The two potential causes of varicella-like rashes after VZV vaccine include:

* Attenuated vaccine virus can replicate after immunization and cause **mild infection** in approximately 3% of immunized children.
* Wild-type VZV can cause classic varicella if acquired before the child's immunization results in protective antibody

Both vaccine-strain and wild-type varicella have an incubation period of 1-3 weeks.

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| **Vaccine-strain versus wild-type varicella** | |
| **Vaccine strain** | **Wild type** |
| * <10 lesions * Maculopapular &/or vesicular * Mildly contagious * Not contraindications for future vaccination | * >100 lesions * Vesicular in successive crops * Highly contagious |

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| **Varicella** | |
| **Epidemiology** | * Primary infection (ie, chickenpox) with varicella-zoster virus * Transmission via direct contact or aerosol droplets |
| **Clinical features** | * Prodrome (fever, malaise) * Pruritic maculopapular rash followed by successive crops of vesicles in different stages * Mild in children, more severe in adolescents/adults |
| **Treatment** | * Supportive (antihistamines) * Antiviral therapy (acyclovir)   + Adolescents/adults   + Immunocompromised   + Complicated disease (encephalitis, pneumonia) |
| **Prevention** | * 2 doses of varicella-zoster virus vaccine (ages 1 & 4) |

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| **Infectious mononucleosis** | |
| **Etiology** | * Epstein-Barr virus most common |
| **Clinical features** | * Fever * Tonsillitis/pharyngitis ± exudates * Posterior or diffuse cervical lymphadenopathy * Significant fatigue * ± Hepatosplenomegaly * ± Rash after amoxicillin(2-10 days after)- delayed hypersensitivity [not true hypersensitivity reaction], most people can receive same drung in future |
| **Diagnostic findings** | * Positive heterophile antibody (Monospot) test (25% false-negative rate during 1st week of illness) * Atypical lymphocytosis * Transient hepatitis |
| **Complication** |  Acute airway obstruction   Autoimmune hemolytic anemia & thrombocytopenia   Splenic rupture |
| **Management** | * Avoid sports for ≥3 weeks (contact sports ≥4 weeks) due to the risk of splenic rupture (with or without palpable splenomegaly on presentation because the spleen may not be palpable until it is 2-3 times its normal size) |

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| **Herpes simplex virus (HSV) encephalitis** | |
| **Clinical findings** | * Acute (<1week) * Fever * Headache * Seizure * Altered mental status (confusion, agitation) * ± Focal neurologic findings (hemiparesis, cranial nerve palsies, ataxia) |
| **Diagnostic findings** | * CSF analysis:   + ↑ WBCs (↑ lymphocytes), ↑ RBCs   + ↑ Protein, normal glucose   + HSV DNA on PCR * Brain MRI: temporal lobe hemorrhage/edema |
| **Treatment** | * Intravenous acyclovir even while waiting for confirmation |
| **CSF** = cerebrospinal fluid; **WBCs** = white blood cells; **RBCs** = red blood cells. | |

Either primary or reactivated infection.    
Spread of primary infection likely occurs via the olfactory bulb to the olfactory cortex (within the temporal lobe) whereas reactivated HSV spreads from the trigeminal ganglion (where HSV typically remains dormant) to the adjacent temporal lobe.  Therefore, temporal lobe abnormalities on imaging, such as hemorrhage or edema, are highly suggestive of HSV.

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| **Molluscum contagiosum** | | |
|  | **Children** | **Adults** |
| **Typical location** | * Trunk * Intertriginous areas (axillae) * Face (including eyelids) | * Lower abdomen, genitals, upper thighs |
| **Evaluation** | * Clinical diagnosis (firm, domed, papule with central umbilication) * No further evaluation | * Clinical diagnosis * Genital lesions: STI testing * Extensive lesions: HIV testing |
| **Treatment** | * Reassurance * Self resolving in 6-12 months * Treat as adult when complication present(superinfection, bleeding) | * Cryotherapy * Curettage * Topical therapy (cantharidin, podophyllotoxin) |
| **STI** = sexually transmitted infection. | | |

