COVID Vaccine and Allergy

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Safe and Impactful COVID Vaccine Administration

- Proper Screening
- Monitoring
- Clinical Assessment
Vaccine Adverse Event Reporting System (VAERS) detected 21 cases of anaphylaxis after administration of a reported 1,893,360 first doses of the Pfizer-BioNTech COVID-19 vaccine

- 11.1 cases per million doses (0.001%)
  - 1.3 cases per million for flu vaccines
- 71% occurred within 15 min of vaccination, 86% within 30 minutes
  - Range = 2–150 minutes
- Of 20 with follow-up info, all had recovered or been discharged home.
17 (81%) with h/o allergies to food, vaccine, medication, venom, contrast, or pets.
4 with no h/o any allergies
7 with h/o anaphylaxis
- Rabies vaccine
- Flu vaccine
19 (90%) diffuse rash or generalized hives
Early Signs of Anaphylaxis

• Respiratory: sensation of throat closing*, stridor, shortness of breath, wheeze, cough
• Gastrointestinal: nausea*, vomiting, diarrhea, abdominal pain
• Cardiovascular: dizziness*, fainting, tachycardia, hypotension
• Skin/mucosal: generalized hives, itching, or swelling of lips, face, throat

*these can be subjective and overlap with anxiety or vasovagal syndrome

Labs that can help assess for anaphylaxis
• Tryptase, serum (red top tube)
• C5b-9 terminal complement complex Level, serum (SC5B9) (lavender top EDTA tube)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Immediate allergic reactions (including anaphylaxis)</th>
<th>Vasovagal reaction</th>
<th>Vaccine side effects (local and systemic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing after vaccination</td>
<td>Most occur within 15-30 minutes of vaccination</td>
<td>Most occur within 15 minutes</td>
<td>Median of 1 to 3 days after vaccination (with most occurring day after vaccination)</td>
</tr>
<tr>
<td><strong>Signs and symptoms</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constitutional</td>
<td>Feeling of impending doom</td>
<td>Feeling warm or cold</td>
<td>Fever, chills, fatigue</td>
</tr>
<tr>
<td>Cutaneous</td>
<td><strong>Skin symptoms present in ~90% of people with anaphylaxis, including pruritus, urticaria, flushing, angioedema</strong></td>
<td>Pallor, diaphoresis, clammy skin, sensation of facial warmth</td>
<td>Pain, erythema or swelling at injection site, lymphadenopathy in same arm as vaccination</td>
</tr>
<tr>
<td>Neurologic</td>
<td>Confusion, disorientation, dizziness, lightheadedness, weakness, loss of consciousness</td>
<td>Dizziness, lightheadedness, syncope (often after prodromal symptoms for a few seconds or minutes), weakness, changes in vision (such as spots of flickering lights, tunnel vision), changes in hearing</td>
<td>Headache</td>
</tr>
<tr>
<td>Respiratory</td>
<td><strong>Shortness of breath, wheezing, bronchospasm, stridor, hypoxia</strong></td>
<td>Variable; if accompanied by anxiety, may have an elevated respiratory rate</td>
<td>N/A</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Hypotension, tachycardia</td>
<td>Variable; may have hypotension or bradycardia during syncopal event</td>
<td>N/A</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>Nausea, vomiting, abdominal cramps, diarrhea</td>
<td>Nausea, vomiting</td>
<td>Vomiting or diarrhea may occur</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>N/A</td>
<td>N/A</td>
<td>Myalgia, arthralgia</td>
</tr>
<tr>
<td><strong>Vaccine recommendations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended to receive second dose of mRNA COVID-19 vaccine?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Emergency Supplies

The following emergency equipment should be immediately available to the clinical team assessing and managing anaphylaxis.

