COVID-19 Vaccines Frequently Asked Questions

General Vaccination Questions	
What are the indications for the COVID-19 vaccines? (Last reviewed/updated on 2021-05-11)	• Pfizer-BioNTech (Comirnaty®): Authorized emergency use in all individuals who are ages 12 years or older unless contraindicated. • Moderna (mRNA-1273): Authorized emergency use in all individuals who are ages 18 years or older unless contraindicated. • Janssen (Ad26.COV2.S): Authorized emergency use in all individuals who are ages 18 years or older unless contraindicated.

What are the contraindications for the COVID-19 vaccines?
(Last reviewed/updated on 2021-07-05)
	• Individuals with a history of the following should not receive any of the COVID-19 vaccines unless already evaluated and approved by an allergist:
	  ○ Severe allergic reaction, e.g., anaphylaxis, after a previous dose or to a component of the COVID-19 vaccine
	  ○ Immediate allergic reaction of any severity to a previous dose or known allergy to a component of the vaccine
	• Individuals with a contraindication to one of the mRNA COVID-19 vaccines may be able to receive Janssen COVID-19 vaccine and vice versa after been evaluated and approved by an allergist.
	• Allergic reactions not related to vaccines, injectable therapy, components of any of the COVID-19 vaccines, such as allergic reactions to food, pet, venom, environmental allergens, or oral medications, are not contraindications to vaccination.

Are there any testing requirements, e.g., testing for COVID-19 or pregnancy, prior to vaccination? (Last reviewed/updated on 2021-04-26)	• No prerequisite testing is recommended to determine vaccine eligibility.
How are the vaccines administered? (Last reviewed/updated on 2021-03-03)	• Pfizer-BioNTech (Comirnaty®): 30 µg (0.3 mL) intramuscularly (deltoid muscle preferably, or alternatively, anterolateral thigh); **21 days apart**. • Moderna (mRNA-1273): 100 µg (0.5 mL) intramuscularly (deltoid muscle preferably, or alternatively, anterolateral thigh); **28 days apart**. • Janssen (Ad26.COV2.S): 5×10^{10} viral particles (0.5 mL) intramuscularly, one time dose (deltoid muscle, or alternatively, anterolateral thigh).
What are the acceptable dosing intervals of the two dose COVID-19 vaccines? (Last reviewed/updated on 2021-04-28)	• The doses of the mRNA COVID-19 vaccines should be given at the recommended intervals as outlined by the manufacturers (see previous question). • The second dose, however, may be administered up to 4 days prior to the recommended interval and up to 42 days after the first dose.
Are additional vaccine doses necessary following the completion of the vaccination series? (Last reviewed/updated on 2021-08-19)	• The FDA recently approved and CDC/ACIP has recommended an additional mRNA COVID-19 vaccine dose for moderately-to-severely immunocompromised individuals who previously completed the vaccination series with a mRNA COVID-19 vaccine.

	• The vaccine dose amount is the same as the previous two mRNA doses received and should be administered at least 28 days after completion of the primary vaccination series.
	• Individuals with the following are considered moderately-to-severely immunocompromised:
	  o Active treatment for solid tumor and hematologic malignancies
	  o Receipt of solid-organ transplant and taking immunosuppressive therapy
	  o Receipt of CAR-T-cell or hematopoietic stem cell transplant (within 2 year so of transplantation or taking immunosuppression therapy)
	  o Moderate or severe primary immunodeficiency (e.g., DiGeorge syndrome, Wiskott-Aldrich syndrome)
	  o Advanced or untreated HIV infection
	  o Active treatment with high-dose corticosteroids (i.e., ≥20mg prednisone or equivalent per day), alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, tumor-necrosis (TNF) blockers, and other biologic agents that are immunosuppressive or immunomodulatory.
	• The additional mRNA COVID-19 vaccine dose does not apply to recipients of the Johnson & Johnson/Janssen COVID-19 vaccine.

What are the differences between the COVID-19 vaccines developed by Pfizer-BioNTech, Moderna, and Johnson & Johnson/Janssen? (Last reviewed/updated on 2021-03-04)	• The COVID-19 vaccines developed by Pfizer-BioNTech and Moderna are based on the mRNA technology and uses a lipid nanoparticle as the delivery vehicle. • The COVID-19 vaccine developed by Johnson & Johnson/Janssen is based on recombinant gene technology that uses a replication-incompetent adenovirus as the delivery vehicle.
Is there a preferred COVID-19 vaccine? (Last reviewed/updated on 2021-04-28)	• Neither CDC nor UHC has a preferred COVID-19 vaccine. • There are no clinical trials that directly compare the COVID-19 vaccines. • Regardless of the reported efficacies of the COVID-19 vaccines, it should be emphasized that all three available COVID-19 vaccines are effective in reducing the number of severe COVID-19 cases, hospitalizations, and deaths due to COVID-19. • Eligible individuals should be encouraged to get whichever COVID-19 vaccine that is readily available to them.
Are there any considerations or precautions that vaccine recipients should be made aware regarding the COVID-19 vaccines? (Last reviewed/updated on 2021-07-05)	• For the mRNA COVID-19 vaccines (Pfizer-BioNTech (Comirnaty®) and Moderna), o All individuals should be counseled about expected local and systemic (non-allergic) symptoms, especially if receiving the second dose and/or history of SARS-CoV-2 infection. It is important to be aware that development of these symptoms following the first dose is not a contraindication to receiving the second dose. These individuals should be encouraged to complete the vaccination series to be optimally protected.

	○ All individuals, especially males aged 12-29 years, should be aware of the **rare** possibility of myocarditis or pericarditis following the vaccination. ACIP reviewed the reported cases and determined that the benefits of vaccination clearly outweigh the risks. Individuals who develop symptoms, such as chest pain, dyspnea, or palpitations, usually within a few days after the second dose, should be advised to seek medical care immediately. • For the Janssen COVID-19 vaccine, ○ Women who are less than 50 years-old should be advised of the increased incidences of thrombosis with thrombocytopenia syndrome (TTS) and offering the choice of another COVID-19 vaccine, i.e., mRNA COVID-19 vaccine, if readily available. ○ Individuals with history of immune-mediated condition associated with thrombosis and thrombocytopenia should be offered one of the mRNA COVID-19 vaccines if they are within at least 90 days after resolution of their illness. • Individuals with contraindications to the mRNA COVID-19 vaccines have a precaution to the Janssen COVID-19 vaccine and vice versa. Consultation with an allergist is strongly advised to determine if the alternative vaccine is safe for administration. • Individuals with history of immediate allergic reactions to other vaccines or injectable therapy should be monitored for 30 minutes after receiving any of the COVID-19 vaccine.
Special Populations Questions	
Can children receive any of COVID-19 vaccines? (Last reviewed/updated on 2021-05-11)	• The FDA has authorized the emergency use of the Pfizer-BioNTech COVID-19 vaccine (Comirnaty®) for ages 12 years through 15 years. Vaccine clinical trials for ages 6 months through 11 years is in progress. • The Moderna vaccine is currently authorized for use for ages 18 years and older. Vaccine clinical trials for ages 6 months through 11 years and 12 through 17 years are in progress. • The Janssen vaccine is currently authorized for use for ages 18 years and older
Should the COVID-19 vaccines be offered to women who are pregnant, planning to be pregnant or breastfeeding? What is the safety profile of the COVID-19 vaccines in this group? (Last reviewed/updated on 2021-08-19)	• COVID-19 vaccination of all eligible women who are pregnant, planning to be pregnant, or breastfeeding is now recommended by CDC and American College of Obstetrics and Gynecology because of the high risk in developing severe illness from COVID-19. • There is substantial evidence that the COVID-19 vaccines are safe to administer in women in this group. • Routine pregnancy testing before vaccination is not recommended.
Should individuals who are immunocompromised, including those with HIV, or receiving immunosuppressive therapy receive the COVID-19 vaccine? What is the safety profile of the vaccines in individuals in this population?	• All eligible immunocompromised individuals should be vaccinated against COVID-19. • Individuals in this population are considered to have higher risk for developing severe illness due to COVID-19.

