COVID-19 Vaccines in People with Cancer

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The COVID-19 pandemic\(^1\), caused by the SARS-CoV-2 virus, continues to have a serious impact on many people, including people with cancer, their families, and caregivers. (To learn more about COVID-19 and how it might affect cancer patients and caregivers, see Common Questions About the COVID-19 Outbreak\(^2\).)
Vaccines (also called immunizations or vaccinations) are used to help a person’s immune system recognize and protect the body against certain infections. Vaccines are available to help protect against COVID-19. Here we’ll discuss some of the questions people with cancer (or with a history of cancer) might have about the COVID-19 vaccines.

The American Cancer Society (ACS) supports the National Comprehensive Cancer Network (NCCN)* recommendation that all people with cancer should be fully vaccinated against COVID-19. Since the situation for every person is different, it is best to discuss the risks and benefits of getting the COVID-19 vaccine with your cancer doctor, who can advise you.

(*The National Comprehensive Cancer Network is an alliance of many of the nation’s leading cancer centers that provide detailed guidelines on cancer treatment and cancer care.)

Is it safe for people with cancer to get any type of vaccine?

People with cancer (or with a history of cancer) can get some vaccines, but this depends on many factors, such as the type of vaccine, the type of cancer a person has (had), if they are still being treated for cancer, and if their immune system is working properly. Because of this, it’s best to talk with your doctor before getting any type of vaccine. To learn more, see Vaccinations and Flu Shots for People with Cancer.

Which COVID-19 vaccines are available?

Three COVID-19 vaccines are available in the US.

Two of the vaccines are approved by the US Food and Drug Administration (FDA):

- The Pfizer-BioNTech vaccine (Comirnaty) is approved by the FDA for people 16 years of age or older. The initial series is given in 2 doses, 3 to 8 weeks apart.*
- The Moderna vaccine (Spikevax) is approved by the FDA for people 18 years of age or older. The initial series is given in 2 doses, 4 to 8 weeks apart.*

In addition, some COVID-19 vaccines have received emergency use authorization (EUA) from the FDA for the ages below:

- The Pfizer-BioNTech vaccine is authorized for people 5 years of age or older. The initial series is given in 2 doses: 3 weeks apart for ages 5 to 11, and 3 to 8
weeks apart for ages 12 and older.*

- The **Johnson & Johnson (Janssen)** vaccine is authorized for people 18 years of age and older who can't get or don't want to get one of the other COVID-19 vaccines. It is initially given as a single injection.

*This is the recommended dosing schedule for the general public. For people with weakened immune systems, which includes many people with cancer, the number of doses in the initial series and the interval between them might be different. To learn more, see “What if I have a weakened immune system?”.

**Additional COVID-19 vaccine doses (including boosters):** Additional doses of the COVID-19 vaccines have now been authorized. For more on this, see “What if I have a weakened immune system?” and “Should I get a COVID-19 vaccine booster?”

All three of these vaccines have been found to lower the risk of being infected with COVID-19. They have also been shown to be very effective at lowering the risk of having severe disease, being hospitalized, or dying from COVID-19 if you are infected. But keep in mind that since no vaccine is 100% effective, some people who are fully vaccinated (at least 2 weeks after the last dose of the initial series) might still become infected with COVID-19 and get sick. This is called a **breakthrough infection**.

**How do these vaccines work?**

The Pfizer-BioNTech and Moderna vaccines contain messenger RNA (mRNA), which is a type of genetic material. After a person receives the vaccine, the mRNA enters cells in the body and tells them to make copies of the COVID-19 virus’s “spike” protein (the protein that normally helps the virus infect human cells). This doesn’t cause disease, but it does help teach the immune system to act against the virus if the body is exposed to it in the future.

The Johnson & Johnson (Janssen) vaccine contains an adenovirus (a type of virus that is different from the coronavirus that causes COVID-19), which has been changed in the lab so that it contains the gene (piece of DNA) for the COVID-19 virus’s spike protein. Once the adenovirus enters cells in the body, this gene tells the cells to make copies of the spike protein. This triggers the immune system to recognize and attack the COVID-19 virus if the body is exposed to it in the future. The adenovirus in this vaccine is not a live virus because it has been changed so that it can no longer reproduce in the body (nor can it cause disease).

