	August 2014 to December 2017	Children	Prospective and retrospective
University of Alberta Hospital	Alberta	70,000	March 2012 to February 2013	Adults	Retrospective
British Columbia Children's Hospital	British Columbia	45,000	June 2014 to May 2017	Children	Prospective and retrospective
Janeway Children's Health and Rehabilitation Centre	Newfoundland and Labrador	36,000	October 2016 to November 2017	Children	Prospective and retrospective

TABLE E2. Characteristics of prospective vs retrospective patients with prescribed EAls presenting to the ED with anaphylaxis

Variable (% , 95% CI)	Prospective (N = 241)	Retrospective (N = 242)	Difference
Province			
Newfoundland	0.0% (0.0% to 5.7%)	1.2% (0.0% to 66.4%)	−12.4% (−3.0 to 0.6%)
Quebec	71.8% (66.4% to 77.5%)	76.0% (71.1% to 81.4%)	−4.2% (−12.5% to 4.0%)
Ontario	7.5% (2.1% to 13.2%)	0.8% (0.0% to 6.2%)	6.6% (2.7% to 10.6%)
Alberta	0.0% (0.0% to 5.7%)	4.5% (0.0% to 9.9%)	−4.5% (−7.6% to 0.15%)
British Columbia	20.7% (15.4% to 26.5%)	17.4% (12.4% to 22.8%)	3.4% (−4.0% to 10.8%)
Age (mean, 95% CI)	10.2 (3.0 to 14.3)	9.4 (3.5 to 12.4)	0.8 (−0.80 to 2.57)
Teens (13-19-y-olds)	21.6% (16.7% to 27.4%)	15.3% (11.1% to 20.6%)	6.3% (−1.0% to 13.6%)
Sex (% males)	54.8% (48.3% to 61.1%)	58.3% (51.8% to 64.5%)	−3.5% (−12.7% to 5.8%)
Severity			
Mild*	20.7% (15.4% to 26.2%)	18.2% (13.2% to 23.7%)	2.6% (−4.9% to 10.0%)
Moderate†	73.9% (68.5% to 79.3%)	75.6% (70.7% to 81.1%)	−1.8% (−9.9% to 6.4%)
Severe‡	5.4% (0.0% to 10.8%)	6.2% (1.2% to 11.7%)	−0.8% (−5.4% to 3.8%)
Trigger			
Food	92.1% (89.2% to 95.3%)	90.9% (86.4% to 94.1%)	1.2% (−4.2% to 6.6%)
Insect	0.4% (0.0% to 3.6%)	0.8% (0.1% to 3.3%)	−0.4% (−2.2% to 1.4%)
Drug	1.7% (0.0% to 4.8%)	1.2% (0.3% to 3.9%)	−0.4% (−2.1% to 1.2%)
Other	0.4% (0.0% to 3.6%)	2.5% (1.0% to 5.6%)	−2.1% (−4.6% to 2.5%)
Unknown	5.4% (2.5% to 8.6%)	4.5% (2.4% to 8.2%)	0.8% (−3.4% to 5.1%)
Activity during reaction			
Exercise	3.8% (1.4% to 6.5%)	4.3% (2.1% to 8.3%)	−0.5% (−4.8% to 3.8%)
Normal activity	95.2% (92.8% to 97.9%)	92.3% (87.6% to 95.4%)	2.9% (−2.2% to 8.0%)
Alcohol	0.0% (0.0% to 2.3%)	0.0% (0.0% to 2.3%)	0.0% (0.0% to 0.0%)
Cold exposure	0.0% (0.0% to 2.3%)	0.0% (0.0% to 2.3%)	0.0% (0.0% to 0.0%)
Other	1.0% (0.0% to 3.6%)	3.4% (1.5% to 7.1%)	−2.4% (−5.7% to 0.9%)
Treated outside of health care facility			
Epinephrine	41.9% (35.7% to 48.4%)	39.3% (33.1% to 45.7%)	2.7% (−6.5% to 11.8%)
Antihistamines	55.2% (48.7% to 61.5%)	50.8% (44.4% to 57.3%)	4.4% (−4.9% to 13.7%)
Antacids	1.7% (0.5% to 4.5%)	0.8% (0.1% to 3.3%)	0.8% (−1.6% to 3.2%)
Beta-agonists	7.9% (4.9% to 12.2%)	9.1% (5.9% to 13.6%)	−1.2% (−6.6% to 4.2%)
Corticosteroids	1.7% (0.5% to 4.5%)	2.1% (0.8% to 5.0%)	−0.4% (−3.2% to 2.4%)
IV Fluids	0.0% (0.0% to 2.0%)	0.0% (0.0% to 1.9%)	0.0% (0.0% to 0.0%)
Other	5.8% (3.3% to 9.8%)	6.2% (3.6% to 10.2%)	−0.4% (−5.0% to 4.2%)
No treatment	17.8% (13.3% to 23.4%)	22.9% (17.8% to 29.0%)	−5.1% (−12.8% to 2.6%)
Asthma	18.7% (14.1% to 24.3%)	21.1% (16.2% to 26.9%)	−2.4% (−9.9% to 5.1%)
Eczema	14.1% (10.1% to 19.3%)	13.6% (9.7% to 18.8%)	0.5% (−6.1% to 7.1%)

IV, Intravenous fluid.

*Symptoms include urticaria, erythema, angioedema, oral pruritus, nausea, nasal congestion, sneezing, rhinorrhea, or throat tightness.⁴

†Symptoms include crampy abdominal pain, diarrhea, recurrent vomiting, dyspnea, stridor, cough, wheeze, or “light-headedness.”⁴

‡Symptoms include cyanosis, hypoxia, respiratory arrest, hypotension, dysrhythmia, confusion, or loss of consciousness.⁴

TABLE E3. EAI Use outside of the health care facility by age

Age (y)	No. of patients, n (%)	95% CI
0-12	135/351 (38.5)	33.4%-43.8%
13-19	47/89 (52.8)	42.0%-63.4%
>20	14/43 (32.6)	19.5%-48.7%

TABLE E4. EAI Use outside of the health care facility by province and age

Province	No. of patients, n (%)	95% CI
Quebec	157/357 (44.0)	38.8%-49.3%
0-12 y	111/262 (42.4)	36.4%-48.6%
13-19 y	32/62 (51.6)	38.7%-64.3%
>20 y	14/33 (42.4)	26.0%-60.6%
Ontario	9/20 (45.0)	23.8%-68.0%
0-12 y	3/13 (23.1)	6.2%-54.0%
13-19 y	6/7 (85.7)	42.0%-99.2%
>20 y	0/0	
Alberta	0/11 (0.0)	0.0%-32.1%
British Columbia	30/92 (32.6)	23.4%-43.3%
0-12 y	21/73 (28.8)	19.1%-40.7%
13-19 y	9/19 (47.4)	25.2%-70.5%
>20 y	0/0	
Newfoundland & Labrador	0/3 (0.0)	0.0%-69.0%