(Last reviewed/updated on 2021-08-19)	• Individuals who meet the criteria of moderately-to-severely immunocompromised status and completed the vaccination series with one of the two mRNA COVID-19 vaccine should receive an additional vaccine dose, at least 28 days after the last dose. • Serologic antibody testing to confirm immunity is not recommended.
Should individuals with autoimmune diseases receive any of the COVID-19 vaccine? What is the safety profile of the vaccines for individuals in this population? (Last reviewed/updated on 2021-03-05)	• There are limited efficacy and safety data on the COVID-19 vaccines on individuals with autoimmune diseases. • The clinical trials did not report increased recurrence of autoimmune diseases in the trials. • Individuals with autoimmune diseases should still be considered to receive the COVID-19 vaccines unless they have contraindications to vaccination.
Should the COVID-19 vaccine be administered to individuals with history of severe allergies or anaphylaxis? (Last reviewed/updated on 2021-07-06)	• None of the COVID-19 vaccines should be given to individuals with documented history of allergic reaction of any severity or anaphylaxis to a previous dose of the COVID-19 vaccines or to any components of the COVID-19 vaccines unless approved by an allergist. See Figure 1 for the components of the mRNA COVID-19 vaccines. • The Janssen COVID-19 vaccine should not be given to individuals with documented history of allergy to polysorbate unless they have been evaluated and approved by an allergist. See Figure 2 for a list of medications and vaccines containing PEG. • Known polysorbate allergy is no longer a contraindication, but a precaution, to receiving the mRNA COVID-19 vaccines. • Individuals who are allergic to the mRNA COVID-19 vaccines may be considered to receive the Janssen COVID-19 vaccine, and vice versa, after evaluation and approval by an allergist. Administration of the vaccine should be conducted under the supervision of HCP experienced in the management of severe allergic reactions. • The vaccines may be given to individuals regardless of history of allergic reactions of any severity to foods, medications, insects, latex, vaccine, or other injectable therapy except as noted above. However, individuals with allergic reactions to other vaccines or injectable therapies should be monitored for 30 minutes after receiving the COVID-19 vaccine.
Should individuals with history of Guillain-Barre syndrome (GBS) receive the COVID-19 vaccines? (Last reviewed/updated on 2021-03-05)	• GBS has not been reported following vaccination among participants in the mRNA COVID-19 clinical trials. • GBS was reported in one participant in the vaccine group and one participant in the placebo group in the Janssen COVID-19 vaccine clinical trial. • Individuals with history of GBS may receive the COVID-19 vaccine unless they have contraindications to vaccination.

Should individuals with history of multisystem inflammatory syndrome in children (MIS-C) or multisystem inflammatory syndrome in adults (MIS-A) due to COVID-19 receive the COVID-19 vaccine?	• These individuals may choose to be vaccinated.
	• Considerations for vaccination include:
	  ○ Recovery from MIS-C or MIS-A
	  ○ Personal risk of severe acute COVID-19

(Last reviewed/updated on 2021-07-05)	○ Level of community COVID-19 transmission and risk of reinfection ○ Lack of safety data of COVID-19 vaccines following those illnesses ○ Timing of any immunomodulatory therapies • Individuals who choose to do so should delay vaccination until they have recovered from their illness and for 90 days after the diagnosis of MIS-C or MIS
Should individuals with history of myocarditis or pericarditis after the first mRNA COVID-19 vaccine dose receive the second dose? (Last reviewed/updated on 2021-07-05)	• Most experts recommend that individuals who developed myocarditis or pericarditis after the first dose of the mRNA COVID-19 vaccine should defer the second dose. • The administration of the second dose may be considered after reviewing the following: ○ Personal risk of severe acute COVID-19 ○ Level of community transmission and risk of infection ○ Additional data on the risk of myocarditis or pericarditis following vaccination ○ Additional data on the long-term outcomes of myocarditis or pericarditis following vaccination • Those individuals who choose to receive the second dose of an mRNA COVID-19 vaccine should wait at least until their episode of myocarditis or pericarditis has completely resolved.
Should individuals with a history of dermal fillers receive the mRNA COVID-19 vaccine? (Last reviewed/updated on 2021-03-04)	• Yes, if they have no contraindications to receiving the vaccine. No additional precautions are needed.
Other Vaccine-Related Questions	
Can individuals who had COVID-19 and recovered receive any of the COVID-19 vaccines? (Last reviewed/updated on 2021-04-30)	• Yes. Individuals who recovered from COVID-19 are encouraged to receive the vaccine once they have recovered from their illness and met the criteria for discontinuation of isolation. • There is no established recommended interval between infection and vaccination. It is acceptable to delay vaccination up to at least 90 days after infection.
Can individuals who received antibody therapy for the treatment of COVID-19, i.e., monoclonal antibody or convalescent plasma, receive any of the COVID-19 vaccines? (Last reviewed/updated on 2021-03-04)	• Yes. Individuals who received antibody therapy should wait at least 90 days after the treatment before receiving any of the vaccines.
When should the second dose of a mRNA COVID-19 vaccine be given if an individual develops COVID-19 after the first dose? (Last reviewed/updated on 2021-04-30)	• The second dose should be given once the individual has recovered from COVID-19 but still has met the minimum dose interval period recommended by the manufacturer.
If a vaccine recipient developed COVID-19 after the first dose of a mRNA COVID-19 vaccine and received antibody therapy, e.g., convalescent plasma or monoclonal antibody, when should the second dose of the vaccine be given? (Last reviewed/updated on 2021-04-30)	• The second dose of either mRNA COVID-19 vaccine should be given at least 90 days after receiving antibody therapy for COVID-19.

