



Varicella (Chickenpox) Vaccines

Pink Book Web-on-Demand Series

September 13, 2022

Andrew Kroger, MD, MPH

Medical Officer/Medical Health Educator

NCIRD, CDC

Learning Objectives

- Describe the Advisory Committee on Immunization Practices General Best Practice Guidelines on Immunization.
- Describe an emerging immunization issue.
- For each vaccine-preventable disease, identify those for whom routine immunization is recommended.
- For each vaccine-preventable disease, describe characteristics of the vaccine used to prevent the disease.
- Locate current immunization resources to increase knowledge of team's role in program implementation for improved team performance.
- Implement disease detection and prevention health care services (e.g., smoking cessation, weight reduction, diabetes screening, blood pressure screening, immunization services) to prevent health problems and maintain health.

Continuing Education Information

- CE credit, go to: <https://tceols.cdc.gov/>
- Search course number: **WD4564-091322**
- CE credit expires: **July 1, 2024**
- CE instructions are available on the **Pink Book Web-on-Demand Series** web page
- Questions and additional help with the online CE system, e-mail CE@cdc.gov

The screenshot shows the TCEO website interface. At the top, there is a blue header with the text "Training and Continuing Education Online (TCEO)". Below this is the TCEO logo, which consists of the letters "TCEO" in a bold, blue font, with a green circular arrow icon to the right. Underneath the logo, the text "TRAINING AND CONTINUING EDUCATION ONLINE" is displayed in a smaller, blue font. On the left side of the page, there is a vertical navigation menu with several blue buttons: "TCEO Home", "Search Courses", "Create Account", "9 Simple Steps to Earn CE", "Frequently Asked Questions", and "Contact TCEO". The main content area on the right has a white background and contains the following text:

New to TCEO?
Visit [Create Account](#). Once your account has been created, you will be able to search for courses and complete requirements to receive CE.

Already have a TCEO account from the previous system?
To move your account to the new system please sign in above using your existing TCEO username and password. Once signed in, follow the prompts to verify and update your account. After your account is updated forward you will use this email address and password to sign in.

Not sure how to get started?
Follow these [9 Simple Steps](#) to earn continuing education for the courses you have taken or conferences you have attended!

Below the text, there is a row of four small images: a woman in scrubs talking to a child, a man in a suit looking at a screen, a doctor in a white coat holding a dog, and a woman sitting at a desk with a laptop.

At the bottom of the page, there is a "Welcome to TCEO" message and a short paragraph: "Training and Continuing Education Online (TCEO) is a system that provides access to CDC educational activities for continuing education (CE). Use TCEO to search for CE opportunities, complete course..."

Disclosure Statements

DISCLOSURE: In compliance with continuing education requirements, all planners and presenters must disclose all financial relationships, in any amount, with ineligible companies during the previous 24 months as well as any use of unlabeled product(s) or products under investigational use.

CDC, our planners, and content experts, wish to disclose they have no financial relationship(s) with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients.

Content will not include any discussion of the unlabeled use of a product or a product under investigational use with the exception of Dr. Kroger's discussion of Varicella vaccine in a manner recommended by the Advisory Committee on Immunization Practices, but not approved by the Food and Drug Administration.

CDC did not accept financial or in-kind support from any ineligible company for this continuing education activity.

Disclosure Statements

The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

1

**Varicella
Disease**

Varicella-Zoster Virus (VZV)

- Herpes virus (DNA)
- Primary infection results in varicella (chickenpox).
- Reactivation infection results in herpes zoster (shingles).
- Short survival in environment

Varicella Pathogenesis

- **Respiratory transmission of virus – inhalation of aerosolized VZV from the skin lesions**
- **Replication in nasopharynx and regional lymph nodes**
- **Primary viremia 4–6 days after infection**
- **Multiple tissues, including sensory ganglia, infected during viremia**

Varicella (Chickenpox) Clinical Features

- Incubation period 14–16 days
- Mild prodrome for 1–2 days (adults)
- Rash generally appears first on the head or trunk; most concentrated on the trunk
- Successive crops over several days with lesions present in several stages of development



