



HAL
open science

Anaphylaxis in outpatients: A 5-year retrospective study on incidence and clinical characteristics at a university hospital in Wuhan, China

Le Li, Hao Chen, Nan Huang, Wenjing Li, Yaqi Yang, Dongxia Ma, Pascal Demoly,
Rongfei Zhu

► To cite this version:

Le Li, Hao Chen, Nan Huang, Wenjing Li, Yaqi Yang, et al.. Anaphylaxis in outpatients: A 5-year retrospective study on incidence and clinical characteristics at a university hospital in Wuhan, China. *Allergy*, 2024, <10.1111/all.16152>. <hal-04913226>

HAL Id: hal-04913226

<https://hal.science/hal-04913226v1>

Submitted on 27 Jan 2025

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY-NC 4.0 - Attribution - Non-commercial use - International License

LETTER

Anaphylaxis in outpatients: A 5-year retrospective study on incidence and clinical characteristics at a university hospital in Wuhan, China

To the Editor,

Anaphylaxis is a severe systemic hypersensitivity reaction with acute onset that can potentially be fatal. Currently, the worldwide incidence stands at approximately 46 cases per 100,000 people annually, with rates fluctuating between 0.49 and 328.7 per 100,000 person years¹, with considerable variation across age groups and regions. Despite increasing global awareness, research into the prevalence of anaphylaxis within the Chinese population remains sparse.

In this retrospective epidemiological study in Wuhan, China, we identified anaphylaxis cases among outpatients using the World Allergy Organization's (WAO) 2020 updated guidelines.² Acute onset was defined within 6 h post-exposure.³ Potential cases were initially screened via relevant diagnoses (Appendix 1) from the Data Platform Application Portal (DPAP) of Tongji Hospital, Wuhan, China from January 1, 2019, to December 31, 2023. We transformed guidelines into practical descriptions for medical records (Appendix 2). Screening was performed using PyCharm, followed by manual review and data extraction from medical records (Figure 1). The study was approved by the Tongji Hospital IEC (NO. TJ-IRB202401061) with an informed consent waiver.

We identified 1026 anaphylaxis patients from a cohort of 6,280,013 outpatients with a female predominance (54.8%) and a median age of 29 years. The crude annual incidence rate was 16.34 per 100,000, which increased to 154.72 after adjusting for age and gender. We observed an increasing trend in incidence over the study period, peaking among adolescents (Figure 1).

Identifiable triggers were present in 74.9% (798/1066) of cases, with drugs leading at 40.7% (434/1066). Antibiotics and allergen extracts dominated, accounting for 40.6% (176/434) and 15.9% (69/434). Food followed, contributing to 27.0% (288/1066), showed age-specific features: dairy products were predominant in infants and toddlers (33.3%, 19/57), while seafoods were more common in other age groups (Table 1). Alarming, only 10.8% (115/1066) of patients received epinephrine, despite its critical role

in anaphylaxis management, with a declining trend in its use over 5 years. Glucocorticoids, antihistamines, calcium gluconate, and bronchodilators were frequently administered. In addition, other medications such as acid-suppressing drugs, water-soluble vitamins, and glucose saline solutions were also widely used in the treatment of anaphylaxis. Notably, 84 patients (8.2%) experienced recurrent episodes, with no fatalities reported.

The anaphylaxis incidence rate from our study exceeds some English-speaking regions.⁴ This may reflect the population and variations in anaphylaxis definitions and diagnostic methods. An annual increment in anaphylaxis incidence was noted, plateauing from 2020 to 2022, suggesting impacts from COVID-19 and resource limitations. Drugs and food were predominant triggers, with age-specific food allergen patterns observed. These data reflect regional, lifestyle, and genetic influences on allergen distribution.⁵ It is noteworthy that allergen extracts were the second highest drug-related trigger for anaphylaxis, with 55.1% (38/69) caused by crude allergen extracts (Appendix 3). This could be due to the fact that more than 3000 outpatients receive subcutaneous immunotherapy treatments at our center annually, and anaphylaxis induced by subcutaneous immunotherapy is not uncommon. Alarming, epinephrine use for anaphylaxis treatment has declined to a mere 10.8%, lower than other Chinese studies (14.2%–25%).⁶ This reflects a notable lack of awareness and understanding of anaphylaxis among our medical practitioners. In clinical settings, there is often hesitation to administer epinephrine promptly to patients experiencing anaphylaxis without shock. This reluctance stems from concerns about potential adverse reactions, including the induction of malignant arrhythmias. As a result, the use of epinephrine is largely confined to critical scenarios.

