

EDUCATIONAL OBJECTIVES

At the end of this continuing education activity, pharmacists and pharmacy technicians will be able to

- Describe common and serious reactions associated with the COVID-19 vaccines
- List management strategies for reactions to COVID-19 vaccines



The University of Connecticut School of Pharmacy is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

Pharmacists and pharmacy technicians are eligible to participate in this knowledge-based activity and will receive up to 0.1 CEU (1 contact hours) for completing the activity, passing the quiz with a grade of 70% or better, and completing an online evaluation. Statements of credit are available via the CPE Monitor on-line system and your participation will be recorded with CPE Monitor within 72 hours of submission

ACPE UAN: 0009-0000-21-034-H06-P
0009-0000-21-022-H06-T

Grant funding: None
Cost: FREE

INITIAL RELEASE DATE: June 28, 2021
EXPIRATION DATE: June 28, 2024

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Managing COVID-19 Vaccine Side Effects

ABSTRACT: As scientific evidence confirms the safety of various COVID-19 vaccines, pharmacists and pharmacy technicians have emerged as key immunizers across the country. Potential vaccine side effects are a topic of great concern to patients because these are new types of vaccines. Various manifestations after vaccination and the timing of those side effects are covered in newspapers, the nightly televised news, and social media. As with all things COVID, the healthcare community and the nation are on steep learning curves. This continuing education activity discusses potential and common vaccine side effects and recommended management strategies.

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FACULTY DISCLOSURE: The authors have no actual or potential financial conflicts of interest associated with this article.

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INTRODUCTION

The coronavirus vaccine is a hot topic as the long awaited vaccines roll out. The U.S. Food and Drug Administration (FDA) has authorized and the CDC recommends three different vaccines at this time. None of these vaccines can infect patients with COVID-19.

The first two products with conditional approval from the FDA—the Pfizer-BioNTec and Moderna vaccines—are mRNA vaccines and they have generated much discussion in the community. mRNA vaccines contain genetic material from the virus that causes COVID-19 that triggers an immune response to make antibodies to the virus's unique spike protein. After the cells make copies of the protein, they destroy the genetic material from the vaccine. Once the protein is copied, the body recognizes it as a foreign body and starts to build T-lymphocytes and

Table 1. COVID Vaccines: Key Points⁶

	Doses required	Injection volume	Space between doses	Type of vaccine	Recommended ages	Requires reconstitution
Moderna	2	0.5 mL	28 days	mRNA	18+	No
Pfizer-BioNTec	2	0.3 mL	21 days	mRNA	12+	Yes
Johnson & Johnson/Janssen	1	0.5 mL	N/A	Viral vector	18+	No

B-lymphocytes that will remember how to fight the virus if patients are exposed to it in the future.¹

The second type are protein subunit vaccines, and all of these are investigational at this time. These include proteins of the virus that causes COVID-19 instead of the entire germ. The body recognizes the protein as foreign and starts to build T-lymphocytes and antibodies that will remember how to fight the virus if immunized patients are infected in the future.

The third type are vector vaccines, and the Johnson and Johnson/Janssen vaccine is an example. These contain a modified version of a virus different than the one that causes COVID-19. Researchers insert a viral vector (in this case, an adenovirus from the family of viruses that cause the common cold) taken from the virus that causes COVID-19 inside the shell of the modified virus. Once the viral vector is inside the cells, genetic material triggers the cell to make a protein that is unique to the virus that causes COVID-19. The cells then make copies of the protein, which prompts the body to build T-lymphocytes and B-lymphocytes that will remember how to fight the virus if immunized patients are infected in the future.

All vaccines currently employed in the U.S. are labeled with two recommendations:

- COVID-19 vaccines should be administered alone and separated by 14 days before or after the administration of other vaccines. If the vaccine is administered within 14 days of another vaccine inadvertently, the dose does not need to be repeated for either vaccine.²
- After receiving the current vaccines, people with histories of immediate allergic reaction to a vaccine or anaphylaxis should be observed for 30 minutes. All other people should be observed for 15 minutes.

Moderna

The Moderna vaccine is an mRNA two part series separated by four weeks and recommended for people aged 18 years or older. The vaccine is distributed as a solution with 10 or 15 doses, but the manufacturer has plans to increase the vial size in the future.³

PAUSE AND PONDER: What kinds of side effects have your patients reported after vaccination with a COVID vaccine?