A child with varicella



Varicella with a secondary bacterial infection



Varicella lesion progressing to necrotizing fasciitis

Increased Risk of Complications of Varicella

- **Persons older than 15 years**
- **Infants younger than 1 year**
- **Immunocompromised persons**
- **Newborns of women with rash onset within 5 days before to 48 hours after delivery**
- **Pregnant person**



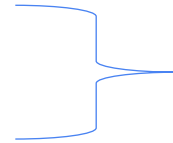
Severe varicella in an adult

Herpes Zoster (Shingles)

- **Reactivation of varicella-zoster virus**

- **Associated with:**

- Aging
- Immunosuppression
- Intrauterine exposure
- Varicella in the first year of life



Risk factors for
pediatric zoster

Varicella Epidemiology

Reservoir	Human
Transmission	Person to person - inhalation of aerosols from vesicular fluid of skin lesions Direct contact with lesions Possibly infected respiratory tract secretions
Temporal Pattern	Peak in late winter and spring (U.S.) – pre-vaccine
Communicability	1–2 days before until lesions have formed crusts (4-7 days) May be longer in immunocompromised

Varicella Laboratory Diagnosis

- **Rapid VZV identification – vesicular fluid, scabs, lesion scrapings**
 - Real-time PCR (preferred, if available)
 - DFA
- **Isolation of VZV from clinical specimen (vesicular fluid)**
- **Significant rise in VZV IgG by any standard serologic assay**

Varicella Antiviral Therapy

- Not recommended for routine use among otherwise healthy infants and children with varicella
- Recommended for persons 13 years old and older
- Recommended for persons with chronic cutaneous or pulmonary disorders, long-term salicylate therapy, or steroid therapy
- IV in immunocompromised children and adults with viral-mediated complications, and pregnant persons
- Some experts recommend for post-exposure prophylaxis

Varicella Vaccine Post-Exposure Prophylaxis

- **Varicella vaccine is recommended for use in susceptible persons after exposure to varicella**
 - 70%-90% effective if given within 3-5 days of exposure
 - 100% effective against severe varicella if given within 3-5 days of exposure
 - Not effective if administered more than 5 days after exposure but will produce immunity if not infected

Varicella-Zoster Immune Globulin

- **Used for post exposure prophylaxis for some persons in whom varicella vaccine is contraindicated (pregnant persons, immunosuppressed, etc.) or some persons for whom varicella vaccine is not recommended (some infants)**
- **VariZIG is the only varicella-specific immunoglobulin product in the United States.**
- **Updated recommendations for use published in July 2013[†]**

[†]MMWR July 19, 2013/62(28);574-6

2

**Varicella
Vaccines**

Varicella Children and Adult Vaccination Schedule

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19-23 mos	2-3 yrs	4-6 yrs	7-10 yrs	11-12 yrs	13-15 yrs	16 yrs	17-18 yrs
Varicella (VAR)							← 1 st dose →					2 nd dose					

Vaccine	19-26 years	27-49 years	50-64 years	≥65 years
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	

- Live vaccine
- Administered by Subcut (subcutaneous) injection

Vaccines for the Prevention of Varicella (Chickenpox)

Product	ACIP Recommended Age Indications	ACIP Abbreviation
Varivax[®]	12 months and older	VAR
ProQuad[®]	12 months–12 years	MMRV

Varicella Vaccine Recommendations for Children and Adolescents

(Birth through 18 Years)

- **First dose at 12–15 months of age**
 - Minimum age is 12 months
 - Doses given before 12 months of age are not counted as valid.
- **Second dose at 4–6 years of age**
 - May be administered before age 4 years (observe 3-month minimum interval)
 - People who received 2 doses of VAR or MMRV vaccine as children according to the U.S. vaccination schedule are considered protected for life.