This study's limitations include potential recall bias and variability in medical record documentation. Besides, serum tryptase detection kits have not yet received marketing approval in China, which precludes the possibility of using serum tryptase to further verify the diagnosis of anaphylaxis in patients initially identified by our physicians.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2024 The Authors. *Allergy* published by European Academy of Allergy and Clinical Immunology and John Wiley & Sons Ltd.

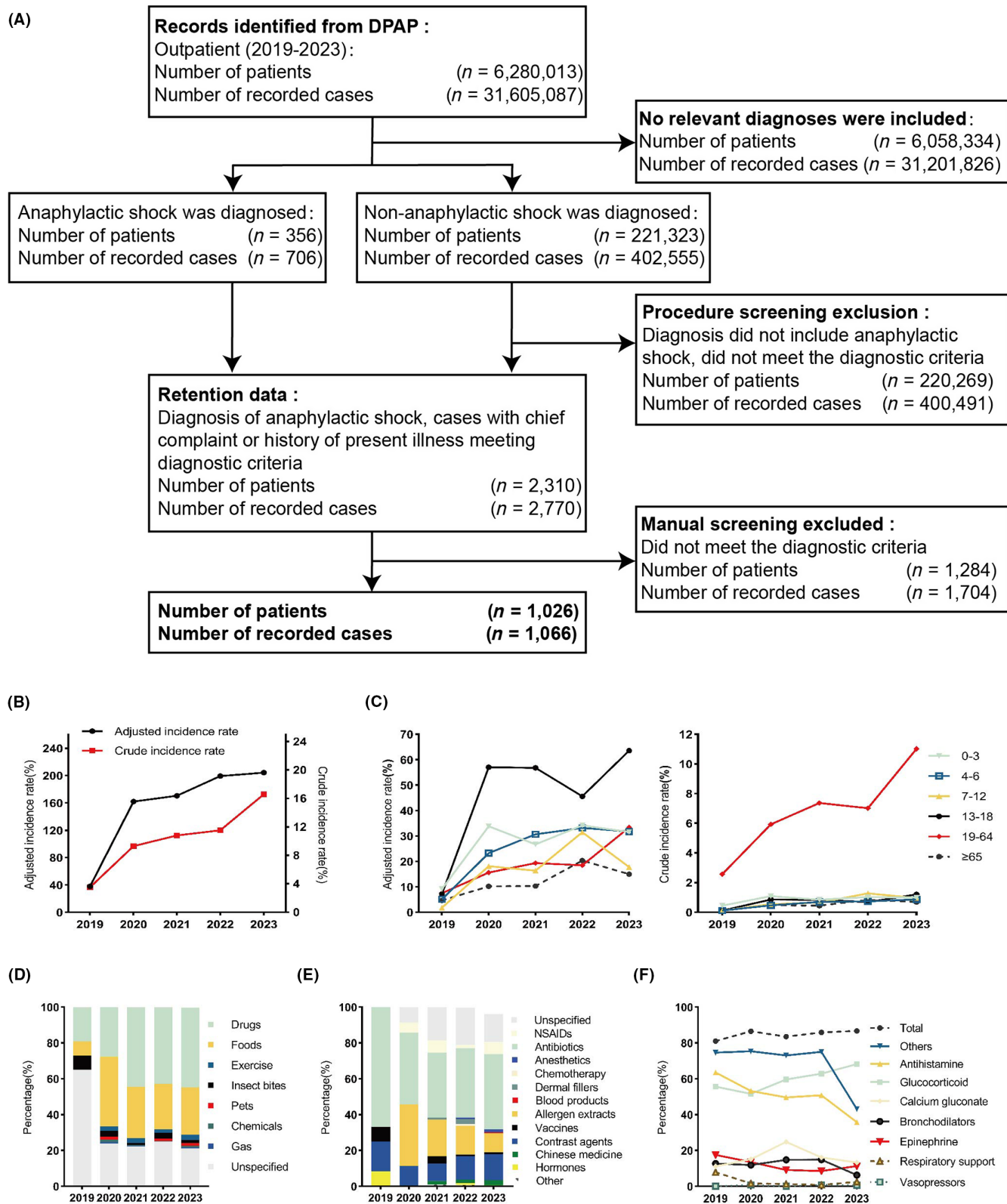


FIGURE 1 Flow diagram of anaphylaxis data extraction and trend chart of incidence, triggers, and medication applications of anaphylaxis in outpatients. (A) The figure presents a flowchart detailing the process from database retrieval to automated and manual screening, with patient numbers and case inclusion/exclusion data at each step; (B) The figure illustrates the trends of crude and adjusted incidence rates of anaphylaxis in a university hospital in Wuhan, China, from 2019 to 2023; (C) Adjusted and crude incidence rate trends by age groups; (D) Trend chart of anaphylaxis triggers; (E) Trend chart of drug trigger changes; and (F) Trend chart of various medication applications in anaphylaxis management.