Will antiviral therapy, whether for COVID-19 or other infections, affect COVD-19 vaccination? (Last reviewed/updated on 2021-04-30)	• Individuals who have received antiviral therapy for any reason may receive the COVID-19 vaccine, including the Janssen COVID-19 vaccine, without restrictions.
Should individuals who are acutely ill, including fever alone, receive the COVID-19 vaccine? (Last reviewed/updated on 2021-03-04)	• Individuals who are acutely ill should defer vaccination until they have recovered. • Individuals with fever but without other symptoms should defer vaccination until the fever has resolved. • Individuals with active tuberculosis or being evaluated for tuberculosis may receive the vaccine.
If a vaccine recipient misses the second mRNA COVID-19 vaccine dose, does the vaccination series needs to be restarted? (Last reviewed/updated on 2021-03-08)	• No. The vaccination series does not need to be restarted. • The second dose should be given as soon as possible after missing the recommended time interval.
Are the mRNA COVID-19 vaccines interchangeable? (Last reviewed/updated on 2021-08-03)	• There are no data on the interchangeable use of the two mRNA COVID-19 vaccines. • In general, vaccine recipients should receive the same mRNA vaccine for both doses.
What are the options for vaccine recipients who are unable to get the same mRNA vaccine they received for the first dose for their second dose? (Last reviewed/updated on 2021-08-03)	• If the original mRNA COVID-19 vaccine used first dose of the vaccination series is not readily available, you may wait up to 6 weeks after the first dose to administer the second dose of the same product. • If the original mRNA COVID-19 vaccine cannot be determined or is no longer available, then another mRNA COVID-19 vaccine may be administered to complete the vaccination series if there are 28 days between both doses. • In exceptionally rare situations where vaccine recipients are not able to complete the mRNA COVID-19 vaccination series with the same or a different mRNA COVID-19 vaccine, e.g., the vaccine not being available or contraindication to receiving any mRNA COVID-19 vaccine, a single dose of the Janssen COVID-19 may be considered at a minimum interval of 28 days from the first mRNA COVID-19 dose.
Do the vaccines have any reported interactions with other medications or therapy? (Last reviewed/updated on 2021-03-04)	• There are no known medication or vaccine interactions with any of the COVID-19 vaccines.
Should any of the COVID-19 vaccines be co-administered or administered around the same time as other vaccines? (Last reviewed/updated on 2021-05-11)	• The COVID-19 vaccines may be near the same time or co-administered with other vaccines.
When should individuals who are receiving immune-based therapy, e.g., allergy shots and infusion of biologics, receive the COVID-19 vaccine? (Last reviewed/updated on 2021-03-07)	• There are limited clinical data to determine if the efficacy of any of the COVID-19 vaccines are affected by immune-based therapy. As such, it may be good practice to administer the vaccine and immune-based treatments at least 48 hours apart to help avoid confusion if a potential adverse reaction occurs.
What concomitant medications or diseases may inhibit or prevent the COVID-19 vaccines from inducing immune response?	• The following populations may have reduced or lack of immune response to the COVID-19 vaccines: o Immunodeficiencies involving adaptive immunity

(Last reviewed/updated on 2021-08-19)	○ Asplenia ○ B-cell directed therapy ○ T-cell directed therapy ○ Many chemotherapy regimens ○ Hematopoietic cell transplantation ○ Underlying aberrant immunity, e.g., graft-vs.-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia, lymphopenia ○ High-dose corticosteroids, ≥20 mg per dose or >2 mg/kg/d daily of prednisone or equivalent • Regardless, all eligible immunocompromised and immunosuppressed individuals should be vaccinated against COVID-19. • If possible, it is suggested that immunosuppressive therapies are deferred until at least 2 weeks after completing the vaccination series.
Will vaccinated individuals be able to travel by air internationally to the US without the need to be tested for SARS-CoV-2 prior to departure? (Last reviewed/updated on 2021-03-04)	• CDC has not listed vaccination as an acceptable alternative to a negative SARS-CoV-2 test result to meet the requirement to allow entry into the U.S. • Individuals who are planning to travel internationally will be required to have proof of a negative SARS-COV-2 test that is performed up to 3 days prior to their departure to the U.S. • Recovered individuals with previous diagnosis of COVID-19 within 90 days of departure and met the criteria to end isolation do not need to be tested but will require "documentation of recovery" from public health or a healthcare provider stating that that they have recovered with a copy of the test result attached.
Will the COVID-19 vaccines affect SARS-CoV-2 test results? (Last reviewed/updated on 2021-03-04)	• Vaccination will not affect the results of molecular diagnostic tests, i.e., PCR- or antigen-based tests. • Serologic anti-SARS-CoV-2 antibody tests against the spike (S) protein, however, will be positive in vaccinated individuals.
Should serologic antibody tests be performed after completing the vaccination series to ensure immunity? (Last reviewed/updated on 2021-02-07)	• Routine serologic testing for anti-SARS-CoV-2 antibodies to confirm vaccine-induced immunity is not recommended at this time.
How should fully vaccinated individual be evaluated for possible past infection with SARS-CoV-2? (Last reviewed/updated on 2021-03-05)	• Fully vaccinated individuals may be assessed for past infection with SARS-CoV-2 by serologic tests that specifically detect anti-SARS-CoV-2 nucleocapsid (N) protein antibody. • The use of tests that detect anti-SARS-CoV-2 spike (S) protein antibody will not differentiate between immunity from natural infection and vaccine.
When should individuals who are receiving the COVID-19 vaccine undergo screening for tuberculosis? (Last reviewed/updated on 2021-03-05)	• The use of either tuberculin skin test (TST) or interferon gamma releasing assay (IGRA) for administrative purposes, e.g., new employee screening, should be performed before or during the same encounter as the administration of the Johnson & Johnson/Janssen COVID-19 vaccine or first dose of a mRNA COVID-19 vaccine. Furthermore, the use

	of these tests in individuals who are in the midst of or completed their vaccination should be deferred until at least 4 weeks after the completion of vaccination. • The use of either TST or IGRA for medical care, e.g., contact investigation after exposure to active pulmonary tuberculosis or required screening before starting immunomodulating therapy, when less than 4 weeks after the completion of vaccination is at the discretion of the responsible medical provider. If a test is performed during this period which was found to have a negative result, it is recommended that the individual is retested at least 4 weeks after the completion of vaccination. • Nota Bene: individuals with symptoms or findings suggestive of active pulmonary tuberculosis should undergo further medical evaluation, such as chest radiograph and sputum AFB culture, rather than using TST or IGRA.
Vaccine Administration Error/Deviation Questions	
If the vaccine was administered in the incorrect site, i.e., site other than the deltoid or anterolateral thigh, what should be done? (Last reviewed/updated on 2021-03-05)	• Do not repeat dose. • Inform the vaccine recipient for the potential of local and systemic adverse events.
If the vaccine was administered via the incorrect route, e.g., subcutaneous, what should be done? (Last reviewed/updated on 2021-03-05)	• Do not repeat dose. • Inform the vaccine recipient for the potential of local and systemic adverse events.
If the vaccine was administered to someone who did not meet the age requirement, i.e., age younger than what was approved for use, what should be done? (Last reviewed/updated on 2021-05-14)	• If the recipient is less than 12 years old, do not administer additional doses. • If the recipient is between 12 to 17 years old and received a COVID-19 vaccine other than the one developed by Pfizer-BioNTech: o If the first dose administered was the Moderna vaccine, you may administer the Moderna vaccine as the second dose (as off-label use). o If the first dose administered was the Janssen vaccine, do not repeat dose with the Pfizer-BioNTech vaccine (Comirnaty®).
If a vaccine recipient was administered the second mRNA COVID-19 vaccine dose earlier than the 4-day grace period from the recommended interval time, what should be done? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose or restart vaccination series. • The vaccine recipient should be considered vaccinated at this point.
If the vaccine recipient has not yet received the second dose of mRNA COVID-19 vaccine 42 days after the first dose, what should be done? (Last reviewed/updated on 2021-03-07)	• Administer the second dose of the vaccine as soon as possible, preferably with the same vaccine as the first dose. • The vaccination series does not need to be restarted. • This also applies to individuals who received the first dose and developed COVID-19 and was treated with antibody therapy before receiving the second dose.
If the vaccine recipient was inadvertently administered two different mRNA COVID1-9 vaccines during the vaccination series, what should be done? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose. • The vaccination series does not need to be restarted. • This individual is to be considered vaccinated.

