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Allergic Reactions Including Anaphylaxis After Receipt of the First Dose of Pfizer-BioNTech COVID-19 Vaccine

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On December 11, 2020, the US Food and Drug Administration (FDA) issued an Emergency Use Authorization (EUA) for the Pfizer-BioNTech coronavirus disease 2019 (COVID-19) vaccine, administered as 2 doses separated by 21 days.[1] Shortly after, the Advisory Committee on Immunization Practices (ACIP) issued an interim recommendation for its use.[2]

Multimedia

Following implementation of vaccination, reports of anaphylaxis after the first dose of the Pfizer-BioNTech COVID-19 vaccine emerged.[3] Anaphylaxis is a life-threatening allergic reaction that occurs rarely after vaccination, with onset typically within minutes to hours.[4]

Notifications and reports of suspected severe allergic reactions and anaphylaxis following vaccination were captured in the Vaccine Adverse Event Reporting System (VAERS), the national

Table. Characteristics of Cases of Anaphylaxis (N = 21) Following Receipt of Pfizer-BioNTech COVID-19 Vaccine Reported to the Vaccine Adverse Events Reporting System (VAERS), December 14-23, 2020[a]

		Past history							
Age, y	Sex	Allergies or allergic reactions[b]	Anaphylaxis	Reaction onset, min	Signs and symptoms	Treatment setting	Epinephrine received	Brighton level[c]	Outcome or disposition[d]
27	F	Tropical fruit	No	2	Diffuse erythematous rash, sensation of throat closure	ED	Yes	2	Recovered at time of report
35	M	No	No	5	Diffuse erythematous rash, swollen tongue	ED	Yes	1	Discharged home
55	F	Rabies vaccine	Yes, rabies vaccine	5	Generalized urticaria, wheezing	Inpatient	Yes	1	Discharged home
52	F	Sulfa drugs	Yes, sulfa drugs	7	Wheezing, stridor, nausea	Inpatient	Yes	1	Discharged home
30	F	Bee sting	No	8	Generalized urticaria, wheezing	Inpatient	Yes	1	Recovered at time of report
32	F	No	No	10	Diffuse erythematous rash, difficulty breathing	Inpatient	Yes	2	Discharged home
60	F	Eggs, milk, sulfa drugs, jellyfish sting	Yes, jellyfish sting	10	Diffuse erythematous rash, hoarseness	ED	Yes	2	Recovered at time of report
29	F	Shellfish, eggs	No	10	Generalized urticaria, swollen lips and tongue	ED	Yes	1	Discharged home
52	F	Metoprolol, clarithromycin	No	10	Generalized urticaria, stridor, wheezing	ED	Yes	1	Recovered at time of report
49	F	Iodinated contrast media	No	13	Generalized urticaria, swollen throat	ED	Yes	1	Recovered at time of report
36	F	No	No	13	Generalized urticaria, nausea	ED	Yes	2	Not specified
40	F	Sulfa drugs, walnuts	Yes, walnuts	14	Generalized urticaria, nausea	ED	Yes	2	Discharged home
33	F	Wasp sting	No	15	Diffuse erythematous rash, swollen lip	ED	Yes	1	Recovered at time of report
41	F	Prochlorperazine	Yes, prochlorperazine	15	Diffuse erythematous rash, persistent dry cough	ED	No	2	Discharged home
57	F	Penicillin, azithromycin	Yes, unspecified	15	Diffuse pruritic rash, hoarseness	ED	Yes	2	Recovered at time of report
45	M	No	No	23	Generalized urticaria, swollen airway	ED	Yes	2	Discharged home
46	F	Hydrocodone, nuts	No	25	Diffuse erythematous rash, difficulty swallowing	ED	Yes	2	Discharged home
30	F	Cats, dogs	No	30	Generalized pruritus, wheezing	ED	No	2	Discharged home
44	F	Influenza A(H1N1) vaccine	Yes, influenza A(H1N1) vaccine	34	Generalized urticaria, swollen lips	ED	Yes	1	Discharged home
29	F	Sulfa drugs	No	54	Generalized urticaria, persistent cough	ED	Yes	2	Recovered at time of report
29	F	Steroids	No	150	Diffuse pruritic rash, swollen lip	ED	Yes	1	Discharged home

Abbreviations: COVID-19, coronavirus disease 2019; ED, emergency department.