**You cannot get COVID-19 from any of these vaccines**, as they do not contain the virus that causes COVID-19.
Some vaccines for other diseases contain changed versions of the live viruses that cause the diseases. These live viruses don’t cause problems in people with normal immune systems. But they might not be safe for people with weakened immune systems, so live virus vaccines typically are not recommended for cancer patients. However, the **COVID-19 vaccines available in the US do not contain these types of live viruses.**

For more on these vaccines, see “Should people with cancer get a specific COVID vaccine?”

**What is the difference between FDA approval and emergency use authorization (EUA)?**

If a vaccine is fully approved by the FDA, it means that the information on the vaccine and its effects has been thoroughly reviewed, and the FDA has determined that the benefits outweigh the known and possible risks for the people it is meant to help.

In an EUA, the FDA allows the use of a vaccine or drug during a time of emergency, such as the current COVID-19 pandemic, when the available evidence shows the potential benefits outweigh the potential risks. Drugs and vaccines that have been given an EUA continue to be studied in clinical trials. An EUA is not the same as a full FDA approval, which requires a more thorough review of safety and effectiveness.

Even after a drug or vaccine has been given full approval, the FDA will continue to monitor it for unexpected side effects or for more information that might be helpful to know.

**What are the side effects of the vaccines?**

Common side effects that have been reported after getting the vaccines include:

- Pain, redness, or swelling at the injection site
- Feeling tired
- Headache
- Fever
- Chills
- Muscle and joint pain
- Nausea
For the vaccines that require two shots as part of the initial series, the side effects might be a little stronger after the second shot compared to what you might have had after the first injection. In general, the side effects tend to go away within a few days.

Swollen/tender lymph nodes

Some people might have swelling or tenderness of the lymph nodes under the arm in which they got the injection. This is often a normal response by the body’s immune system, which is getting ready to fight a future COVID-19 infection.

A swollen lymph node under the arm might cause concern, since this can also be a sign of breast cancer (as well as some other cancers - see below). The time it takes for the lymph nodes to shrink back down after the vaccine may be a few days to a few weeks, although this is still being studied. If you notice swollen or tender lymph nodes that do not go away after a few weeks (or if they continue to get bigger), contact your doctor to discuss the next steps.

Screening mammograms: See “Could the vaccine cause issues if I’m getting a mammogram?” for more information about COVID-19 vaccines and mammograms.

For those who have breast cancer or a history of breast cancer: See “What if I have breast cancer or a history of breast cancer?” for more information about which arm to consider getting the injection in.

For those with any type of cancer or a history of cancer: Many types of cancer can spread to nearby lymph nodes (and some types of cancer can start in the lymph nodes). This can cause the nodes to become enlarged. Because the COVID vaccines can also cause lymph nodes to become enlarged, it’s important to talk to your health care team if you are scheduled to get an imaging test (such as an MRI or CT scan) in the weeks after getting a COVID vaccine. In some cases, your doctors might advise that you delay the imaging test if possible, so that any swollen lymph nodes that result from the vaccine aren’t confused for cancer. If you do have a scan done soon after getting the vaccine, it’s important to make sure that your health care team is aware you got the vaccine, so they can take this into account when looking at the scans.

Serious and long-term side effects of COVID-19 vaccines

A few uncommon but possibly serious safety concerns have been reported for the vaccines so far.

Allergic reactions to the vaccine
In very rare cases, people have had serious allergic reactions after getting one of the vaccines. This seems to be more likely in people who have had serious allergic reactions before.

**Blood clots**

Very rarely, people who have received the **Johnson & Johnson (Janssen) vaccine** have developed serious blood clots in the brain, lungs, abdomen (belly), legs, or other parts of the body, along with low blood platelet counts. (Platelets are cells that normally help in blood clotting.)

The FDA and the US Centers for Disease Control and Prevention (CDC) have reviewed the data on these incidents and have determined that the vaccine’s known and potential benefits outweigh its known and potential risks in people 18 years of age and older. However, because of the increased risk of blood clots, the FDA has limited the authorization of this vaccine to people who can’t get or don’t want to get one of the other COVID vaccines.

People getting this vaccine (and their caregivers) should review the Janssen Fact Sheet for Recipients and Caregivers to learn more about the possible benefits and risks of the vaccine.

The FDA and CDC recommend that you contact your health care provider right away if you have possible symptoms of a blood clot, such as a severe or constant headache, blurred vision, seizures, abdominal (belly) pain, leg pain or swelling, chest pain, or shortness of breath. You should also contact your health care provider if you have symptoms that might be from a low platelet count, such as new or easy bruising, or tiny purple or red spots on the skin that might look like a rash.