Pfizer-BioNTec

The Pfizer-BioNTec vaccine is an mRNA two part series separated by three weeks that is recommended for people 12 years or older. The vaccine is distributed as a powder that needs to be reconstituted with saline before administration. It is a five-dose vial.⁴

Johnson & Johnson/Janssen

The Johnson & Johnson (which was developed with Janssen) COVID-19 vaccine that was recently approved for emergency use is administered as a single dose. The vaccine is distributed as a multidose vial containing five doses. The manufacturer indicates healthcare providers should not combine residual vaccines from multiple vials to obtain a dose.⁵

Table 1 summarized key points about the vaccines.

COVID-19 Vaccine Contraindications

When administering the vaccine, immunizers must always check with patients to see if they have had previous serious allergic reactions or anaphylaxis—many patients do not know what anaphylaxis is, so immunizers need to be ready to explain it in words the patient will understand. A good way to explain it is an allergic reaction in which it feels like your throat is closing or you need a shot (an epinephrine pen) to stop it. If the answer is yes, then the patient must be monitored for 30 minutes after the vaccine. Other patients must wait 15 minutes if they have no history of anaphylactic reaction.⁷ The Moderna vaccine gives rise to about three anaphylactic reactions per million doses administered, and the Pfizer–BioNTech vaccine triggers five reactions per million doses according to VAERS data.⁸

An allergic reaction is considered severe when a person needs to be treated with epinephrine or if they must visit the emergency room for treatment. An immediate allergic reaction means a reaction within four hours of vaccination, including symptoms such as hives, swelling, or wheezing.



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Patients who have had severe allergic reactions (anaphylaxis) or immediate allergic reactions—even if they were not severe—to any ingredient in an mRNA COVID-19 should not be vaccinated with mRNA vaccines. Patients who reacted badly to the first dose of the vaccine should not receive the second dose.

mRNA vaccines contain polyethylene glycol (PEG), and the J&J/Janssen vaccine contains polysorbate. Patients who are allergic to PEG—and this is a rare allergy—should not receive an mRNA COVID-19 vaccine. Patients would have most likely been exposed to PEG in laxatives like Miralax or colonoscopy preps. Immunizers should refer them to their doctor to see if the J&J/Janssen vaccine is a good alternative. Patients who are allergic to polysorbate, a ubiquitous solubilizing agent, should not receive the J&J/Janssen COVID-19 vaccine. Immunizers should refer these patients to their doctors to see if the mRNA Pfizer-BioNTec or Moderna vaccines are alternatives.⁹

Although the Pfizer-BioNTec and Moderna vaccines contain a number of excipients, PEG 2000 is the only one reported to cause anaphylaxis. All mRNA vaccines are likely to contain PEG, which is used to stabilize the lipid nanoparticles. An allergy to PEG is rare, but reactions can be severe or even fatal. In a UK study, a 52-year-old woman developed throat constriction, cough, and then loss of consciousness immediately after receiving the Pfizer-BioNTech COVID-19 vaccine. PEG is an excipient in many drugs, but hypersensitivity depends on its molecular weight (MW).¹⁰

Side Effects of the COVID-19 Vaccines

The coronavirus vaccines contain a few anticipated side effects, however almost all are mild. The most common local side effect is injection site pain, but some other mild adverse reactions commonly seen include swelling, itching, and redness.¹¹ Some frequent systemic side effects are headache, chills, and fatigue. The most unpleasant adverse effect commonly associated with these vaccines is a fever or chills. Although these symptoms may be uncomfortable, they typically only last two to three days and they may indicate that the patient's immune system is respond-

ing to the vaccine and building immunity against infection. It appears that side effects tend to occur within 24 hours, but some patients have reported them as long as a week after the shot.¹²

Several studies report that these adverse effects may be less likely to occur in older populations. According to CDC data from December 14, 2020 to January 13, 2021, only 25% of individuals aged 50 to 64 experienced side effects from either the Moderna or Pfizer-BioNTec vaccine. In comparison, 65% of people younger than 50 experienced these side effects.¹³ Both local and systemic adverse reactions are more common in younger patients who are 18 to 65 years old. Additionally, patients are more likely to experience stronger adverse reactions from the second dose than the first dose.¹⁴

COVID Arm

The CDC indicates that many vaccine recipients have reported a red, itchy, swollen, or painful rash in the area around the injection site. These rashes can start a few days to more than a week after the first shot and are sometimes quite large and are called “COVID arm” colloquially. Developing “COVID arm” after the first shot should not deter patients from receiving the second shot as scheduled. They should tell their immunizers that they experienced a rash or “COVID arm” after the first shot. The immunizer may recommend using the opposite arm for the second shot.