MMRV Vaccine

- For the first dose of measles, mumps, rubella, and varicella vaccines at age 12–47 months, either MMR vaccine and varicella vaccine or MMRV vaccine may be used.
- Providers who are considering administering MMRV vaccine should discuss the benefits and risks of both vaccination options with the parents or caregivers.
- Unless the parent or caregiver expresses a preference for MMRV vaccine, CDC recommends that separate MMR vaccine and varicella vaccine should be administered for the first dose for children 12–47 months of age

MMRV Vaccine

- **Administer MMRV:**

- For the second dose of measles, mumps, rubella, and varicella vaccines at age 15 months through 12 years
- For the first dose at age 48 months or older
- If the parent expresses a preference for the first dose at 12 months through 47 months of age

ACIP Immunization Recommendations: Adults

- **Adults born in 1980 or later without acceptable evidence of immunity to varicella should receive 2 doses of Var**
- **Two doses are recommended for adults with the second dose at least 28 days after the first dose**
- **Adults born before 1980 are generally presumed immune to varicella**

Varicella Vaccination and Adolescents and Adults

- **All persons 13 years of age and older without evidence of varicella immunity**
 - 2 doses separated by at least 4 weeks
 - Do not repeat first dose because of extended interval between doses
- **Second catch-up dose recommended for persons of any age who have only received 1 dose**

Varicella Vaccine and Immunocompromised Persons

- **Live vaccine – should not be administered to immunosuppressed persons (with exceptions)**
- **Single-antigen varicella vaccine may be administered to persons with isolated humoral immunodeficiency.**
- **Consider varicella vaccination for:**
 - HIV-infected children with CD4 count of 15% or higher
 - HIV-infected older children and adults with CD4 count of 200 or higher

Knowledge Check

- An 18-month-old child received their first dose of VAR at 13 months of age. A second dose was administered at a different clinic at 15 months of age. Does this child need another dose of VAR?
 - A. Yes
 - B. No



Knowledge Check

- An 18-month-old child received their first dose of VAR at 13 months of age. A second dose was administered at a different clinic at 15 months of age. Does this child need another dose of VAR?
- B. No



3

**Clinical
Considerations**

Varicella Vaccination and Health Care Personnel

- **Vaccination is recommended for all health care personnel who lack evidence of immunity.**
- **Prevaccination serologic screening probably cost-effective – for those likely to have had disease**
- **Postvaccination testing not necessary or recommended**
- **Give 2 doses, 4 weeks apart to susceptible persons**

Varicella Breakthrough Infection

- Breakthrough infection is significantly milder, with fewer lesions, maculopapular, not vesicular (but transmissible).
- No consistent evidence that risk of breakthrough infection increases with time since 2-dose vaccination.
- Risk of breakthrough varicella 2.5 times higher if varicella vaccine administered less than 30 days following MMR.
- No increased risk if varicella vaccine given simultaneously or more than 30 days after MMR.

Varicella Vaccine

Immunogenicity and Efficacy

- **In a pre-licensure clinical trial, 2 doses of vaccine were:**
 - 98% effective at preventing any form of varicella.
 - 100% effective against severe varicella.

- **In post-licensure studies, 2 doses of vaccine were:**
 - 92% (95% confidence interval 88%–95%) effective at preventing all varicella.

Acceptable Evidence of Varicella Immunity

- **Written documentation of age-appropriate vaccination**
- **Laboratory evidence of immunity or laboratory confirmation of varicella disease**
- **U.S.-born before 1980***
- **Health care provider diagnosis or verification of varicella disease**
- **History of herpes zoster based on health care provider diagnosis**

*Birth year immunity criterion does not apply to health care personnel or pregnant persons

4

Safety

Contraindications

Varicella & MMRV

Severe allergic reaction to a vaccine component or following a prior dose

Pregnancy or planned pregnancy within 4 weeks

Immunosuppression

Family history of altered immunocompetence

Precautions

Varicella and MMRV

Recent (≤ 11 months) receipt of antibody-containing blood product (specific interval depends on product)

Moderate or severe acute illness with or without fever

Receipt of specific antiviral drugs (acyclovir, famciclovir, or valacyclovir) 24 hours before vaccination (avoid use of these antiviral drugs for 14 days after vaccination)