TABLE 1 Triggers of anaphylaxis in different age groups.

Age	0–3	4–6	7–12	13–18	19–64	≥65	Total
Drug	20.70%	59.30%	71.40%	31.60%	37.80%	61.50%	40.70%
Antibiotics	61.10%	54.30%	27.30%	40.00%	38.70%	53.10%	40.60%
Allergen extracts	5.60%	8.60%	52.70%	28.00%	10.80%	0.00%	15.90%
Contrast agents	0.00%	0.00%	0.00%	0.00%	17.50%	28.10%	12.90%
NSAIDs	0.00%	2.90%	5.50%	4.00%	6.30%	3.10%	5.30%
Chinese medicine	0.00%	0.00%	1.80%	4.00%	3.00%	0.00%	2.30%
Vaccines	5.60%	8.60%	0.00%	0.00%	1.50%	0.00%	1.80%
Anesthetics	0.00%	0.00%	1.80%	4.00%	1.10%	0.00%	1.20%
Dermal fillers	0.00%	0.00%	0.00%	0.00%	1.50%	0.00%	0.90%
Hormones	0.00%	2.90%	0.00%	0.00%	0.70%	0.00%	0.70%
Chemotherapy	0.00%	0.00%	0.00%	0.00%	0.00%	3.10%	0.20%
Blood products	0.00%	0.00%	0.00%	0.00%	0.40%	0.00%	0.20%
Other	0.00%	2.90%	0.00%	0.00%	1.90%	0.00%	1.40%
Unspecified	27.80%	20.00%	10.90%	20.00%	16.70%	12.50%	16.60%
Food	65.50%	25.40%	14.30%	29.10%	24.40%	15.40%	27.00%
Seafoods	17.50%	46.70%	36.40%	30.40%	32.20%	12.50%	29.50%
Grains	17.50%	0.00%	0.00%	8.70%	8.60%	12.50%	9.70%
Dairy products	33.30%	0.00%	0.00%	0.00%	0.60%	0.00%	6.90%
Nuts	1.80%	6.70%	9.10%	0.00%	4.60%	12.50%	4.20%
Eggs	14.00%	6.70%	9.10%	0.00%	0.60%	0.00%	3.80%
Fruits	0.00%	6.70%	0.00%	13.00%	3.40%	0.00%	3.50%
Meat	1.80%	0.00%	0.00%	8.70%	3.40%	0.00%	3.10%
Vegetables	0.00%	0.00%	0.00%	4.30%	3.40%	12.50%	2.80%
Insect	0.00%	0.00%	0.00%	0.00%	4.00%	0.00%	2.40%
Soy products	1.80%	0.00%	9.10%	0.00%	1.70%	0.00%	1.70%
Health supplements	0.00%	0.00%	0.00%	0.00%	1.10%	0.00%	0.70%
Unspecified	12.30%	33.30%	36.40%	34.80%	35.60%	50.00%	31.30%
Insect bites	0.00%	0.00%	1.30%	0.00%	3.40%	3.80%	2.50%
Exercise	0.00%	0.00%	0.00%	8.90%	2.70%	0.00%	2.40%
Pets	0.00%	0.00%	0.00%	1.30%	1.40%	0.00%	1.00%
Chemicals	0.00%	0.00%	0.00%	0.00%	1.00%	1.90%	0.80%
Gas	0.00%	1.70%	0.00%	0.00%	0.40%	0.00%	0.40%
Unspecified	13.80%	13.60%	13.00%	29.10%	28.90%	17.30%	25.10%

Also, unmeasured confounding factors cannot be eliminated, such as the population consists of patients seeking medical treatment. It is noteworthy that while the DPAP system is restricted to internal hospital use and is not transferable, the extensive data set of 75 million medical records from over 16 million patients mitigates some biases.

AUTHOR CONTRIBUTIONS

RZ and PD conceived and designed the project. LL and HC set up the data screening procedure and generated the figures. LL, NH, WL, YY, and DM manually screened and collected the patients' information. LL wrote the first draft of the manuscript, RZ and PD revised the raw manuscript. All authors critically revised the manuscript and approved the submitted manuscript.