If the vaccine recipient was administered higher-than-authorized vaccine dose or volume, what should be done? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose. • Inform the vaccine recipient of potential for local and systemic adverse reactions.
If a vaccine recipient was administered lower-than-authorized vaccine dose or volume, e.g., leaked out, syringe failure, etc., what should be done? (Last reviewed/updated on 2021-03-07)	• If at least half of the dose was administered, do not repeat dose. • If less than half of the dose was administered, or unable to assess the volume administered, then repeat the full dose in the opposite arm. • There is no change in dosing interval, if the action performed is the first dose.
If a vaccine recipient was administered the vaccine dose without diluent, what should be done (Pfizer-BioNTech only)? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose. • Inform the vaccine recipient of potential for local systemic adverse reactions.
When should I contact the vaccine manufacturer for more information and instructions? (Last reviewed/updated on 2021-03-07)	• When the vaccine administered was improperly stored and handled. • When the vaccine administered was past the expiration/beyond use date. • When the incorrect diluent type was used. If the manufacturer recommends repeating the vaccine dose, the repeat dose should be administered immediately in the opposite arm.
If a vaccine recipient was administered a COVID-19 vaccine within 14 days of receiving another (non-COVID-19) vaccine(s), what should be done? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose. • Do not restart vaccination series.
If a vaccine recipient was administered a COVID-19 vaccine within 90-days of receiving antibody therapy for the treatment of COVID-19, what should be done? (Last reviewed/updated on 2021-03-07)	• Do not repeat dose. • If it was the dose of vaccine was the first in the vaccination series, please wait 90 days after receiving the antibody therapy before administering the second dose.
Vaccination Benefits Questions	
When are vaccine recipients considered fully vaccinated? (Last reviewed/updated on 2021-04-30)	• Vaccine recipients are considered fully vaccinated 2 weeks after completing the vaccination series of either mRNA COVID-19 vaccines or one dose of the Janssen COVID-19 vaccine. • Those did not complete the vaccination series for any reason are not considered fully vaccinated.
What are the medical benefits of vaccination? (Last reviewed/updated on 2021-04-28)	• All three COVID-19 vaccines significantly reduce the risk of developing symptomatic COVID-19. • All three COVID-19 vaccines significantly reduce the risk of developing severe illness, hospitalization, and death due to COVID-19.
Can vaccinated individuals still develop COVID-19? (Last reviewed/updated on 2021-04-26)	• It is still possible for vaccinated individuals to get infected by SARS-CoV-2 and develop COVID-19.

	• The risk, however, of developing symptomatic COVID-19 is significantly lower, even after the first dose. • Fully vaccinated individuals who test positive for SARS-CoV-2, either PCR or antigen, should have a specimen submitted to Montana Public Health Laboratory for whole genome sequencing to detect the presence of a SARS-CoV-2 variant of concern. Additionally, these cases should also be reported to VAERS.
Are the current COVID-19 vaccines effective against the reported variants of concern, i.e., Alpha (B.1.1.7), Beta (B.1.135), Delta (B.1.617.2), and Gamma (P.1)? (Last reviewed/updated on 2021-08-19)	• The effectiveness of all FDA-authorized COVID-19 vaccines is preserved against all variants that are circulating in the U.S. • It is expected that cases of COVID-19 will occur in those who are fully vaccinated (breakthrough infections) are immunologic responses may be variable depending on underlying factors, e.g., immunocompromised status. The overall number of these cases, however, is small.
Will vaccination prevent asymptomatic COVID-19? (Last reviewed/updated on 2021-08-19)	• A number of studies suggest that vaccination reduces of incidence of asymptomatic infections. • It is still important, however, to emphasize that infection with SARS-CoV-2 can still occur after vaccination, especially with the Delta variant. Therefore, it is important to encourage the continued use of facemasks and physical distancing while in public of all fully vaccinated individuals.
Will vaccination prevent transmission of SARS-CoV-2? (Last reviewed/updated on 2021-04-26)	• There are limited data to suggest that vaccination may help decrease the transmission of SARS-CoV-2. • At present, it is still important that vaccinated persons continue to follow transmission-based mitigation and prevention practices.
What is the expected duration of immunity of fully vaccinated individuals? (Last reviewed/updated on 2021-08-19)	• There are several factors that influences the durability of the immunity derived from vaccination, such as age, underlying medical conditions, and impaired immune response. • Preliminary data seem to indicate the presence of neutralizing antibodies at least 6 months post vaccination in most individuals. • Studies suggest that antibody titers do appear to wane over time but still remain effective against severe illness, hospitalizations, and death due to COVID0-19.
Infection Prevention & Control	
Should the COVID-19 vaccine be given after an exposure to known SARS-CoV-2 infection or during an outbreak to prevent infection? (Last reviewed/updated 2021-03-05)	• It is not recommended to administer the COVID-19 vaccine as post-exposure prophylaxis or management of an outbreak because the incubation period of SARS-CoV-2 infection is shorter than the immune response to the vaccine.
What can fully vaccinated individuals safely do? (Last reviewed/updated on 2021-08-19)	• Because of the rapid spread of the Delta variant, all individuals regardless of their vaccination status should continue to wear facemasks while in indoor public settings in areas of substantial or high level of transmission of SARS-CoV-2.