Use of aspirin or aspirin-containing products

MMRV only: personal or family (i.e., sibling or parent) history of seizures of any etiology: these children generally should be vaccinated with separate MMR and varicella vaccines

Varicella Vaccine Adverse Reactions

Adverse Reactions	
Local reactions (pain, erythema)	19% (children) 24% (adolescents and adults)
Rash: may be maculopapular rather than vesicular, average 5 lesions	3%–4%
Systemic reactions	Not common

Adverse Reactions

MMRV vs. MMR + VAR

- Fever is more common in the 5–12 days after vaccination with MMRV (22%) than with MMR + VAR (15%)
- Data from CDC Vaccine Safety Datalink sites indicate the rate of febrile seizures following MMRV (9 per 10,000 vaccinated) was approximately 2 times higher than among those receiving MMR + VAR at the same visit (4 per 10,000 vaccinated)
- Merck post-licensure surveillance has identified a similar trend

5

**Storage &
Handling**

Varicella Storage and Handling

- **Store between -50°C and -15°C (-58°F and 5°F)**
 - Must be kept at freezing temperatures
 - Keep Varicella and MMRV vaccine vials in their original closed boxes to protect the vaccine from light
 - Do not tear off end flaps or cover.
- **Keep diluent at room temperature**
 - Do not freeze diluent
 - Can be refrigerated

VAR (Varivax)

Ages: 12 months and older

Use for: Any dose in the series

Route: Subcutaneous (subcut) injection

Reconstitute VAR powder ONLY with manufacturer-supplied sterile water diluent

Beyond Use Time: Discard reconstituted vaccine if not used within 30 minutes.

MMRV (ProQuad)

Ages: 12 months through 12 years

Use for: Any dose in the series

Route: Subcutaneous (subcut) injection

Reconstitute MMRV powder ONLY with manufacturer-supplied sterile water diluent

Beyond Use Time: Discard reconstituted vaccine if not used within 30 minutes.

Varicella-Containing Vaccines: Varivax[®] (Var) and ProQuad[®] (MMRV)

- **Preparation: Reconstitute the vaccine with the diluent supplied by the manufacturer just before administering**
- **Discard if reconstituted vaccine is not used within 30 minutes**
- **Administration: Subcut injection**
 - Site: Fatty tissue of the anterolateral thigh or upper outer triceps of the arm
 - Needle length and gauge: 5/8-inch, 23- to 25-gauge needle

Knowledge Check

- A nursing student had VAR titers done before she started school. Her titers came back negative. She has 2 documented doses of VAR after 1 year of age, separated by more than 4 weeks. How many doses of VAR should we administer?
 - A. One
 - B. Two
 - C. None



Knowledge Check

- A nursing student had VAR titers done before she started school. Her titers came back negative. She has 2 documented doses of VAR after 1 year of age, separated by more than 4 weeks. How many doses of VAR should we administer?
- C. None



6

**Varicella
Resources**

Vaccine Information Statements

- There is a VIS for:
 - Var (Varicella)
 - MMRV (ProQuad)
- Give the parent or patient the appropriate VIS for the product that will be administered

VACCINE INFORMATION STATEMENT

MMRV (Measles, Mumps, Rubella, and Varicella) Vaccine: What You Need to Know

Many Vaccine Information Statements are available in Spanish and other languages. See www.imzmnz.gov/vis. Hojas de información sobre vacunas están disponibles en español y en muchos otros idiomas. Visite www.imzmnz.gov/vis.

1 Why get vaccinated?

Measles, mumps, rubella, and varicella are viral diseases that can have serious consequences. Before vaccines, these diseases were very common in the United States, especially among children. They are still common in many parts of the world.

Measles

- Measles virus causes symptoms that can include fever, cough, runny nose, and red, watery eyes, commonly followed by a rash that covers the whole body.
- Measles can lead to ear infections, diarrhea, and infection of the lungs (pneumonia). Rarely, measles can cause brain damage or death.