**Inflammation of the heart**

A small proportion of people who have received the **Pfizer-BioNTech and Moderna vaccines** have developed myocarditis (inflammation of the heart muscle) or pericarditis (inflammation of the lining outside of the heart).

In most cases, the symptoms started a few days after the second vaccine dose and were more likely to happen in adolescents and young adults. For people who received the **Pfizer-BioNTech vaccine**, the risk was highest in boys 12 to 17 years of age and in men under the age of 40.

If you receive either the Pfizer-BioNTech or Moderna vaccine and start to have chest
pain, shortness of breath, or feelings of having a fast-beating, fluttering, or pounding heart, the FDA and CDC recommend getting medical attention right away.

People getting these vaccines (and their caregivers) should review the Moderna Fact Sheet for Recipients and Caregivers\textsuperscript{17} and the Pfizer-BioNTech Fact Sheet for Recipients and Caregivers\textsuperscript{18} to learn more about the possible benefits and risks of these two vaccines.

\textit{Guillain-Barré Syndrome (GBS)}

GBS has occurred in a very small portion of people who have received the \textbf{Johnson & Johnson (Janssen) vaccine}. In this syndrome, the body’s immune system damages parts of the nervous system.

In most people, symptoms of GBS begin within 6 weeks after getting the vaccine. They can include:

- Weakness or tingling, especially in the legs or arms, that gets worse and/or spreads to other parts of the body
- Trouble walking
- Trouble with facial movements, including speaking, chewing, or swallowing
- Double vision or having trouble moving the eyes
- Problems with bladder control or bowel function

The FDA advises you to get medical attention right away if you develop any of these symptoms after getting the Janssen vaccine.

People getting this vaccine (and their caregivers) should review the Janssen Fact Sheet for Recipients and Caregivers\textsuperscript{19} to learn more about the possible benefits and risks of the vaccine.

For the latest information, visit the websites of the \textbf{FDA}\textsuperscript{20} and \textbf{CDC}\textsuperscript{21}.

All of these COVID-19 vaccines are still fairly new, so possible long-term side effects are still being studied, and it’s possible that the guidance about the different vaccines might change. If you have concerns about getting one of these COVID-19 vaccines, it’s important to talk with your doctor.

\textbf{Can COVID-19 vaccines cause cancer or make cancer grow?}
There is no information that suggests that COVID-19 vaccines cause cancer. There is also no information that suggests these vaccines can make cancer grow or recur (come back).

Should cancer patients and survivors get the vaccine?

The ACS supports the NCCN recommendation that all people with cancer should be fully vaccinated as soon as they can with the COVID-19 primary vaccine series, plus additional booster doses. This includes people who have already had COVID-19.

The main concern about getting the vaccine is not whether it’s safe for people with cancer, but about how effective it will be, especially in people with weakened immune systems. Some cancer treatments like chemotherapy (chemo), radiation, stem cell or bone marrow transplant, or immunotherapy can affect the immune system, which might make the vaccine less effective. People with certain types of cancers, like leukemias or lymphomas, can also have weakened immune systems which might make the vaccine less effective.

Although doctors are still learning about how effective the vaccines are in people being treated for cancer, it appears that the vaccines might not be as effective in people with weakened immune systems as compared to people with healthy immune systems. Given this, the NCCN recommends that people with cancer who have a weakened immune system should get 3 doses of one of the mRNA COVID-19 vaccines as the primary series, plus an additional 2 booster doses (for a total of 5 shots).

For people with cancer who do not have a weakened immune system, the NCCN recommends 2 doses of an mRNA COVID-19 vaccine or one dose of the Janssen vaccine, plus an additional booster dose.

Read more below about getting additional doses of the COVID-19 vaccine as well as booster doses. See “What if I have a weakened immune system?” and “Should I get a COVID-19 vaccine booster or boosters?”

Since the situation for every person is different, it is best to discuss the risks and benefits of getting one of the COVID-19 vaccines with your cancer doctor. They can advise you and tell you when you should receive it.

For people with cancer who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive
measures.

Should people with cancer get a specific COVID-19 vaccine?