<table>
<thead>
<tr>
<th>Should be available at all sites</th>
<th>If feasible, include at sites (not required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epinephrine prefilled syringe or autoinjector*</td>
<td>Pulse oximeter</td>
</tr>
<tr>
<td>H1 antihistamine (e.g., diphenhydramine)†</td>
<td>Oxygen</td>
</tr>
<tr>
<td>Blood pressure cuff</td>
<td>Bronchodilator (e.g., albuterol)</td>
</tr>
<tr>
<td>Stethoscope</td>
<td>H2 antihistamine (e.g., famotidine, cimetidine)</td>
</tr>
<tr>
<td>Timing device to assess pulse</td>
<td>Intravenous fluids</td>
</tr>
<tr>
<td></td>
<td>Intubation kit</td>
</tr>
<tr>
<td></td>
<td>Adult-sized pocket mask with one-way valve (also known as cardiopulmonary resuscitation (CPR) mask)</td>
</tr>
</tbody>
</table>

*COVID-19 vaccination sites should have at least 3 doses of epinephrine on hand at any given time.
†Antihistamines may be given as adjunctive treatment but should not be used as initial or sole treatment for anaphylaxis. Additionally, caution should be used if oral medications are administered to persons with impending airway obstruction.
Management of anaphylaxis at a COVID-19 vaccination site

- If anaphylaxis is suspected, take the following steps:
  - Rapidly assess airway, breathing, circulation, and mentation (mental activity).
  - Call for emergency medical services.
  - Place the patient in a supine position (face up), with feet elevated, unless upper airway obstruction is present or the patient is vomiting.
  - Epinephrine (1 mg/ml aqueous solution [1:1000 dilution]) is the first-line treatment for anaphylaxis and should be administered immediately.
    - In adults, administer a 0.3 mg intramuscular dose using a premeasured or prefilled syringe, or an autoinjector in the mid-outer thigh.
    - The maximum adult dose is 0.5 mg per dose.
    - Epinephrine dose may be repeated every 5-15 minutes (or more often) as needed to control symptoms while waiting for emergency medical services.
    - Because of the acute, life-threatening nature of anaphylaxis, there are no contraindications to epinephrine administration.
  - Antihistamines (e.g., H1 or H2 antihistamines) and bronchodilators do not treat airway obstruction or hypotension, and thus are not first-line treatments for anaphylaxis. However, they can help provide relief for hives and itching (antihistamines) or symptoms of respiratory distress (bronchodilators) but should only be administered after epinephrine in a patient with anaphylaxis. Because anaphylaxis may recur after patients begin to recover, monitoring in a medical facility for at least several hours is advised, even after complete resolution of symptoms and signs.

https://www.cdc.gov/vaccines/covid-19/clinical-considerations/managing-anaphylaxis.html
## Ingredients* included in mRNA COVID-19 vaccines

<table>
<thead>
<tr>
<th>Description</th>
<th>Pfizer-BioNTech</th>
<th>Moderna</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRNA</td>
<td>nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2</td>
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</tr>
<tr>
<td>Lipids</td>
<td>2[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide</td>
<td>PEG2000-DMG: 1,2-dimyristoyl-rac-glycerol, methoxypolyethylene glycol</td>
</tr>
<tr>
<td></td>
<td>1,2-distearoyl-sn-glycero-3-phosphocholine</td>
<td>1,2-distearoyl-sn-glycero-3-phosphocholine</td>
</tr>
<tr>
<td></td>
<td>cholesterol</td>
<td>cholesterol</td>
</tr>
<tr>
<td></td>
<td>(4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)</td>
<td>SM-102: heptadecan-9-yl 8-((2-hydroxyethyl) (6-oxo-6-(undecyloxy) hexyl) amino) octanoate</td>
</tr>
<tr>
<td>Salts, sugars, buffers</td>
<td>potassium chloride</td>
<td>Tromethamine</td>
</tr>
<tr>
<td></td>
<td>monobasic potassium phosphate</td>
<td>Tromethamine hydrochloride</td>
</tr>
<tr>
<td></td>
<td>sodium chloride</td>
<td>Acetic acid</td>
</tr>
<tr>
<td></td>
<td>dibasic sodium phosphate dihydrate</td>
<td>Sodium acetate</td>
</tr>
<tr>
<td></td>
<td>sucrose</td>
<td>sucrose</td>
</tr>
</tbody>
</table>

*As reported in the prescribing information*
Recommended Screening Questions for mRNA COVID Vaccines

1. Have you ever had an allergic reaction to a component of the COVID-19 vaccine, including polyethylene glycol (PEG, which is found in some medications such as laxatives and preparations for colonoscopy procedures), polysorbate, or a previous dose of COVID-19 vaccine? (This would include a severe allergic reaction [e.g., anaphylaxis] that required treatment with epinephrine or EpiPen® or that caused you to go to the hospital. It would also include an allergic reaction that occurred within 4 hours that caused hives, swelling, or respiratory distress, including wheezing.)