Mumps

- Mumps virus causes fever, headache, muscle aches, tiredness, loss of appetite, and swollen and tender salivary glands under the ears on one or both sides.
- Mumps can lead to deafness, swelling of the brain and/or spinal cord covering (encephalitis or meningitis), painful swelling of the testicles or ovaries, and, very rarely, death.

Rubella (also known as German Measles)

- Rubella virus causes fever, sore throat, rash, headache, and eye irritation.
- Rubella can cause arthritis in up to half of teenage and adult women.
- If a woman gets rubella while she is pregnant, she could have a miscarriage or her baby could be born with serious birth defects.

Varicella (also known as Chickenpox)

- Chickenpox causes an itchy rash that usually lasts about a week, in addition to fever, tiredness, loss of appetite, and headache.
- Chickenpox can lead to skin infections, infection of the lungs (pneumonia), inflammation of blood vessels, swelling of the brain and/or spinal cord covering (encephalitis or meningitis) and infections of the blood, bones, or joints. Rarely, varicella can cause death.
- Some people who get chickenpox get a painful rash called shingles (also known as herpes zoster) years later.

These diseases can easily spread from person to person. Measles doesn't even require personal contact. You can get measles by entering a room that a person with measles left up to 2 hours before.

Vaccines and high rates of vaccination have made these diseases much less common in the United States.

2 MMRV Vaccine

MMRV vaccine may be given to children 12 months through 12 years of age. Two doses are usually recommended:

- First dose: 12 through 15 months of age
- Second dose: 4 through 6 years of age


A third dose of MMRV might be recommended in certain mumps outbreak situations.

There are no known risks to getting MMRV vaccine at the same time as other vaccines.

3 Some people should not get this vaccine

Tell the person who is giving your child the vaccine if your child:

- **Has any severe, life-threatening allergies.** A person who has ever had a life-threatening allergic reaction after a dose of MMRV vaccine, or has a severe allergy to any part of this vaccine, may be advised not to be vaccinated. Ask your health care provider if you want information about vaccine components.
- **Has a weakened immune system** due to disease (such as cancer or HIV/AIDS) or medical treatments (such as radiation, immunotherapy, steroids, or chemotherapy).
- **Has a history of seizures, or has a parent, brother, or sister with a history of seizures.**
- **Has a parent, brother, or sister with a history of immune system problems.**
- **Has ever had a condition that makes them bruise or bleed easily.**
- **Is pregnant or might be pregnant.** MMRV vaccine should not be given during pregnancy.
- **Is taking salicylates (such as aspirin).** People should avoid using salicylates for 6 weeks after getting a vaccine that contains varicella.

 U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

VACCINE INFORMATION STATEMENT

Recombinant Zoster (Shingles) Vaccine, RZV: What You Need to Know

Many Vaccine Information Statements are available in Spanish and other languages. See www.imzmnz.gov/vis. Hojas de información sobre vacunas están disponibles en español y en muchos otros idiomas. Visite www.imzmnz.gov/vis.

1 Why get vaccinated?

Shingles (also called herpes zoster, or just zoster) is a painful skin rash, often with blisters. Shingles is caused by the varicella zoster virus, the same virus that causes chickenpox. After you have chickenpox, the virus stays in your body and can cause shingles later in life.

2 Shingles vaccine (recombinant)

Recombinant shingles vaccine was approved by FDA in 2017 for the prevention of shingles. In clinical trials, it was more than 90% effective in preventing shingles. It can also reduce the likelihood of PHN.

Two doses, 2 to 6 months apart, are recommended for adults 50 and older.

This vaccine is also recommended for people who have already gotten the live shingles vaccine (Zostavax). There is no live virus in this vaccine.

VACCINE INFORMATION STATEMENT

Varicella (Chickenpox) Vaccine: What You Need to Know

Many Vaccine Information Statements are available in Spanish and other languages. See www.imzmnz.gov/vis. Hojas de información sobre vacunas están disponibles en español y en muchos otros idiomas. Visite www.imzmnz.gov/vis.