ACKNOWLEDGEMENTS

We would like to thank the Tongji Hospital affiliated with Huazhong University of Science and Technology for providing the data platform used in this study.

FUNDING INFORMATION

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Thus, there are no funding information to report.

CONFLICT OF INTEREST STATEMENT

There are no financial or other issues that might lead to conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Le Li¹ Hao Chen¹ Nan Huang¹Wenjing Li¹Yaqi Yang¹Dongxia Ma¹Pascal Demoly² Rongfei Zhu^{1,3} 

¹Department of Allergy, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

²Allergy Unit, Pulmonology Department, Hôpital Arnaud de Villeneuve and IDESP, University of Montpellier–Inserm, Montpellier, France

³Institute of Allergy and Clinical Immunology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China

Correspondence

Rongfei Zhu, Department of Allergy, Huazhong University of Science and Technology and Institute of Allergy and Clinical Immunology, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China.

Email: zrf13092@163.com

Pascal Demoly, Allergy Unit, Pulmonology Department, Hôpital Arnaud de Villeneuve and IDESP U1318, University of Montpellier–Inserm, 34295 Montpellier Cedex 5, France.

Email: pascal.demoly@inserm.fr

ORCID

Le Li  <https://orcid.org/0009-0003-3458-6062>

Hao Chen  <https://orcid.org/0000-0001-6959-5450>

Pascal Demoly  <https://orcid.org/0000-0001-7827-7964>

Rongfei Zhu  <https://orcid.org/0000-0003-2103-3381>

REFERENCES

- Pühringer V, Jilma B, Herkner H. Population-based incidence of all-cause anaphylaxis and its development over time: a systematic review and meta-analysis. *Front Allergy*. 2023;4:1249280.
- Cardona V, Ansotegui IJ, Ebisawa M, et al. World allergy organization anaphylaxis guidance 2020. *World Allergy Organ J*. 2020;13(10):100472.
- Demoly P, Adkinson NF, Brockow K, et al. International consensus on drug allergy. *Allergy*. 2014;69(4):420-437.
- Decker WW, Campbell RL, Manivannan V, et al. The etiology and incidence of anaphylaxis in Rochester, Minnesota: a report from the Rochester Epidemiology Project. *J Allergy Clin Immunol*. 2008;122(6):1161-1165.
- Mullins RJ, Dear KB, Tang ML. Time trends in Australian hospital anaphylaxis admissions in 1998–1999 to 2011–2012. *J Allergy Clin Immunol*. 2015;136(2):367-375.
- Jiang C, Li H, Wang L, Liu C, Hao X. Gaps between actual initial treatment of anaphylaxis in China and international guidelines: a review and analysis of 819 reported cases. *Allergy*. 2020;75(4):968-971.

APPENDIX 1**POTENTIAL DIAGNOSES RELATED TO ANAPHYLAXIS (ICD-10)**

- T78.401 Allergy.
- T78.4 Allergic Reaction.
- T88.7 Drug Allergy.
- T78.101 Food-Induced Allergic Reaction.
- J39.351 Upper Respiratory Tract Allergy.
- T80.6 Serum Sickness.
- T78.2 Anaphylactic Shock.
- T78.0 Food-Induced Anaphylactic Shock.
- T80.5 Serum-Induced Anaphylactic Shock.
- J30.401 Allergic Rhinitis [Allergic Rhinitis].
- J30.4 Allergic Rhinitis.
- J45.004 Allergic Rhinitis with Asthma.
- J05.1 Allergic Pharyngitis.
- J04.0 Pharyngitis (Allergic).
- L23.901 Allergic Dermatitis.
- L30.903 Allergic Rash.
- L20.8 Autoallergic Dermatitis.
- L27.2 Milk Allergy Dermatitis.
- O99.7 Pregnancy with Allergic Dermatitis.
- L25.1 Drug Allergic Contact Dermatitis.
- K52.201 Allergic Enteritis.
- K52.203 Allergic Colitis.
- T78.3 Atopic Reaction.
- J30.1-J30.4 Atopic Rhinitis.
- R05.X51 Atopic Cough.
- T78.2 Atopic Conjunctivitis.
- L30.902 Atopic Urticaria.
- J45.0 Atopic Bronchitis.