2. Have you ever had an allergic reaction to another vaccine (other than COVID-19 vaccine) or an injectable medication?

3. Have you ever had a severe allergic reaction (e.g. anaphylaxis) to something other than a component of COVID-19 vaccine, polysorbate, or any vaccine or injectable medication? This would include food, pet, insect, venom, environmental, latex, or oral medication allergies.
# Pre-vaccination Checklist for COVID-19 Vaccines

**For vaccine recipients:**

The following questions will help us determine if there is any reason you should not get the COVID-19 vaccine today. If you answer "yes" to any question, it does not necessarily mean you should not be vaccinated. It just means additional questions may be asked. If a question is not clear, please ask your healthcare provider to explain it.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
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</thead>
<tbody>
<tr>
<td>1. Are you feeling sick today?</td>
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<tr>
<td>2. Have you ever received a dose of COVID-19 vaccine?</td>
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<tr>
<td>- If yes, which vaccine product did you receive?</td>
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<td></td>
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<tr>
<td>- Pfizer</td>
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<td></td>
<td></td>
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<tr>
<td>- Moderna</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- Another product</td>
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<tr>
<td>3. Have you ever had an allergic reaction to the following products?</td>
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<tr>
<td>- A component of the COVID-19 vaccine, including polysorbate 80 (PEG), which is found in some medications, such as laxatives and prepreparations for colonoscopy procedures</td>
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<tr>
<td>- Polyethylene</td>
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<tr>
<td>4. Have you ever had an allergic reaction to another vaccine, including COVID-19, or an vaccine product?</td>
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<tr>
<td>- A previous dose of COVID-19 vaccine</td>
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<tr>
<td>5. Have you ever had a severe allergic reaction to something other than a component of the COVID-19 vaccine, polysorbate 80, or another vaccine product?</td>
<td></td>
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<tr>
<td>- Includes food, pet, environmental, or occupational allergies.</td>
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<tr>
<td>6. Have you received any vaccine in the last 14 days?</td>
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<tr>
<td>7. Have you ever had a positive test for COVID-19 or a doctor ever told you that you had COVID-19?</td>
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<tr>
<td>8. Have you received passive antibody therapy (monoclonal antibodies or convalescent serum) as treatment for COVID-19?</td>
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<tr>
<td>9. Do you have a weakened immune system caused by something such as HIV infection or cancer or do you take immunosuppressive drugs or therapies?</td>
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<tr>
<td>10. Do you have a bleeding disorder or are you taking a blood thinner?</td>
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<tr>
<td>11. Are you pregnant or breastfeeding?</td>
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</tbody>
</table>

**Forms reviewed by**  
**Date**

Allergy to COVID-19 vaccine or related component

**High Risk**
- History of immediate allergic reaction of any severity to a previous COVID-19 vaccine, its components (e.g., PEG), or polysorbate.

Stop

Do NOT administer vaccine. Consider Allergy referral.

Allergy to another vaccine or an injectable therapy

**Medium Risk**
- History of any immediate allergic reaction to another vaccine or an injectable therapy unrelated to COVID-19 vaccine components or polysorbate.

Consider Allergy referral prior to vaccination. 30-minute observation if vaccinated.

Anaphylaxis due to an unrelated cause

**Low-Medium Risk**
- History of anaphylaxis due to any cause unrelated to COVID-19 vaccine components, polysorbate, another vaccine, or an injectable therapy.

Administer vaccine with 30-minute observation

**Low Risk**
- No history of anaphylaxis or any immediate allergic reaction to COVID-19 vaccine components, polysorbate, another vaccine, or an injectable therapy.