1 Why get vaccinated?

Varicella (also called chickenpox) is a very contagious viral disease. It is caused by the varicella zoster virus. Chickenpox is usually mild, but it can be serious in infants under 12 months of age, adolescents, adults, pregnant women, and people with weakened immune systems.

Chickenpox causes an itchy rash that usually lasts about a week. It can also cause:

- fever
- tiredness
- loss of appetite
- headache

More serious complications can include:

- skin infections
- infection of the lungs (pneumonia)
- inflammation of blood vessels
- swelling of the brain and/or spinal cord coverings (encephalitis or meningitis)
- blood stream, bone, or joint infections

Some people get so sick that they need to be hospitalized. It doesn't happen often, but people can die from chickenpox. Before varicella vaccine, almost everyone in the United States got chickenpox, an average of 4 million people each year.

Children who get chickenpox usually miss at least 5 or 6 days of school or childcare.

Some people who get chickenpox get a painful rash called shingles (also known as herpes zoster) years later.

Chickenpox can spread easily from an infected person to anyone who has not had chickenpox and has not gotten chickenpox vaccine.

2 Chickenpox vaccine

Children 12 months through 12 years of age should get 2 doses of chickenpox vaccine, usually:

- First dose: 12 through 15 months of age
- Second dose: 4 through 6 years of age

People 13 years of age or older who didn't get the vaccine when they were younger, and have never had chickenpox, should get 2 doses at least 28 days apart.

A person who previously received only one dose of chickenpox vaccine should receive a second dose to complete the series. The second dose should be given at least 3 months after the first dose for those younger than 13 years.


and at least 28 days after the first dose for those 13 years of age or older.

There are no known risks to getting chickenpox vaccine at the same time as other vaccines.

3 Some people should not get this vaccine

Tell your vaccine provider if the person getting the vaccine:

- **Has any severe, life-threatening allergies.** A person who has ever had a life-threatening allergic reaction after a dose of chickenpox vaccine, or has a severe allergy to any part of this vaccine, may be advised not to be vaccinated. Ask your health care provider if you want information about vaccine components.
- **Is pregnant, or thinks she might be pregnant.** Pregnant women should wait to get chickenpox vaccine until after they are no longer pregnant. Women should avoid getting pregnant for at least 1 month after getting chickenpox vaccine.
- **Has a weakened immune system** due to disease (such as cancer or HIV/AIDS) or medical treatments (such as radiation, immunotherapy, steroids, or chemotherapy).
- **Has a parent, brother, or sister with a history of immune system problems.**
- **Is taking salicylates (such as aspirin).** People should avoid using salicylates for 6 weeks after getting varicella vaccine.
- **Has recently had a blood transfusion or received other blood products.** You might be advised to postpone chickenpox vaccination for 3 months or more.
- **Has tuberculosis.**

 U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Continuing Education Information

- CE credit, go to: <https://tceols.cdc.gov/>
- Search course number: WD4564-091322
- CE credit expires: July 1, 2024
- CE instructions are available on the Pink Book Web-on-Demand Series web page
- Questions and additional help with the online CE system, e-mail CE@cdc.gov

Training and Continuing Education Online (TCEO)




TRAINING AND CONTINUING EDUCATION ONLINE

- TCEO Home
- Search Courses
- Create Account
- 9 Simple Steps to Earn CE
- Frequently Asked Questions
- Contact TCEO

New to TCEO?
Visit [Create Account](#). Once your account has been created, you will be able to search for courses and complete requirements to receive CE.

Already have a TCEO account from the previous system?
To move your account to the new system please sign in above using your existing TCEO username and password. Once signed in, follow the prompts to verify and update your account. After your account is updated forward you will use this email address and password to sign in.

Not sure how to get started?
Follow these [9 Simple Steps](#) to earn continuing education for the courses you have taken or conferences you have attended!



Welcome to TCEO

Training and Continuing Education Online (TCEO) is a system that provides access to CDC educational activities for continuing education (CE). Use TCEO to search for CE opportunities, complete course

E-mail Your Immunization Questions to Us

- NIPINFO@cdc.gov



Thank You From Atlanta!