	• In most outdoor settings, most fully vaccinated individuals do not need to wear facemasks. Facemasks should be worn, however, in large group settings. • Immunocompromised or immunosuppressed are also strongly encouraged to use facemasks and practice physical distancing while in public. • Facemask use is still required for who those individuals traveling via public transportation, regardless of vaccination status. • They are not required to be tested before or after travel, or self-quarantine after domestic travel. • They can refrain from testing before leaving the US. for international travel (unless required by the destination) and refrain from self-quarantine after arriving back in the US. They are, however, still required to have a negative SARS-CoV-2 test performed no more than 3 days prior to boarding a departure flight to the US.
What should fully vaccinated individuals continue to do? (Last reviewed/updated on 2021-05-14)	• They should get tested if experiencing COVID-19 symptoms. • They should follow CDC and state/local health department travel requirements and recommendations.
Are fully vaccinated individuals still required to be quarantined if they are exposed to suspected or known COVID-19 cases? (Last reviewed/updated on 2021-08-19)	• CDC does not require any fully vaccinated individuals who are exposed to suspected or confirmed cases of COVID-19 to be quarantined if they remain asymptomatic. They should, however, be advised to monitor for symptoms for 14 days after the last exposure event. Additionally, they should be tested 3-5 days after exposure.
Are vaccinated individuals still required to be isolated if diagnosed with COVID-19? (Last reviewed/updated on 2021-04-26)	• Yes. All individuals diagnosed with COVID-19 are required to be isolated for the recommended duration, regardless of their vaccination status.
If individuals who have positive results with either PCR- or antigen-based tests after vaccination, should the results be considered as false-positive? (Last reviewed/updated on 2021-04-26)	• Vaccination does not affect the results of any PCR- or antigen-based tests. • Individuals who have received the any of the vaccines and have positive results from either test should be considered infected.
Vaccine-Related Adverse Reactions	
Should vaccine recipients who developed allergic reactions to a prior COVID-19 vaccine be given the second dose? (Last reviewed/updated on 2021-03-05)	• Individuals who had immediate allergic reaction of any severity, including anaphylaxis, to a previous dose of a COVID-19 vaccine should not receive the second dose until they have been evaluated and approved to receive the vaccine by an allergist.
Should individuals who developed significant systemic (non-allergic) symptoms following the first of an mRNA COVID-19 vaccine receive the second dose? (Last reviewed/updated on 2021-07-05)	• Unless the symptoms are related to anaphylaxis or an immediate allergic reaction, the development of these symptoms are not considered to be contraindication to receiving the second dose of mRNA COVID-19 vaccine. • Individuals who developed significant symptoms should be encouraged to receive the second dose of the mRNA COVID-19 vaccine to be maximally protected.
If a vaccine recipient is unable to complete the vaccination series due to a contraindication, e.g., severe allergic reaction	• In these individuals, a single dose of the Janssen COVID-19 vaccine may be considered at a minimal interval of 28 days from the mRNA COVID-19 vaccine dose.

to a prior dose of either mRNA vaccines, is there another option to fully vaccinate against COVID-19? (Last reviewed/updated on 2021-04-30)	• If this option is employed, these individuals will be considered to vaccinated based on receiving the Janssen COVID-19 vaccine instead of a mixed vaccination series.
What is the safety profile of the COVID-19 vaccines? (Last reviewed/updated on 2021-08-19)	• Over 200 million doses of the COVID-19 vaccines have been given since the vaccinated efforts have been started. The incidence of severe adverse reactions, e.g., anaphylaxis, TTS, myocarditis/pericarditis, is rare. • Most adverse reactions are related to vaccine reactogenicity.
What are the commonly reported adverse reactions to the COVID-19 mRNA vaccines? (Last reviewed/updated on 2021-03-05)	• Reactogenicity commonly reported to v-safe include pain at the injection site, fatigue, headache, muscle ache, chills, fever, joint pain, and nausea. • Adverse events commonly reported to VAERS for the Pfizer-BioNTech COVID-19 vaccine include headache, fatigue, dizziness, nausea, chills, fever, pain, injection site pain, pain in extremity, and dyspnea. • Adverse events commonly reported to VAERS for the Moderna COVID-19 vaccine include headache, fever, chills, pain, dizziness, fatigue, nausea, injection site pain, pain in extremity, and dyspnea. • Vaccine recipients should also be advised that self-limiting lymphadenopathy following vaccination has been reported. • Most adverse reactions last about 1-2 days but usually not more than 3 days.
What are the commonly reported adverse reactions to the Janssen COVID-19 vaccine? (Last reviewed/updated on 2021-03-05)	• Most adverse reactions with this vaccine are mild to moderate in severity. • Injection site pain is the most common injection site reaction, followed by erythema and swelling. All reactions resolve in 2-3 days • Common systemic adverse events include (in decreasing frequency) fatigue, headache, myalgia, nausea, and fever. Most vaccine recipients will experience at least one adverse event. All reactions resolve in 1-2 days.
How should most of the commonly reported adverse reactions be managed? (Last reviewed/updated on 2021-03-05)	• The commonly reported adverse reactions can be managed as needed with either NSAIDs or acetaminophen. • Because of some concerns that vaccine efficacy may be affected by these medications, prophylactic use of NSAIDs or acetaminophen to prevent post-vaccination symptoms is not recommended at this time. • Additionally, prophylactic use of antihistamine to prevent allergic reactions is not recommended as they may mask symptoms of hypersensitivity reactions.
What should be done if a vaccine recipient has persistent reaction symptoms? (Last reviewed/updated on 2021-02-07)	• Since infection with SARS-CoV-2 may still occur, vaccine recipients with persistent fever, fatigue, headache, muscle ache, joint pain, or diarrhea should be evaluated and ruled out for COVID-19.
What should be done if vaccine recipients develop symptoms that are not listed on the commonly reported vaccine-related adverse reactions?	• Vaccine recipients who developed symptoms should be evaluated for other causes of their symptoms. If no obvious cause has been identified, the symptoms should be reported as a possible vaccine-related adverse reaction.

(Last reviewed/updated on 2021-02-07)	• Individuals who report respiratory symptoms, anosmia and/or dysgeusia should be ruled out for infection with SARS-CoV-2.
Should vaccine recipients who developed delayed-onset local reaction after the first mRNA COVID-19 vaccine dose avoid receiving the second vaccine dose? (Last reviewed/updated on 2021-03-05)	• Delayed-onset local reaction may include erythema, induration, pruritis, and pain that occur on the same arm where the vaccine was administered. It may present as early as few days and through the second week after the injection. This reaction seems to occur more commonly with Moderna mRNA COVID-19 vaccine. • Development of this reaction after the first dose of mRNA COVID-19 vaccine is not considered a precaution or contraindication to receiving the second vaccine dose, preferably given in the opposite arm. • The symptoms are usually self-limited and may be managed with analgesics.
Are the COVID-19 vaccines associated with increased incidence in Bell's palsy? (Last reviewed/updated on 2021-03-05)	• Although cases of Bell's palsy have been reported during the clinical trials of the COVID-19 vaccines, CDC considers the incidence of Bell's palsy of vaccine recipients similar to that of the expected incidence in the general public. Thus, they do not feel that the reported cases are vaccine-related.
How should reactions to dermal fillers be managed? (Last reviewed/updated on 2021-02-07)	• Vaccine-related reactions involving dermal fillers are temporary and may be managed oral corticosteroids and diphenhydramine (Benadryl).
Are there any reported cases of hypersensitivity or anaphylaxis to the vaccines? (Last reviewed/updated on 2021-03-05)	• Yes, but they are rare. • The reported incidences are 5 cases/1M doses administered for Pfizer-BioNTech vaccine and 2.8 cases/1M doses administered for Moderna vaccine. • For the Johnson & Johnson/Janssen COVID-19 vaccine, the clinical trial reported 77 cases out of 21,895 participants in the vaccine group while 65 cases out of 21,888 participants were reported. None of the reported cases were due to anaphylaxis.
Should vaccine recipients who had hypersensitivity or anaphylaxis to the first dose receive the second dose? (Last reviewed/updated on 2021-03-05)	• These individuals should be referred to an allergist to for further evaluation to determine if the reaction was related to the vaccine. If the individuals are unable to be evaluated by an allergist, they should not receive the second dose of vaccine.
How should vaccine-related adverse reactions be reported? (Last reviewed/updated on 2021-03-05)	• For individuals who received their vaccine at Billings Clinic, providers are asked to enter all adverse reactions into Safety Net. • For all others, all adverse reactions should be entered into the Vaccine Adverse Events Reporting System (VAERS) at https://vaers.hhs.gov/.
Can vaccine recipients self-report adverse reactions? (Last reviewed/updated on 2021-03-05)	• Yes. All vaccine recipients are encouraged to register with v-safe at https://vsafe.cdc.gov/ to report adverse reactions.
Common COVID-19 Vaccine Myths	
The COVID-19 vaccines cannot be trusted because their development was rushed.	• The pharmaceutical companies were able to develop the COVID-19 vaccines because of the worldwide effort. • All three COVID-19 vaccines were developed based on existing technology. Their effectiveness and safety profile have been established prior to the development of the COVID-19 vaccines.

