

How can we moderate increasing emergency department visits for anaphylaxis in the United States?

Examining trends in the incidence and rates of anaphylaxis-related ED visits between 2005-2014

Evidence and practice landscape



Emergency departments (EDs) are the front line for diagnosing and treating cases of *anaphylaxis* – potentially life-threatening allergic reactions to common things such as food, medication or an insect bite.

The risk of anaphylaxis is a topic we encounter often in our daily lives. Nearly 6 million children in the U.S. have a food allergy, and this number has grown by 50% between 1997 and 2011.¹ More than 3 in 10 of these children have a history of severe reactions.² People are increasingly being prescribed more medications – especially those who are older or have multiple health conditions – and put at greater risk for adverse reactions. And recent controversy over rising prices for *epinephrine*, the anaphylaxis antidote that comes in the form of an injectable pen, highlights the public health need for appropriate access to help treat anaphylaxis.

Studies suggest anaphylaxis has been occurring more frequently over time, looking at trends up to 2009.³ These studies have focused on hospitalizations related to anaphylaxis, which depend on multiple factors beyond the allergic reaction itself. There have been no recent studies on anaphylaxis-related ED visits alone, which may be a more accurate measure of anaphylaxis cases. It is difficult to determine how much of this observed surge is due to increased rates of anaphylaxis and how much is due to increased awareness, diagnosis and coding of anaphylaxis with time.

Clinical emergency medicine researchers from Mayo Clinic leveraged the OptumLabs data to conduct the largest contemporary study of trends in the incidence and rates of anaphylaxis-related ED visits over the recent decade (2005-2014).⁴

Key insights

- **Rates of anaphylaxis ED visits in the U.S. have doubled between 2005-2014** (101%, 14.2 to 28.6 per 100,000 enrollees). **The greatest increase rates were among children 5-17 years old, which nearly tripled** (196%, 11.9 to 35.2 per 100,000 enrollees).
- **Food allergies increased the most among children 5-17 years old** (285%, 4.7 to 18.1 per 100,000 enrollees).
- **The highest rate of medication-related anaphylaxis was found among adults 65+** (5.7 per 100,000 enrollees in 2014).

Translation thinking

Has a significant rise in cases of anaphylaxis occurred, or have we become more aware of the risks and warning signs of severe allergic reactions over time? Are doctors diagnosing and coding ED visits for anaphylaxis more as a result?

While these questions remain, the insights from this study can support cross-stakeholder education on tactics to effectively prepare for, evaluate, and treat anaphylaxis.

- **Providers** can educate patients about identifying and managing their anaphylaxis risk. For known allergies, doctors can develop a personalized decision aid with their patients to help manage severe allergic reactions, such as:
 - **The [Anaphylaxis Emergency Action Plan](#)** by American Academy of Allergy Asthma & Immunology
- **Patients** should leverage education tools such as action plans to help decide when to use an epinephrine injector and when to go to the ED for allergic reactions. Patients who experience anaphylaxis should follow-up with a doctor to assess the allergy and learn how to prevent and/or manage future reactions. Child caregivers (parents, teachers, babysitters, counselors) and adult caregivers (adult children or siblings) are also key audiences for anaphylaxis education.
- **Policymakers** can support increased availability of alternative epinephrine treatments that address cost barriers and limitations of current available options, paired with the proper education tools and clinical guidelines.

Project mechanics

Objective

- Examine trends in the incidence and rates of anaphylaxis-related ED visits from 2005-2014.³

Study population

- 56,212 ED visits for anaphylaxis among privately insured and Medicare Advantage enrollees of all ages in the United States between 2005-2014. Patients had at least 30 days of medical insurance coverage before the ED visit.

Methods

Retrospective analysis using the *OptumLabs Data Warehouse*, which includes administrative claims data on over 100 million Medicare Advantage and commercially insured enrollees.

- ED visit cohort was identified through two methods: (1) via ICD-9-CM diagnosis codes for anaphylactic shock and (2) validated Harduar-Morano algorithm of ICD-9-CM codes of symptom combinations.
- Patient characteristics (age, sex, race, census region) were described using median or percentage as appropriate.
- Annual rates were calculated using the number of ED visits for anaphylaxis as the numerator and the total enrollees as the denominator. Rates were expressed as the number of ED visits for anaphylaxis per 100,000 enrollees.
- Linear regression analysis was used to assess trends by year.
- All significance tests were two sided, and a P value of less than .05 was considered statistically significant.