As mentioned in “Which COVID-19 vaccines are available?”, the Pfizer-BioNTech and Moderna vaccines are mRNA vaccines, while the Johnson & Johnson (Janssen) vaccine is an adenovirus vaccine. The other main difference between them is that the initial series for the mRNA vaccines is given as two shots over 3 to 8 weeks, while the adenovirus vaccine is initially given as a single shot. (Additional shots are also recommended for some people – see “What if I have a weakened immune system?” and “Should I get a COVID-19 vaccine booster?”)

All three of the vaccines have been shown to be effective at lowering the risk of getting COVID-19, as well as the risk of severe illness, being hospitalized, or dying from the disease if you are infected.

At this time, the FDA has restricted the authorization of the Johnson & Johnson (Janssen) vaccine to certain people aged 18 or older, and the CDC prefers that people get one of the mRNA (Pfizer-BioNTech or Moderna) vaccines over the Johnson & Johnson (Janssen) vaccine. The mRNA vaccines are more readily available and don’t appear to have the rare side effect of blood clots (see “What are the side effects of the vaccines?”). For people who can’t or don’t want to get an mRNA vaccine, the CDC stresses that getting any COVID-19 vaccine, including the Johnson & Johnson vaccine, is better than being unvaccinated.

As new information about the different COVID-19 vaccines becomes available, it’s possible that the guidance about the different vaccines might change. For this reason, it’s important to talk with your cancer doctor about getting the vaccine.

What if I have a weakened immune system?

Getting the COVID-19 vaccine

As noted above in “Should cancer patients and survivors get the vaccine?”, the COVID-19 vaccines might not be as effective in people with weakened immune systems. This includes, for example, people who have:

- Been getting active cancer treatment (either for solid tumors or cancers of the blood) or have received cancer treatment in the past year
- Blood cancers but are not getting active cancer therapy
• Received a stem cell transplant or CAR T-cell therapy within the last 2 years or are taking medicine to suppress the immune system
• Been getting active treatment with high-dose corticosteroids or other drugs that may suppress the immune response

Despite this, experts still recommend that those with a weakened immune system get the vaccine because they are at higher risk for severe COVID-19 disease, and because getting even some protection from the vaccine is better than having none.

As noted in “Which COVID-19 vaccines are available?”, three COVID-19 vaccines are available in the United States at this time. These include:

• The **Pfizer-BioNTech** vaccine, which can be used in people 5 years of age or older. For people with weakened immune systems, the initial series is given in 2 doses, 3 weeks apart.
• The **Moderna** vaccine, which can be used in people 18 years of age or older. For people with weakened immune systems, the initial series is given in 2 doses, 4 weeks apart.
• The **Johnson & Johnson (Janssen)** vaccine, which can be used in people 18 years of age and older who can’t get or don’t want to get one of the other COVID vaccines. It is initially given as a single injection.

At this time, the CDC prefers that people get one of the mRNA (Pfizer-BioNTech or Moderna) vaccines over the Johnson & Johnson (Janssen) vaccine.

**Getting additional doses of the vaccine**

After getting the initial series, getting another dose of vaccine might help people with a weakened immune system to build up a stronger immune response against the virus that causes COVID-19.

**Pfizer-BioNTech and Moderna vaccines**

For people with moderately to severely weakened immune systems, the CDC recommends a third dose of an mRNA vaccine (the Pfizer-BioNTech vaccine for people 5 years of age and older, or the Moderna vaccine for people 18 years of age and older).

The third dose of vaccine should be given at least 4 weeks after the second dose.
Whenever possible, the same mRNA vaccine should be used for the third dose, according to the CDC. If the same vaccine isn’t available (or if it isn’t known which mRNA vaccine a person got), then either mRNA vaccine may be given for the third dose.

People 5 years of age and older who receive this third dose should also get a **booster dose (fourth shot)** of vaccine, according to the CDC. This should be given at least 3 months after the third dose.

People 12 years of age and older should also get a **second booster dose (fifth shot)** at least 4 months after the first booster dose, according to the CDC. (See “Should I get a COVID-19 booster?”)

**Johnson & Johnson (Janssen) vaccine**

For immunocompromised people who initially received the Johnson & Johnson (Janssen) vaccine, the CDC recommends getting an additional dose (**second shot**) using one of the mRNA vaccines, at least 4 weeks after the first dose.