The COVID-19 vaccines can make me sick with COVID-19.	• None of the available vaccines contain SARS-CoV-2. Therefore, the vaccine cannot cause COVID-19.
The COVID-19 vaccines can alter my DNA.	• The mRNA in the Pfizer-BioNTech and Moderna vaccines do not enter the cell nucleus. It is quickly degraded after entering the cells. • The DNA in the Janssen vaccine is not able to integrate into the host cell DNA.
The COVID-19 vaccines can affect fertility.	• There is no evidence during animal trials that the vaccines affect fertility. • Observational studies have not demonstrated that the vaccines affect fertility.
Since some observational studies have shown substantial immunity after the first dose of mRNA vaccines, a second dose is not necessary.	• We do not know the long-term efficacy of either mRNA vaccines as the clinical trials only evaluated two-dose regimens. • The efficacy of the Pfizer-BioNTech mRNA COVID-19 vaccine against the Delta variant is about 44% after one dose but increases to >90% after the second dose. • Therefore, everyone who are receiving a mRNA vaccine should get both doses. • To be deemed fully vaccinated, recipients of the mRNA vaccine must receive two doses.
Because the survival rate is so high, vaccination is not needed.	• Although the death rates from COVID-19 is still around 1.5%, the number of individuals hospitalized for moderate to severe COVID-19 can be high and overwhelm the capacity of many hospitals. • Vaccination can help to reduce the likelihood of hospitalization. • Vaccination can help the development of severe disease. • Vaccination can potentially help the spread of the disease to others who are likely to develop severe disease.
After vaccination, face coverings and physical distancing are not needed.	• Preventative measures are needed because the vaccine is not 100% effective against developing COVID-19. • Until the effectiveness of the vaccines against the variants of concern have been established, it is wise to continue all preventative measures.
If someone had COVID-19, the vaccine is not needed because they will already have immunity.	• If eligible and there are no contraindications, everyone should receive the COVID-19 regardless of prior history of COVID-19. • Re-infection, particularly with variants of concern, has been reported.
Immunity through natural infection is always better than through vaccination.	• Although for infections, this may be the case. For other infections, such as measles, a vaccine provides better protection. • Immunity through vaccination is much safer than through natural infection. • Vaccination also do not have the post-infection complications like some natural infections may have, e.g., chickenpox and shingles.
The side effects of the COVID-19 vaccines are severe and serious.	• Most reported vaccine-related symptoms are mild to moderate and well tolerated. • Although hypersensitivity reactions have been reported, they are rare. • Clinical trials demonstrated very few serious adverse events.
The COVID-19 vaccines contain controversial substances.	• The vaccines do not contain implants, microchips, tracking devices, or fetal tissue.

If a vaccine recipient had a “bad reaction” to the first mRNA vaccine, the second dose should not be given.	• Unless the recipient experienced a reaction that was deemed to be a contraindication for the second dose by an allergist, the second dose should be given.
Those with egg allergy should not receive the vaccine.	• None of the COVID-19 vaccines do contain egg or are developed from eggs.

Figure 1. Components of mRNA COVID-19 vaccines.

Description	Pfizer-BioNTech (mRNA)	Moderna (mRNA)	Janssen (viral vector)
Active ingredient	Nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2	Nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2	Recombinant, replication-incompetent Ad26 vector, encoding a stabilized variant of the SARS-CoV-2 Spike (S) protein
Inactive ingredients	2[(polyethylene glycol (PEG))-2000]-N,N-ditetradecylacetamide	PEG2000-DMG: 1,2-dimyristoyl-rac-glycerol, methoxypolyethylene glycol	Polysorbate-80
	1,2-distearoyl-sn-glycero-3-phosphocholine	1,2-distearoyl-sn-glycero-3-phosphocholine	2-hydroxypropyl-β-cyclodextrin
	Cholesterol	Cholesterol	Citric acid monohydrate
	(4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)	SM-102: heptadecan-9-yl 8-((2-hydroxyethyl) (6-oxo-6-(undecyloxy) hexyl) amino) octanoate	Trisodium citrate dihydrate
	Sodium chloride	Tromethamine	Sodium chloride
	Monobasic potassium phosphate	Tromethamine hydrochloride	Ethanol
	Potassium chloride	Acetic acid	
	Dibasic sodium phosphate dihydrate	Sodium acetate	
	Sucrose	Sucrose	

* None of the vaccines contain eggs, gelatin, latex, or preservatives. All COVID-19 vaccines are **free from metals** such as iron, nickel, cobalt, lithium, rare earth alloys or any manufactured products such as microelectronics, electrodes, carbon nanotubes, or nanowire semiconductors.
Note: Both the Pfizer-BioNTech and Moderna COVID-19 vaccines contain polyethylene glycol (PEG). PEG is a primary ingredient in osmotic laxatives and oral bowel preparations for colonoscopy procedures, an inactive ingredient or excipient in many medications, and is used in a process called "pegylation" to improve the therapeutic activity of some medications (including certain chemotherapeutics). Additionally, cross-reactive hypersensitivity between PEG and polysorbates (included as an excipient in some vaccines and other therapeutic agents) can occur. Information on active or inactive ingredients for vaccines and medications can be found in the package insert. CDC's vaccine excipient summary and the National Institutes of Health DailyMed database can also be used as a resource.

Adapted from https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html

Figure 2. List of medications and vaccines reported to contain polysorbate or PEG.