[a] Table is reproduced from the *MMWR* report.[3]

[b] As documented in the VAERS report or medical records, or through confirmation with the treating clinician or the patients themselves.

[c] The Brighton Collaboration case definition uses combinations of symptoms to define levels of diagnostic certainty. Brighton level 1 represents the highest level of diagnostic certainty that a reported case is indeed a case of anaphylaxis; levels 2 and 3 are successively lower levels of diagnostic certainty. Level 4 is a case reported as anaphylaxis but that does not meet the Brighton Collaboration case definition. Level 5 is a case that was neither reported as anaphylaxis nor meets the case definition.[6]

[d] As documented in the description of the adverse event in the VAERS report.

passive surveillance (spontaneous reporting) system for adverse events after immunization.[5] Physicians at the US Centers for Disease Control and Prevention (CDC) evaluated these reports and applied Brighton Collaboration case definition criteria[6] to classify case reports as anaphylaxis or not anaphylaxis. Nonallergic adverse events, mostly vasovagal or anxiety-related, were excluded from the analysis. Anaphylaxis and nonanaphylaxis allergic reaction cases with symptom onset occurring later than the day after vaccination were also excluded because of the difficulty in clearly attributing allergic reactions with delayed onset after vaccination. Because the Moderna COVID-19 vaccine was only available beginning December 21, 2020, this article focuses on the Pfizer-BioNTech COVID-19 vaccine.

During December 14 to 23, 2020, after administration of a reported 1 893 360 first doses of Pfizer-BioNTech COVID-19 vaccine (1 177 527 in women, 648 327 in men, and 67 506 with sex of recipient not reported),[3] CDC identified 21 case reports submitted to VAERS that met Brighton Collaboration case definition criteria for anaphylaxis (**Table**), corresponding to an estimated rate of 11.1 cases per million doses administered. Four patients (19%) were hospitalized (including 3 in intensive care), and 17 (81%) were treated in an emergency department; 20 (95%) are known to have been discharged home or had recovered at the time of the report to VAERS. No deaths from anaphylaxis were reported.

Median interval from vaccine receipt to symptom onset was 13 minutes (range, 2-150 minutes); 15 patients (71%) had onset within 15 minutes; 18 (86%) had onset within 30 minutes.[3] The most common symptoms and signs were urticaria, angioedema, rash, and a sense of throat closure. Seventeen (81%) of 21 patients with anaphylaxis had a documented history of allergies or allergic reactions, including to drugs or medical products, foods, and insect stings; 7 (33%) had experienced an episode of anaphylaxis in the past, including one after receipt of rabies vaccine and another after receipt of influenza A(H1N1) vaccine (Table). During the same period, VAERS identified 83 cases of nonanaphylaxis allergic reactions after Pfizer-BioNTech COVID-19 vaccination.[3] Commonly reported symptoms in nonanaphylaxis allergic reactions included pruritus, rash, itchy and scratchy sensations in the throat, and mild respiratory symptoms.

Mortality from COVID-19 in populations at high risk is substantial,[7] and treatment options are limited. Widespread vaccination against COVID-19 with highly effective vaccines represents an important tool in efforts to control the pandemic. CDC guidance on use of mRNA COVID-19 vaccines[8] and management of anaphylaxis is available.[9] Specifically, vaccination locations should (1) ensure that necessary supplies are available to manage anaphylaxis, especially sufficient quantities of epinephrine in prefilled syringes or autoinjectors; (2) screen potential vaccine recipients to identify persons with contraindications and precautions; (3) implement recommended postvaccination observation periods, either 15 or 30 minutes depending on each patient's previous history of allergic reactions; (4) ensure that physicians and other health care professionals can recognize signs and symptoms of anaphylaxis early; and (5) immediately treat suspected anaphylaxis with intramuscular epinephrine (because of the acute, life-threatening nature of anaphylaxis, there are no contraindications to epinephrine administration).

Patients experiencing anaphylaxis should be transported to facilities to receive appropriate medical care. All patients should be instructed to seek immediate medical care if they develop signs or symptoms of an allergic reaction after their observation period ends and they have left the vaccination location. Clinicians have an important role in vaccine safety monitoring by being vigilant in recognizing and reporting adverse events to VAERS.[10]

ARTICLE INFORMATION

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