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| Measles virus (rubeola) | |
| Transmission | * Airborne * Most contagious during the prodrome but can spread disease for several days after resolution of the rash |
| Clinical presentation | * Prodrome (cough, coryza, conjunctivitis, fever, Koplik spots) * Maculopapular exanthem   + Cephalocaudal & centrifugal spread   + Spares palms/soles |
| Prevention | * Live-attenuated measles vaccine at age 1 and 4 * For planned international travel, an additional dose between age 6 and 11 months is also recommended. |
| Treatment | * Supportive * Vitamin A for hospitalized patients- reduces the morbidity and mortality rates for patients with severe measles (those requiring hospitalization) through the promotion of antibody-producing cells and regeneration of epithelial cells (in the gut, lungs, and retina). |

The **measles-mumps-rubella (MMR)** vaccination is recommended at age 1 and again at age 4.  It is safe and effective, with mild reactions occurring in a minority (3-5%) of immunized patients.  This child has **fever** and a **maculopapular** rash a week after receiving the MMR vaccine, which is most likely due to infection with **vaccine-strain** measles virus used in the vaccine.  Although the virus is attenuated, it is a live virus and therefore can cause a mild version of measles within 1-3 weeks of immunization.  No treatment is needed as the vaccine-strain illness is minor and self-limiting.  Although less contagious than wild-type measles, the vaccine strain is also transmissible to others.  Therefore, patients who develop a rash after MMR immunization should avoid contact with **immunocompromised** individuals until the rash has resolved.  
  
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| Rubella (German measles) | |
| Clinical presentation | * Congenital:   + Sensorineural hearing loss   + Cataracts   + Patent ductus arteriosus * Children:   + Fever   + Cephalocaudal spread of blanching fine pink maculopapular rash from face within 24 hours   + Lymphedenopathy (particularly posterior cervical, posterior auricular, and suboccipital). * Adolescents/Adults:   + Same as children + arthralgias/arthritis   + Although most symptoms resolve in a few days, joint pain can last up to a month. * Some patients also have petechiae or erythematous papules, known as **Forchheimer spots**, on the soft palate |
| Diagnosis | * Serology |
| Prevention | * Live attenuated rubella vaccine at age 12 months and age 4 years with the live measles, mumps, and rubella vaccine |

MUMS

Contagious viral illness is usually self-limited, but serious complications (due to systemic spread of the virus) are possible.    
The virus has an affinity for glandular epithelium and classically causes parotitis, which can be unilateral or bilateral.    
Orchitis, a common complication, can develop in infected adolescent boys and young adults and impair fertility.    
Pancreatitis has been described in infected children and adults.    
The virus is neurotropic and can cause aseptic meningitis (generally benign) and sensorineural hearing loss (often transient but can lead to deafness).  
Immunization against mumps is provided by the measles-mumps-rubella vaccine.   
Among unvaccinated children, mumps is most common in school-age children, who often have mild disease or are asymptomatic.    
Symptoms are more severe and complications are more likely among unvaccinated adolescents and adults.    
​​​​​​​Vaccinated patients are more likely to present in late adolescence or early adulthood as immunity wanes.

​​​​​​​​​​​​​​ Erythema infectiosum is caused by parvovirus B19 and classically presents in school-aged children with prodromal symptoms (eg, fever, rhinorrhea) followed by a "slapped cheek" rash and a lacy or reticular rash on the body.  The rash typically does not appear until prodromal symptoms have resolved

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| **Herpangina vs herpetic gingivostomatitis** | | |
| **Diagnosis** | **Herpangina** | **Herpetic gingivostomatitis** |
| **Etiology** | Coxsackie A virus | Herpes simplex virus type 1 |
| **Age** | 1-7 years | 6 months-5 years |
| **Seasonality** | Late summer/early fall | None |
| **Clinical features** | * Fever * Pharyngitis * Gray vesicles/ulcers on oropharynx posterior soft palate, anterior palatine pillar, tonsils, uvula | * Fever * Pharyngitis * Erythematous gingiva * Clusters of vesicles on anterior oral mucosa/lips |
| **Treatment** | Supportive | Oral acyclovir |

**PARAINFLUENZA**

**Croup** (laryngotracheitis), a viral upper respiratory illness most commonly caused by **parainfluenza** virus, typically presents in children age 6 months to 3 years.    
The illness usually begins with nonspecific upper respiratory symptoms (rhinorrhea, congestion) with subsequent development of fever, **hoarseness**, **stridor** (high-pitched noise), and a harsh, barking, seal-like cough.   
The stridor worsens with agitation (crying) or excitement and is typically **inspiratory** due to upper airway edema, but it may be biphasic (inspiratory and expiratory) in severe cases.  
Croup is generally a clinical diagnosis.    
If the diagnosis is unclear, radiographs will reveal subglottic edema known as the steeple sign.    
Treatment is aimed at reducing subglottic edema.    
Corticosteroids (dexamethasone) are useful for mild cases (stridor with agitation), and nebulized racemic epinephrine is added for severe cases (stridor at rest).