APPENDIX 2**SPECIFIC SEARCH TERMS AND QUERIES FOR DISEASE PROGRESSION****DIAGNOSTIC CRITERIA I**

- Search terms for “acute onset”: 1h, 2h, 3h, 4h, 5h, 6h, half an hour, suddenly, abruptly, several seconds, 5min, 10min, 15min, quarter of an hour, 20min, 30min, 40min, 45min, half a day, just now, just, within minutes, within hours, rapidly, all of a sudden, in a short time, quickly, briefly, 1h, 2h, 3h, 4h, 5h, 6h, 0.5h, 1.5h, 2.5h, 3.5h, 4.5h, 5.5h, 1min, 2min, 3min, 4min, 5min, 6min, 7min, 8min, 9min, 10min, 15min, 20min, 25min, 30min, 35min, 40min, 50min, 55min, 60min, 1min,

2min, 3min, 4min, 6min, 7min, 8min, 9min, occurred in ... minutes, occurred after... minutes, occurred after... hours, within 1-2h, within 2-3h, within 3-4h, within 4-5h, within 5-6h, within 1~2h, within 2~3h, within 3~4h, within 4~5h, within 5~6h, within 1~2h, within 2~3h, within 3~4h, within 4~5h, within 5~6h, within a few minutes, within several minutes, within minutes, within half an hour, within forty minutes, within forty-five minutes, appeared within... minutes, accompanied by hours, not long after appearing, immediately appeared, appeared during, approximately appeared, and completed infusion.

- Search terms for "skin or mucosal symptoms": urticaria, skin flushing, itching, angioedema, conjunctivitis, lip swelling, eyelid swelling, facial swelling, rash, swelling, rashes, flushing, red rash, reddening, swelling and redness, wheals, and tightness.
- Search terms for "other system involvement": dyspnea, wheezing, bronchospasm, panting, gasping for breath, laryngeal edema, asphyxiation, angioedema, rhinitis, sneezing, runny nose, nasal congestion, itchy nose, voice change, sore throat, hoarseness, voice hoarseness, coughing, difficulty swallowing, discomfort swallowing, foreign body sensation, sensation of throat blockage, feeling of obstruction, feeling of suffocation, discomfort in the throat area, numbness in the throat area, unclear speech, labored breathing, difficult breathing, asthmatic breathing, sensation of airway obstruction, feeling of tightness, slight difficulty swallowing, shortness of breath, discomfort in the throat area, tightness in the throat area, and hoarseness.

Collapse, incontinence, dizziness, hypotonia, syncope, chest pain, chest tightness, profuse sweating, discomfort in the chest area, crying, shock, consciousness disorder, loss of consciousness, confusion, unclear consciousness, cold extremities, palpitations, lightheadedness, shivering, cold sweats, convulsions, and fainting. Abdominal pain, vomiting, nausea, diarrhea, digestion problems, and loose stools.

DIAGNOSTIC CRITERIA II

- Search terms for "acute onset": same as under diagnostic criteria I.
- Search terms for "allergens": contact, infusion completion, intravenous drip completion, oral intake, ingestion, drinking, alcohol consumption, bites, stings, eating, IV infusion, injection,

self-administration, topical application, use of cosmetics, running, walking, desensitization therapy, inhalation, smelling upon exposure to.

Penicillin, amoxicillin, levofloxacin, sulfonamides, cephalosporins, antibiotics, anesthetics, monoclonal antibodies, rituximab, omalizumab, muscle relaxants, hypnotics, opioids, aspirin, non-steroidal anti-inflammatory drugs (NSAIDs), ibuprofen, mupirocin, ointments, and traditional Chinese medicine.

Latex, gasses.

Serum therapy, blood transfusions, dialysis, iodinated contrast media, enhancement agents, vaccines, and computed tomography (CT).

Insects, cats, plants, flowers, grasses, trees, mites, and allergies. Shellfish, fish, peanuts, nuts, eggs, milk, crabs, shrimps, cicadas, dairy products, and alcohol.

- Search terms for "other system involvement": same as under diagnostic criteria I.

NEGATIVE TERMS III

None, without accompanying symptoms, denying symptoms, not seen, not reported by the patient, not experienced by the patient, if present, if there is any, occasionally present, intermittent.

APPENDIX 3

CLASSIFICATION OF ALLERGEN EXTRACTS THAT TRIGGER ANAPHYLAXIS

Year	Standardized dust mite allergen extracts	Crude allergen extracts
	Allergopharma/Alutard SQ	Union-Xinhualian
2019	0	0
2020	10 (83.3%)	2 (16.7%)
2021	8 (38.1%)	13 (61.9%)
2022	7 (41.2%)	10 (58.8%)
2023	6 (31.6%)	13 (68.4%)
Total	31 (44.9%)	38 (55.1%)