A **booster dose (third shot)** is recommended at least 2 months after the second dose. Any of the three available vaccines can be given for this booster dose, but the mRNA vaccines are preferred. People should also get a **second booster dose (fourth shot)** using one of the mRNA vaccines, at least 4 months after the first booster dose. (See “Should I get a COVID-19 booster?”)

**Can other medicines lower risk as well?**

For people with moderately to severely weakened immune systems (see above), the FDA has also authorized a combination of the monoclonal antibodies **tixagevimab and cilgavimab (Evusheld)** to help lower the risk of COVID-19 infection. For more information, see “Can other medicines lower the risk of COVID-19 infection?” in **Common Questions About the COVID-19 Outbreak**.

If you are concerned about your risk of COVID-19 even after being fully vaccinated, it’s important to talk to your doctor about your immune status and if you should get additional doses of the vaccine, as well as what else you can do to help lower your risk of infection.

**Should I get a COVID-19 vaccine booster or boosters?**

Studies have shown that most people who are fully vaccinated (at least two weeks past
the last dose of their initial series) are well protected from severe disease and death from COVID-19, including the variants that are now in the US. However, some research has found that the vaccines might become less effective over time.

Because of this, the CDC has recommendations about getting booster doses of vaccine after completing the initial series.

**Pfizer-BioNTech and Moderna vaccines**

**All people aged 18 and older** who have received both doses of either vaccine should get a booster shot. This should be at least 5 months after the second dose of the vaccine.

**People aged 5 to 17** who have received both doses of the Pfizer-BioNTech vaccine should get a booster shot, at least 5 months after the second dose.

**People aged 50 and older** should also get a second booster shot of either the Pfizer-BioNTech or Moderna vaccine, at least 4 months after the first booster dose.

**For people with weakened immune systems**

As noted in “What if I have a weakened immune system?”, it is recommended that **people with cancer with a weakened immune system** who initially got one of the mRNA (Pfizer-BioNTech or Moderna) vaccines get a third dose of vaccine, at least 4 weeks after the second dose. People 5 years of age and older should also get a booster dose (fourth shot), which should be at least 3 months after the third dose. People 12 years of age and older should also get a second booster dose (fifth shot) at least 4 months after the first booster dose.

**Johnson & Johnson (Janssen) vaccine**

The CDC recommends that **all people 18 years of age or older** who received the Johnson & Johnson (Janssen) vaccine get a booster shot at least 2 months after their initial dose.

People who received the Johnson & Johnson vaccine for both their initial shot and their booster shot may also choose to get a second booster dose with one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose, for a total of 3 doses.

**People 50 years of age and older** should also get a second booster (third shot) with
one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose.

For people with weakened immune systems

As noted in “What if I have a weakened immune system?”, the CDC recommends that people with a weakened immune system who initially got the Johnson & Johnson (Janssen) vaccine get a second dose of vaccine, at least 4 weeks after the first dose. These people should also get a booster dose (third shot), which should be at least 2 months after the second dose, as well as a second booster dose (fourth shot) using one of the mRNA (Pfizer-BioNTech or Moderna) vaccines, at least 4 months after the first booster dose.

Do I have to get the same vaccine for my booster dose?

No, not necessarily. For people 18 years of age or older, the CDC allows for mixing and matching of vaccine doses for booster shots. (People aged 12 to 17 who initially got the Pfizer-BioNTech vaccine are advised to get the same vaccine for the booster.) For people who received the Johnson & Johnson (Janssen) vaccine as their first dose, the CDC recommends that an mRNA vaccine be the preferred vaccine as their booster shot (or as their second booster shot, if they got the Johnson & Johnson vaccine for both their first and booster shot).

If you are concerned about your risk of COVID-19 even after being fully vaccinated, it’s important to talk to your doctor about whether you should get additional doses of the vaccine, as well as what else you can do to help lower your risk of infection.

Do I still need to take precautions if I get the COVID-19 vaccine?

The COVID-19 vaccines are still being studied, as there are things we don’t yet know about them. For example, researchers are still trying to determine how long the COVID-19 vaccines will help protect against the virus. And while the vaccines can clearly lower the risk of getting serious disease from COVID, it’s not yet clear how well they can prevent the spread of the virus to others.

For people with cancer who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive measures.
What if I have breast cancer or a history of breast cancer?