Administer vaccine with 15-minute observation
**Summary: Triage of persons presenting for mRNA COVID-19 vaccination**

**MAY PROCEED WITH VACCINATION**

**ALLERGIES**
- History of allergies that are unrelated to components of an mRNA COVID-19 vaccine, other vaccines, or injectable therapies, such as:
  - Allergy to oral medications (including the oral equivalent of an injectable medication)
  - History of food, pet, insect, venom, environmental, latex, etc., allergies
  - Family history of allergies

**ACTIONS**
- 30 minute observation period: Persons with a history of anaphylaxis (due to any cause)
- 15 minute observation period: All other persons

**PRECAUTION TO VACCINATION**

**ALLERGIES**
- History of any immediate allergic reaction to vaccines or injectable therapies (except those related to component of mRNA COVID-19 vaccine or polysorbate, as these are contraindicated)

**ACTIONS**
- Risk assessment
- Consider deferral of vaccination and/or referral to allergist-immunologist
- 30 minute observation period if vaccinated

**CONTRAINDICATION TO VACCINATION**

**ALLERGIES**
- History of the following are contraindications to receiving either of the mRNA COVID-19 vaccines:
  - Severe allergic reaction (e.g., anaphylaxis) after a previous dose of an mRNA COVID-19 vaccine or any of its components
  - Immediate allergic reaction of any severity to a previous dose of an mRNA COVID-19 vaccine or any of its components (including polyethylene glycol)
  - Immediate allergic reaction of any severity to polysorbate

**ACTIONS**
- Do not vaccinate
- Consider referral to allergist-immunologist

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1 Refer only to mRNA COVID-19 vaccines currently authorized in the United States (i.e., Pfizer-BioNTech, Moderna COVID-19 vaccines)
2 Immediate allergic reaction to a vaccine or medication is defined as any hypersensitivity-related signs or symptoms consistent with urticaria, angioedema, respiratory distress (e.g., wheezing, stridor), or anaphylaxis that occur within four hours following administration.
3 See Appendix A for a list of ingredients. Note: Polyethylene glycol (PEG), an ingredient in both mRNA COVID-19 vaccines, is structurally related to polysorbate and cross-reactive hypersensitivity between these compounds may occur. Information on ingredients of a vaccine or medication (including PEG, a PEG derivative, or polysorbate) can be found in the package insert.

* These persons should not receive mRNA COVID-19 vaccination at this time unless they have been evaluated by an allergist immunologist and it is determined that the person can safely receive the vaccine (e.g., under observation, in a setting with advanced medical care available).

https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html
Allergic symptoms after first dose of COVID-19 vaccine

Immediate-type (within 4 hours)
- Unclear if allergic
  - Allergy/Immuno. consult
    - Consider testing +/- graded vaccine administration
- Anaphylaxis or non-severe allergic reaction
  - Do not administer second dose
  - Consider Allergy/Immuno. consult if high risk for COVID

Delayed-type (> 4 hours to weeks)
- Large local
  - Necrosis or exfoliative dermatitis?
    - Yes
      - Do not administer second dose
    - No
      - Proceed with second dose
- Systemic symptoms*
  - Allergy/Immuno. consult

*excluding typical vaccine side effects, such as fever, fatigue, chills, myalgia, arthralgia, or headache
Management of Delayed Large Locals

• Recommend symptomatic treatment: ice/cold compress, analgesics (e.g. ibuprofen, acetaminophen), antihistamines (e.g. diphenhydramine, cetirizine), and topical moderate (e.g. triamcinolone) or high (e.g. fluocinolone) potency steroids

• If symptoms are significant, consider oral prednisone 20-40 mg for 1-2 days. This should involve shared decision-making with the patient due to the theoretical risk that corticosteroids may dampen the immune response to the vaccine.

• Delayed local reactions are often self-limiting conditions that do not contraindicate administration of subsequent doses of the same vaccine. A second dose would not be recommended if there was local necrosis (severe Arthus reaction) or exfoliative dermatitis (i.e. SJS/TEN spectrum).

• Large local vaccine reactions secondary to T-cell infiltration are often associated with prolonged and very effective immunity.
San Diego COVID Vaccine Allergist Group

• UC San Diego/Rady Children’s Hospital:
  • Stephanie Leonard, Michael Welch, Susan Laubach, Lori Broderick

• UC San Diego:
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