TABLE II. Polysorbate and PEG excipients in select vaccines[12]

Excipient	Vaccine type	Vaccine	Amount per dose
Polysorbate 20	Influenza	Flublok&Flublock quad	≤27.5 µg (Tween20)
Polysorbate 20	Hepatitis A	Havrix	0.05 mg/mL
Polysorbate 20	Hepatitis A&B	Twinrix	Unknown
Polysorbate 20*	SARS-CoV-2 (Sanofi)		
Polysorbate 80	Tdap	Boostrix	≤100 µg (Tween 80)
Polysorbate 80	Influenza	Fluad	1.175 mg
Polysorbate 80	Influenza	Fluarix quad	≤0.055 mg (Tween 80)
Polysorbate 80	Influenza	Flucelvax quad	≤1500 µg (Tween 80)
Polysorbate 80	Influenza	Flulaval Quad	≤887 µg
Polysorbate 80	HPV	Gardasil and Gardasil -9	50 µg
Polysorbate 80	Hepatitis B	Heplisav-B	0.1 mg/mL
Polysorbate 80	DTaP	Infanrix	≤100 µg (Tween 80)
Polysorbate 80	Japanese encephalitis	JE-Vax	<0.0007%
Polysorbate 80	DTaP + IPV	Kinrix	≤100 µg (Tween 80)
Polysorbate 80	DTaP + HepB + IPV	Pediarix	≤100 µg (Tween 80)
Polysorbate 80	Pneumococcal 13-valent	Prevnar 13	100 µg
Polysorbate 80	DTaP + IPV	Quadracel	10 ppm
Polysorbate 80	Rotavirus	RotaTeq	?
Polysorbate 80	Zoster	Shingrix	0.08 mg
Polysorbate 80	Meningococcal group B	Trumenba	0.018 mg
Polysorbate 80	DTaP + IPV + HepB + Hib	Vaxelis	<0.0056%
Polysorbate 80*	SARS-CoV-2 (AstraZeneca) SARS-CoV-2 (Johnson & Johnson)		
PEG2000	SARS-CoV-2 (Moderna) SARS-CoV-2 (Pfizer)		

TABLE III. Common injectable medications containing PEG[14]

Generic name (brand name)	Molecular weight	General description
Methylprednisolone acetate (Depo-Medrol)	PEG 3350	An anti-inflammatory glucocorticoid for intramuscular, intra-articular, soft tissue or intralesional injection
Methoxy polyethylene glycol-epoetin beta (Micera)	30-kD methoxy PEG butanoic acid	Used to treat anemia in adults with chronic kidney disease
Pegfilgrastim (Neulasta)	20-kD monomethoxy PEG	Used to help reduce the chance of infection due to a low white blood cell count, in people with certain types of cancer (nonmyeloid), who receive anticancer medicines (chemotherapy) that can cause fever and low white blood cell count
Medroxyprogesterone acetate (Depo-Provera)	PEG 3350	Contraceptive and adjunctive therapy and palliative treatment of inoperable, recurrent, and metastatic endometrial or renal carcinoma
Brilliant Blue G Ophthalmic Solution (TissueBlue)	PEG 3350	Disclosing agent indicated to selectively stain the internal limiting membrane
Sulfur hexafluoride (Lumason)	PEG 4000	Ultrasound contrast agent
Biomatoprost implant (Durysta)	PEG, unspecified	Reduction of intraocular pressure in patients with open-angle glaucoma or ocular hypertension
Trastuzumab (Herceptin, Herzuma, Kanjinti, Ogivri, Ontruzant)	PEG 3350	Adjuvant treatment of HER2 overexpressing node-positive or node-negative breast cancer
Rilonacept (Arcalyst)	PEG 3350	IL-1 blocker for treatment of cryopyrin-associated periodic syndromes
Perflutren lipid microsphere (Definity)	PEG 5000	Contrast agent used to brighten and clarify images of the heart during echocardiograms

TABLE IV. Common injectable medications containing polysorbate

Drug class	Generic name (brand name)	Polysorbate
Antiarrhythmic	Amiodarone hydrochloride (generics only)	Polysorbate 80
Antidiabetic	Exenatide (Bydureon Bcise)	Polysorbate 20
	Insuline glargine (Lantus, Semglee)	Polysorbate 20
	Insuline glulisine (Apidra)	Polysorbate 20
	Dulaglutide (Trulicity)	Polysorbate 80
Antidote	Hyaluronidase (Hylenex Recombinant)	Polysorbate 80
Antifungal	Anidulafungin (Eraxis)	Polysorbate 80
Anti-inflammatory	Interferon beta 1a (Avonex, Plegridy)	Polysorbate 20
	Omalizumab (Xolair)	Polysorbate 20
Antineoplastic	Ofatumumab (Kesimpta)	Polysorbate 80
	Siltuximab (Sylvant)	Polysorbate 80
Antipsychotic	Paliperidone palmitate (Invega Trinza, Invega Sustenna)	Polysorbate 20
	Aripiprazole lauroxil (Aristada)	Polysorbate 20
Antiretroviral	Ibalizumab (Trogarzo)	Polysorbate 80
Antipsoriatic	Adalimumab (Humira, Imraldi)	Polysorbate 20 (Imraldi)/ Polysorbate 80 (Humira)
	Golimumab (Simponi)	Polysorbate 80
	Guselkumab (Tremfya)	Polysorbate 80
	Infliximab - dyyb (Inflectra, Remicade, Renflexis)	Polysorbate 80
	Ustekinumab (Stelara)	Polysorbate 80
Antiviral	Interferon alfa-2b (Intron A)	Polysorbate 80
Biological response modifier	Interferon gamma-1b (Actimmune)	Polysorbate 20
Cancer treatment	Ado-trastuzumab emtansine (Kadcyla)	Polysorbate 20
	Atezolizumab (Tecentriq)	Polysorbate 20
	Avelumab (Bavencio)	Polysorbate 20
	Bevacizumab (Avastin, Zirabev)	Polysorbate 20
	Daratumumab/hyaluronidase (Darzalex Faspro)	Polysorbate 20
	Denosumab (Prolia, Xgeva)	Polysorbate 20
	Dinutuximab (Unituxin)	Polysorbate 20
	Enfortumab (Padcev)	Polysorbate 20
	Olaratumab (Lartruvo)	Polysorbate 20
	Palifermin (Kepivance)	Polysorbate 20
	Pertuzumab/trastuzumab/hyaluronidase (Phesgo)	Polysorbate 20
	Polatuzumab vedotin (Polivy)	Polysorbate 20
	Tafasitamab (Monjuvi)	Polysorbate 20
	Trastuzumab (Herceptin, Herceptin Hylecta, Herzuma, Kanjinti, Ontruzant, Trazimera)	Polysorbate 20
	Belantamab (Blenrep)	Polysorbate 80
	Brentuximab vedotin (Adcetris)	Polysorbate 80
	Cemiplimab (Libtayo)	Polysorbate 80
	Docetaxel (Taxotere)	Polysorbate 80
	Durvalumab (Imfinzi)	Polysorbate 80
	Elotuzumab (Empliciti)	Polysorbate 80
	Etoposide (Toposar, VePesid)	Polysorbate 80
	Fam-trastuzumab deruxtecan (Enhertu)	Polysorbate 80
	Fosaprepitant dimeglumine (EMEND, Fosaprepitant)	Polysorbate 80
	Inotuzumab ozogamicin (Besponsa)	Polysorbate 80
	Ipilimumab (Yervoy)	Polysorbate 80
	Isatuximab (Sarclisa)	Polysorbate 80
	Mogamulizumab (Poteligeo)	Polysorbate 80
	Moxetumomab pasudotox (Lumoxiti)	Polysorbate 80
	Nivolumab (Opdivo)	Polysorbate 80
	Ofatumumab (Arzerra)	Polysorbate 80
	Pembrolizumab (Keytruda)	Polysorbate 80