Some people who get a COVID-19 vaccine might have swollen lymph nodes under the arm in which the injection was given (see “What are the side effects of the vaccines?” above). Because a swollen lymph node under the arm can also be a sign of breast cancer spread, most doctors recommend that people with breast cancer or a history of breast cancer get the injection in the arm on the opposite side of your breast cancer. For example, if your breast cancer/breast surgery was in the left breast, it is probably best to get the injection in the right arm. If you have had surgery on both breasts, it’s best to talk with your doctor about the best place on your body to get the injection.

Swollen lymph nodes after a vaccine injection might also have an effect on your mammogram results. (See next question.)

Could the vaccine cause issues if I am getting a mammogram?

Getting a COVID-19 vaccine might result in swollen lymph nodes under the arm in which the injection was given. (See “What are the side effects of the vaccines?” above.)

Swollen lymph nodes under the arm might show up on a mammogram done to screen for breast cancer, which could cause concern and might lead to the need for further tests.

If you’re scheduled for a mammogram soon after you get a COVID-19 vaccine, it’s important to tell your doctor when and in which arm you received the injection. Based on your situation, they can discuss with you if you should change your mammogram appointment. Do not delay your mammogram without speaking to your doctor first.

What if a stem cell transplant or CAR T-cell therapy is or was part of my cancer treatment?

Stem cell transplants and CAR T-cell therapy are types of cancer treatment that can have major effects on the body’s immune system. This can increase your risk of serious infections (including from COVID-19).

If you’ve already received one of these cancer treatments in the past, the NCCN recommends getting the COVID-19 vaccine. This includes 3 primary doses, as well as 2 additional booster doses. (For more on this, see “What if I have a weakened immune system?” and “Should I get a COVID-19 booster?” above.) NCCN also recommends
waiting at least 3 months after these cancer treatments before getting the vaccine, to give the body’s immune system a chance to recover.

If you’ve already gotten the COVID-19 vaccine and are now getting (or are going to get) one of these cancer treatments, the NCCN recommends getting revaccinated with 3 primary doses, as well as 2 additional booster doses, at least 3 months after treatment. This is because the immune system needs to relearn how to protect the body against COVID-19.

If you’re getting (or have gotten) one of these cancer treatments, it’s important to talk to your doctor about your immune status, when you should get the vaccine, as well as what else you can do to help lower your risk of infection.

Should cancer caregivers and close contacts get the vaccine?

Yes. In fact, getting the vaccine can help lower the risk that the person you’re caring for might get COVID-19.

Some vaccines for other diseases contain changed versions of the live viruses that cause the diseases. These types of live virus vaccines typically are not recommended for cancer caregivers because they might have unwanted effects on cancer patients. However, the available COVID-19 vaccines do not contain these types of live viruses, so getting one of these vaccines does not put you at risk for passing COVID-19 on to the person you’re caring for.

It’s important to know that if you do get a COVID-19 vaccine and are later exposed to the virus, it’s not yet clear if the vaccine will prevent you from infecting someone else (even if you don’t get sick).

For caregivers or close contacts who are fully vaccinated (at least two weeks past the last dose of their initial series), the NCCN still recommends wearing a mask, social distancing, washing your hands, minimizing travel, avoiding crowds, and other preventive measures. The CDC also has guidance on who might be eligible for a third dose or booster dose of the vaccines. This guidance is being updated regularly, so check the CDC website for details.

People getting the vaccine might not feel well for a few days after each shot, so it might make sense to have someone else available to help with caregiving during this time.

Where can I get more information about COVID-19 vaccines?
The CDC and FDA have more information about COVID-19 vaccines, including the different types of vaccines and the known possible risks and benefits of each one.

- US Centers for Disease Control and Prevention (CDC)\(^\text{41}\)
- US Food and Drug Administration (FDA)\(^\text{42}\)

For more information about COVID-19 vaccine availability in your area, contact your state or local health department. (The CDC offers links to state health departments\(^\text{43}\).)

**Hyperlinks**

6. [www.fda.gov/vaccines-blood-biologics/comirnaty](http://www.fda.gov/vaccines-blood-biologics/comirnaty)
11. [www.fda.gov/drugs/development-approval-process-drugs#:~:text=FDA%20approval%20of%20a%20drug%20means%20that%20data,takes%20place%20within%20a%20structured%20framework%20that%20includes%3A](http://www.fda.gov/drugs/development-approval-process-drugs#:~:text=FDA%20approval%20of%20a%20drug%20means%20that%20data,takes%20place%20within%20a%20structured%20framework%20that%20includes%3A)
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