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| **Viral gastroenteritis** | |
| **Epidemiology** | * Fecal-oral transmission * Norovirus: most common among all ages * Norovirus infection can also occur with ingestion of contaminated food, such as shellfish, salad, and fruit. * Rotavirus: common in unvaccinated age ≤2 |
| **Clinical features** | * 1-2 days after exposure * Emesis &/or watery diarrhea * Abdominal pain * ± Fever |
| **Diagnosis** | * Clinical\* * Confirmatory testing (detection of norovirus in the stool) may be performed in outbreaks or atypical cases (symptoms >7 days) |
| **Treatment** | * Fluid repletion   + Oral for mild dehydration (normal vital signs, dry mucous membranes)   + Intravenous for severe dehydration (weak/rapid pulse, marked oliguria, ↑ capillary refill time) * Regular diet (with limited fats & simple sugars) as tolerated * **symptom resolution** is usually within **2-3 days**. * ​​​​​​​Because norovirus is not killed by alcohol-based sanitizer or standard cleaning solutions, prevention includes diligent hand hygiene using soap and water and cleansing of contaminated surfaces with bleach. |
| \*Consider bacterial/parasitic pathogens for the following: grossly bloody stools, persistent fever & exposures (international travel, farm animals). | |

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| **Human rabies** | | |
| **Pathogenesis** | * Transmission of rabies virus by a bite from an infected mammal * The virus amplifies in muscle cells at the inoculation site and travels centrally within the nerves to reach the spinal cord, a process that can take several weeks.→nonspecific * From the spinal cord, the virus spreads quickly to the brain then disseminates peripherally, particularly affecting muscles and other highly innervated areas (salivary glands)→encephelitis | |
| **Reservoir** | * United States: bats (most common), raccoons, skunks, foxes * Developing world: dogs | |
|  | **Nonspecific** | * 1-3 months after exposure * nonspecific prodrome (fever, chills, sore throat, malaise) lasting a few days; pain, tingling, and/or numbness of the bite wound, |
| **Clinical**  **features** | **Encephalitic** | * Hydrophobia & aerophobia (due to pharyngeal spasm) * Autonomic instability * Spasticity * Agitation & altered mental status |
| **Paralytic** | * Ascending flaccid paralysis |
| **Postexposure  prophylaxis \*** | * Rabies immunoglobulin * Rabies vaccine series | |
| **Prognosis** | * Coma, respiratory failure & death within weeks | |
| \*In cases of a high-risk animal that cannot be tested or observed. | | |

HIV  
  
HIV replication occurs mostly in CD4+ T cells, resulting in **decreased CD4+ T cells**; however, because B cell and CD8+ T cell production persists, total absolute lymphocyte count is often normal.  Therefore, lymph node enlargement commonly occurs as the immune system responds to high viral loads

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| **HIV in infancy** | |
| **Risk factors** | * High maternal viral load (insufficient prenatal care, lack of antiretroviral therapy) * Breastfeeding by infected mother |
| **Clinical features** | * Failure to thrive * Chronic diarrhea * Lymphadenopathy, hepatosplenomegaly * *Pneumocystis* pneumonia * Prolonged/refractory candidiasis |
| **Diagnosis** | * HIV DNA or RNA PCR (antibody testing is not performed at age <18 months as maternal antibodies may cause false positives). |
| **Treatment** | * Combination antiretroviral therapy |

**Aseptic meningitis** in young, sexually active adults is acute HIV infection.  This syndrome typically occurs 2-4 weeks after transmission and often includes transient unexplained fever, generalized lymphadenopathy, and maculopapular rash.  Approximately 25% of patients with acute HIV have aseptic meningitis, but symptoms are often mild.  Although HIV infection is most common in high-risk groups (eg, intravenous drug users, individuals with multiple sexual partners), physicians should have a low threshold for HIV testing in sexually active individuals because patients may not be fully aware of their risk of exposure (eg, non-monogamous sexual partner) or may not be completely forthright about their social history.​​​​​​​