TABLE IV. *(Continued)*

Drug class	Generic name (brand name)	Polysorbate
	Ramucirumab (Cyramza)	Polysorbate 80
	Rituximab (Truxima, Rituxan, Ruxience)	Polysorbate 80
	Rituximab and hyaluronidase (Rituxan Hycela)	Polysorbate 80
	Temsirolimus (Torisel)	Polysorbate 80
	Temozolomide (Temodar)	Polysorbate 80
Contraceptive	Medroxyprogesterone acetate (Depo-Provera, Depo-Provera CI, Depo-subQ provera 104)	Polysorbate 80
Corticosteroid	Methylprednisolone acetate (Depo-Medrol)	Polysorbate 80
	Triamcinolone acetonide (Aristocort Forte, Aristospan, Kenalog-40, Kenalog-10, Protherix, Triesence, Triloan Suik, Triloan II Suik, Zilretta)	Polysorbate 80
Diagnostic	Sincalide (Kinevac)	Polysorbate 20
	Tuberculin purified protein derivative (Aplisol, Tubersol)	Polysorbate 80
Disease-modifying antirheumatic drug	Anakinra (Kineret)	Polysorbate 80
	Tocilizumab (Actemra)	Polysorbate 80
Enzyme	Velaglucerase alfa (Vpriv)	Polysorbate 20
	Imiglucerase (Cerezyme)	Polysorbate 80
	Taliglucerase alfa (Elelyso)	Polysorbate 80
Erythoid maturation agent	Luspatercept (Reblozyl)	Polysorbate 80
Factor Xa inhibitor antidote	Coagulation factor Xa (recombinant), inactivated-zhzo (Andexxa)	Polysorbate 80
Gonadotropin	Follitropin (Menopur, Follistim)	Polysorbate 20
Growth hormone analog	Somatropin (Nutropin AQ Nuspin 5)	Polysorbate 20
Hematopoietic growth factor	Erythropoietin (Retacrit)	Polysorbate 20
	Pegfilgrastim (Fulphila, Neulasta, Nyvepria, Udenyca)	Polysorbate 20
	Romiplostim (Nplate)	Polysorbate 20
	Darbepoetin alfa (Aranesp)	Polysorbate 80
	Filgrastim (Neupogen, Nivestym, Granix, Zarxio)	Polysorbate 80
Hepatitis B/Hepatitis C agent	Peginterferon (Pegasys Pegintron)	Polysorbate 80
Hemostatic	Vitamin K (Phytonadione)	Polysorbate 80
Immune globulin	Hepatitis B immune globulin (HepaGam B, Nabi-HB)	Polysorbate 80
	Rho (d) immune globulin (WinRho)	Polysorbate 80
Immunomodulator	Interferon beta-1a (Avonex, Avonex Pen)	Polysorbate 20
	Emapalumab (Gamifant)	Polysorbate 80
Immunosuppressant	Mycophenolate mofetil (Cellcept IV)	Polysorbate 80
Inflammatory bowel disease agent	Vedolizumab (Entyvio)	Polysorbate 80
Interleukin inhibitor	Sarilumab (Kevzara)	Polysorbate 20
	Dupilumab (Dupixent)	Polysorbate 80
	Mepolizumab (Nucala)	Polysorbate 80
	Secukinumab (Cosentyx)	Polysorbate 80
	Tildrakizumab -asmn (Ilumya)	Polysorbate 80
Kallikrein inhibitor	Lanadelumab (Takhzyro)	Polysorbate 80
Leptin analog	Metreleptin (Myalept)	Polysorbate 20
Macular degeneration agent	Aflibercept (Eylea)	Polysorbate 20
	Ranibizumab (Lucentis)	Polysorbate 20
	Brolucizumab (Beovu)	Polysorbate 80
mAb treatment	Ocrelizumab (Ocrevus)	Polysorbate 20
	Remdesivir (Veklury)	Polysorbate 20
	Romosozumab (Evenity)	Polysorbate 20
	Teprotumumab (Tepezza)	Polysorbate 20
	Atoltivimab/maftivimab/odesivimab-ebgn (Inmazeb)	Polysorbate 80
	Bamlanivimab	Polysorbate 80
	Burosumab (Crysvita)	Polysorbate 80
	Canakinumab (Ilaris)	Polysorbate 80

TABLE IV. *(Continued)*

Drug class	Generic name (brand name)	Polysorbate
	Casirivimab/Imdevimab	Polysorbate 80
	Eptinezumab (Vyepti)	Polysorbate 80
	Fremanezumab (Ajovy)	Polysorbate 80
	Inebilizumab (Uplizna)	Polysorbate 80
	Raxibacumab	Polysorbate 80
Multiple sclerosis treatment	Natalizumab (Tysabri)	Polysorbate 80
Muscle relaxant	Dantrolene sodium (Dantrium, Ryanodex)	Polysorbate 80
P-selectin inhibitor	Crizanlizumab (Adakveo)	Polysorbate 80
Proprotein convertase subtilisin kexin type 9 inhibitor	Alirocumab (Praluent)	Polysorbate 20
	Evolocumab (Repatha)	Polysorbate 80
Rheumatologic	Belimumab (Benlysta)	Polysorbate 80
Thrombolytic	Tenecteplase (Tnkase)	Polysorbate 20
	Alteplase (Cathflo Activase)	Polysorbate 80
	Reteplase (Retavase)	Polysorbate 80
Vitamin infusion	Calcitriol (Calcijex, Rocaltrol)	Polysorbate 20
	Doxercalciferol (Hectorol)	Polysorbate 20
	Vitamins A, B1, B2, B6, C, D3, E, K (Infuvite)	Polysorbate 80

Adapted from Banerji A et al. mRNA Vaccine to Prevent COVID-19 Disease and Reported Allergic Reactions: Current Evidence and Suggested Approach. J Allergy Clin Immunol Pract 2020; Dec 31:S2213-2198(20)31411-2

Figure 3. Recommendations for Special Conditions and Populations.

CONTRAINDICATION TO VACCINATION	PRECAUTION TO VACCINATION	MAY PROCEED WITH VACCINATION
History of the following: • Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to component of the vaccine† • Immediate allergic reaction* of any severity after a previous dose or known (diagnosed) allergy to a component of the vaccine†	Among people without a contraindication, a history of: • Any immediate allergic reaction* to other vaccines or injectable therapies‡ Note: people with a contraindication to mRNA COVID-19 vaccines have a precaution to Janssen COVID-19 vaccine, and vice versa. See footnote for additional information on additional measures to take in these people.#	Among people without a contraindication or precaution, a history of: • 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: • Do not vaccinate. • Consider referral to allergist-immunologist. • Consider other vaccine alternative.†	Actions: • Risk assessment • Consider referral to allergist-immunologist • 30-minute observation period if vaccinated	Actions: • 30-minute observation period: people with history of anaphylaxis (due to any cause) • 15-minute observation period: all other people

Adapted from https://www.cdc.gov/vaccines/covid-19/info-by-product/clinical-considerations.html