

# Prevalence of Epinephrine Auto-Injector Prescription in Patients with Food Allergies: A Retrospective Analysis from a Single Allergy Clinic

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## Abstract

**Background:** Food induced anaphylaxis is an adverse immune response to specific foods, it affects approximately 6.1% of the Canadian population, with a prevalence of 5.9% in adults and 6.7% in children. These figures are consistent across provinces, including Ontario. Food allergy can potentially lead to life-threatening emergency, which requires treatment with Epinephrine Auto-Injector (EAI).

**Methods and materials:** A retrospective analysis of 288 patients referred to a single allergy clinic in Ontario was conducted. Data were collected on patients referred for food allergies and EAI prescription patterns was compared between allergy and primary care provider practices.

**Results:** Our study on 288 patients revealed that 88.7% of food allergy patients received EAIs through Allergy clinic, while 11.3% declined prescriptions despite medical recommendations. 35.5% of patients received EAIs from primary care physicians prior to referral.

**Conclusion:** Findings highlight the need to improve EAI prescription rates among primary care physicians. These findings align with previous studies and underscore the need for further research to identify barriers to EAI prescription and uptake.

Enhancing primary care education on the critical role of EAIs in preventing anaphylaxis is recommended. Further research should investigate barriers to EAI uptake and refusal.

**Keywords:** Epinephrine Auto-Injector, Food allergy, Anaphylaxis, Primary Care, Allergy Clinic, Prescription Patterns, Prevalence

**Abbreviations:** EAI: Epinephrine Auto-Injector, FIA: Food Induced Anaphylaxis.

## Introduction

Food allergy is defined as an adverse immunologic response to a dietary protein. Food-related reactions are associated with signs and symptoms that may involve multiple systems, including skin, gastrointestinal and respiratory tracts, and cardiovascular system [1]. Food allergies represent a significant public health concern, with approximately 5–10% of the Canadian population reporting a food allergy diagnosis. Health Canada, the Canadian Food Inspection Agency (CFIA), and allergy

associations list the priority food allergens as eggs, milk, mustard, peanuts, crustaceans and molluscs, fish, sesame, soy, sulphites, tree nuts, wheat, and triticale [2]. Some studies suggest variations in prevalence.

Scott et al. found that the prevalence of peanut and tree nut allergies continues to exceed 1% of the U.S. population [3]. Another study suggests that adverse immune responses to foods affect approximately 5% of young children and 3–4% of adults in Westernized countries, with prevalence increasing over time [4].

Studies further indicate a rise in food allergy prevalence. For example, self-reported peanut allergies among children doubled from 1997 to



2002. Peanut and tree nut allergies combined continue to affect over 3 million Americans [5]. Although firm prevalence data remain limited, some reports suggest rates as high as 10% [7]. Between 2010 and 2016, the prevalence of self-reported food allergies increased from 7.1% to 9.3%, while food allergies based on history or physician diagnosis remained stable at approximately 6% [8].

The epinephrine auto-injector (EAI) remains the first-line treatment for anaphylaxis and the cornerstone of food allergy management. However, data suggest a significant under-prescription of EAIs, raising concerns about optimal care delivery.

## Materials and Methods

Data was collected from January 2021 to January 2024 through report generation module through the clinic's EMR (Electronic Medical Records), using ICD codes related to food, each patient's chart was reviewed individually while taking into consideration clinical history, allergy testing results and prescription history. Food Allergy diagnosis was made by either positive skin prick test or positive IgE mediated bloodwork allergen in congruence with clinical history.

**Table 1:** Diagnostic Outcomes and EAI Prescription Patterns.

Category	Number of Patients (n)	Percentage (%)
Total number of patients studied	288	100%
True Food Allergy	186	64.6%
Food Intolerance	67	23.3%
Undiagnosed (Logistical Issues)	33	11.5%
Oral Allergy Syndrome	2	0.7%
<b>**EAI Prescription Patterns Among Food Allergy Patients (n = 186) **</b>		
Prescribed by Allergists Only	99	53.2%
Already Had EAI, Declined Further Prescription	31	16.7%
Prescribed by Both PCPs and Allergists	35	18.8%
Did Not Obtain EAI Despite Strong Recommendations	21	11.3%
<b>**EAI Prescriptions by PCPs Before Referral (n = 186) **</b>		
Received EAI from PCPs	66	35.5%
No EAI Prescription from PCPs	120	64.5%

## Discussion

One study on Canadian children found that the prevalence of physician-reported food allergy was 2.53% (95% CI, 2.48%–2.59%). Among children with food allergies, only 33.7% had an EAI prescription [9]. A meta-analysis of Canadian and American food allergy patients found that epinephrine treatment for food-induced anaphylaxis in emergency departments (EDs) showed increased prevalence over time. Despite this, approximately 45% of ED patients with anaphylaxis received epinephrine [10]. Another study reported that among 174 patients confirmed to have anaphylaxis, 47 (77%) received epinephrine, while 24 (39%) received it in the ED and 37 (61%) did not [11].