Study limitations

- It is unclear whether findings represent a true increase in the incidence of anaphylaxis or simply improved awareness and recognition of the diagnosis.
- As with all studies using administrative claims data, there is potential for inaccuracies and lack of detail regarding individual diagnoses and codes.
- Most cases represented in the data were from the Southern United States, with a minority in the Northeast region. Because studies suggest higher rates of anaphylaxis in northern regions, studying more cases from the South could underestimate rates of anaphylaxis.
- A large subset of anaphylaxis cases did not have specified triggers, leaving uncertainty about visits for specific triggers.
- Effects of unmeasured confounders could not be eliminated.

Key findings

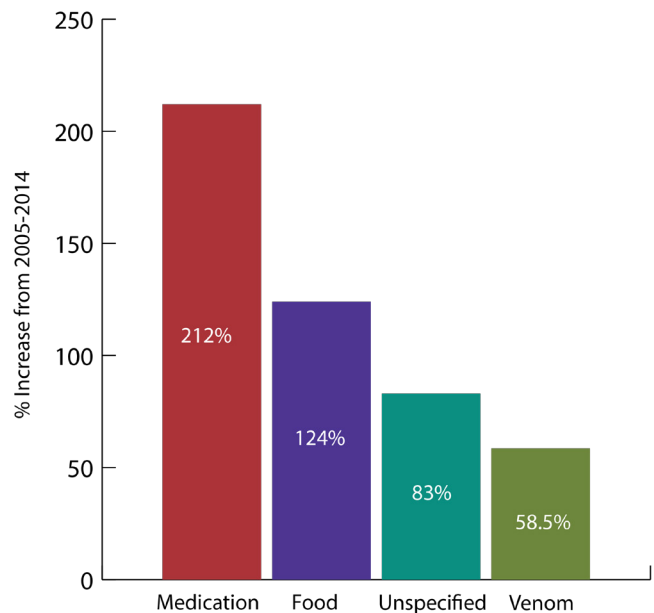
Between 2005-2014, the overall rate of anaphylaxis visits in U.S. EDs doubled.

- 101% increase, 14.2 to 28.6 per 100,000 enrollees (P<.001)

While rates increased in all age groups, the greatest increase was in children aged 5 to 17, which nearly tripled from 2005-2014.

- 196% increase, 11.9 to 35.2 per 100,000 enrollees (P<.01)

Rates of increase for anaphylaxis cases (2005 - 2014) by trigger:



Triggers (rates per 100,000 enrollees):

- Medication:** 212% increase, 0.9 to 2.9 (P<.01)
 - Overall incidence of anaphylaxis was highest among the 65+ population (5.7 in 2014).
 - The largest increase in anaphylaxis cases occurred in the 0-4 age group (478.9%, 0.2 to 1.1), a novel finding that warrants further research.
- Food:** 124% increase, 3.7 to 8.3 (P<.001)
 - There was a significant increase in all age groups except the 65+ population.
 - The largest increase occurred in the 5-17 age group (285%, 4.7 to 18.1).
- Insect venom:** 58.5% increase, 0.8 to 1.3 (P<.01)
- Unspecified:** 83% increase, 8.8 to 16.1 (P<.001)

Driving discovery

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*Concepts to know

Anaphylaxis – a severe, potentially life-threatening allergic reaction that can occur within seconds or minutes of exposure to triggers such as food, medication or insect venom. The immune system releases a flood of chemicals that can cause a person to go into shock or cause life-threatening swelling of the airway. Anaphylaxis requires immediate injection of epinephrine and a trip to the emergency department. If anaphylaxis isn't treated right away, it can lead to unconsciousness or even death.⁵

Epinephrine – an injection that is used for emergency treatment of severe allergic reactions (including anaphylaxis) to insect bites or stings, medicines, foods, or other substances. It is also used to treat anaphylaxis caused by unknown substances or triggered by exercise. This medicine is available only with a doctor's prescription. The most common brand is known as EpiPen and EpiPen Jr.⁶

Sources

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