Managing COVID-19 Vaccine Side Effects

Generally, healthcare providers in immunization clinics should monitor patients for 15 minutes after receiving the vaccine to ensure no severe adverse reactions occur. They should observe all patients with histories of anaphylaxis or an immediate allergic reaction to previous vaccines for 30 minutes after administration. In case of an emergency, COVID-19 vaccination sites should have access to epinephrine, antihistamines, devices that measure pulses, and blood pressure monitors. Someone should call emergency medical services immediately if a severe allergic reaction occurs, using the aforementioned supplies to provide care to the patient in the meantime.

PAUSE AND PONDER: Have you used V-SAFE to report vaccine side effects? If not, why not?

After receiving the vaccine, most side effects disappear spontaneously after a few days. However, patients can manage symptoms in several ways. To reduce pain or discomfort at the injection site, they can apply a clean, cool, wet washcloth to the area. Additionally, immunizers should advise patients to use or exercise their arms frequently, since avoiding use may cause the soreness to feel worse. However, they should not massage the area.¹⁵ To minimize the discomfort caused by a fever patients should stay hydrated and dress in layered clothing. If also experiencing chills, the patient may use a warm compress in addition to the management recommended for fever symptoms.

The CDC recommends against taking antipyretics or analgesics as prophylactic before receiving the vaccine.¹⁶ Generally, side effects take 12-24 hours to appear, so taking pain relievers preemptively will likely be ineffective. However, patients can take these analgesics if they experience side effects that are bothersome. NSAIDs (ibuprofen, naproxen) or acetaminophen can be used to relieve pain or discomfort and can help bring down a fever. Some patients may experience mild allergic reactions like redness, rash, or itchiness five to 10 days after vaccination. Over the counter antihistamines like diphenhydramine or topical corticosteroids like hydrocortisone can help relieve these types of symptoms. If side effects become worrying or continue to persist after a few days, patients should call their doctors or see a health professional for advice.

Patients with underlying or immunocompromising conditions are at an increased risk of developing more severe COVID-19. Individuals with autoimmune conditions or weakened immune systems may receive the COVID-19 vaccine. However, they should be informed that data on the safety of these vaccines on people with these conditions is limited. After receiving the vaccine, side effect management is mostly similar to those without underlying conditions. Distinctly, these types of patients should watch for severe side effects extra carefully and should contact their doctor if any occur. After they are immunized, the immunizer should remind them to also contact a health professional if they're unsure whether their current medications interact poorly with medications used to manage symptoms.

SIDEBAR: V-SAFE¹⁷

V-safe is an application for smartphones that uses text messaging and web surveys to provide personalized health check-ins after you receive a COVID-19 vaccine. Through v-safe, patients can report side effects to the CDC quickly after receiving a COVID-19 vaccine. Depending on patients' answers to the web surveys, someone from CDC may call to check on them and ask for more information. V-safe will also send a text reminder for the second COVID-19 vaccine dose if patients ask for one.

Patients can find v-safe at www.cdc.gov/vsafe and it has options to access it in several languages. It is critical that immunizers know how to use this application and can promote its use among patients.

Conclusion

Manufacturers and public health officials release new information about the various covid vaccines constantly, so it is important to stay informed and check for updates. Patients may have questions about each vaccine, so distinguishing the differences between them is something a healthcare provider needs to know. Be able to explain the nonpharmacologic and pharmacologic treatments available to manage vaccine side effects, and when to seek medical attention. Encourage your patients to register for V-SAFE (see **SIDEBAR**) after receiving the vaccine so they can track their symptoms and stay informed.

With the uncertainty with the pandemic, new vaccines being developed, and regulations changing, pharmacy teams need to have current information about these vaccines at the ready.

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