Clark et al. studied food-induced anaphylaxis (FIA) over two periods, 1999–2001 and 2013–2015, demonstrating increased epinephrine use (38% vs. 56%,  $p < .001$ ) [12]. Similarly, Ducharme et al. found prehospital and ED epinephrine use in only 35.2% and 52.4% of cases, respectively [13]. Fleming et al. highlighted the benefits of early epinephrine treatment, showing significantly lower hospitalization rates among patients who received early epinephrine [14].

Several studies revealed low rates of epinephrine use in specific settings. For instance, among 250 patients with fruit-induced anaphylaxis, only 28.4% received epinephrine pre-hospital, and 40.8% in the ED [15]. In

Food intolerance diagnosis was made with bloating and abdominal pain hours after food intake and without positive IgE mediated skin prick test or positive IgE mediated bloodwork allergen.

Statistical analysis was performed using IBM SPSS version 29.

## Results

Among 288 patients referred for food allergy evaluation, 186 (64.6%) were diagnosed with true food allergies, 67 (23.3%) had food intolerances, 33 (11.5%) could not be diagnosed due to logistical issues and 2 (0.7%) were diagnosed with oral allergy syndrome. EAI Prescription Patterns Among Food Allergy Patients (n=186) was 99 (53.2%) received EAIs prescribed by allergists only, 31 (16.7%) already possessed EAIs before allergist consultation and declined further prescriptions, 35 (18.8%) were prescribed EAIs by both their primary care physicians and allergists and 21 (11.3%) did not obtain EAIs despite strong recommendations. From the total cohort of food allergy patients, 66 (35.5%) had EAIs prescribed by primary care physicians, while 120 (64.5%) did not receive any prescriptions prior to referral. (Table 1)

pediatric ED visits for FIA, epinephrine administration increased by 4% annually between 2007 and 2015, yet remained suboptimal overall [16].

Underuse of EAIs is also evident in specific allergen cases, such as seafood and sesame allergies, where prehospital epinephrine was administered in fewer than 35% of cases [17,18]. European guidelines emphasize the need for improved management, noting that intramuscular epinephrine remains the first-line treatment despite its suboptimal use [19,20].

Despite the severity of potential reactions, In the ED in one cohort study, 72% of patients received antihistamines, 48% received systemic corticosteroids, and 16% received epinephrine. Among those with severe reactions, 24% received epinephrine. At ED discharge, 16% of patients were prescribed self-injectable epinephrine, and 12% were referred to an allergist [20]. Other studies reveal same pattern in different countries and settings, among 1,015 patients consulting general practitioners (GPs) for food allergy symptoms, 34 were classified as high-risk candidates for an EAI, but only 10 (37%) were prescribed one [21].

High-risk food-allergic patients visiting GPs often fail to receive EAI prescriptions and one study showed only 52% of adult food allergy patients reported ever being prescribed an EAI [23]. Pouessel et al. investigated parental knowledge of EAIs, finding that 60%–72% of families carried



the devices and 60% had emergency kits at school. However, only 54% of pediatric patients meeting criteria for anaphylaxis and epinephrine use received the medication, with most receiving it before EMS arrival [23]. Between 2008 and 2016, 2,137 pediatric anaphylaxis presentations were analyzed in one study and 62% of patients received EAI, while 2% received it from a doctor before EMS arrival [24,25]. A cohort study of 59,187 EMS transports over five years revealed low rates of epinephrine administration for allergic complaints, with only 17% of cases involving epinephrine administration or recommendation [26].

## Conclusion

Our findings highlight a critical gap in the management of food allergies. Despite increasing prevalence, EAI prescription rates remain suboptimal, particularly in primary care. Addressing this gap requires improved education for primary care providers and adherence to clinical guidelines. Enhancing access to EAIs and understanding barriers to their prescription and use are necessary to reduce the risks associated with anaphylaxis. Further studies are essential to explore and address these barriers, ensuring optimal care for food allergy patients.

## Conflict of interest

Nothing to disclose.

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