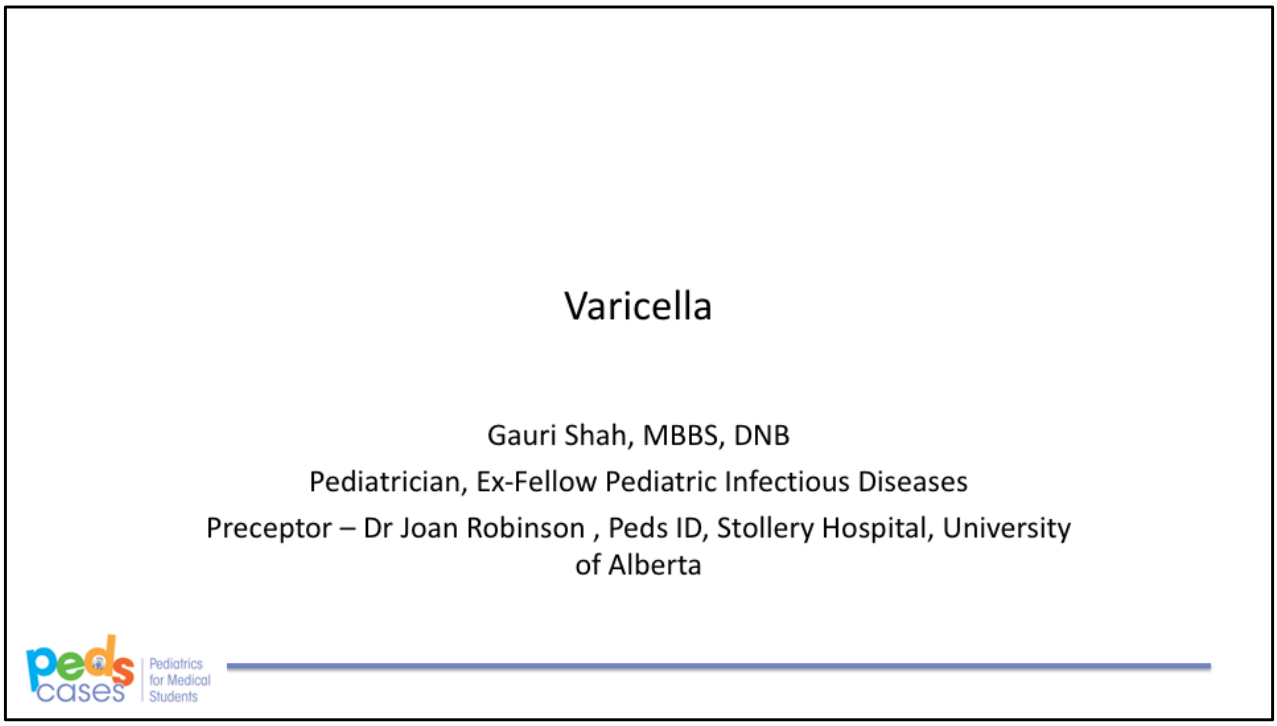
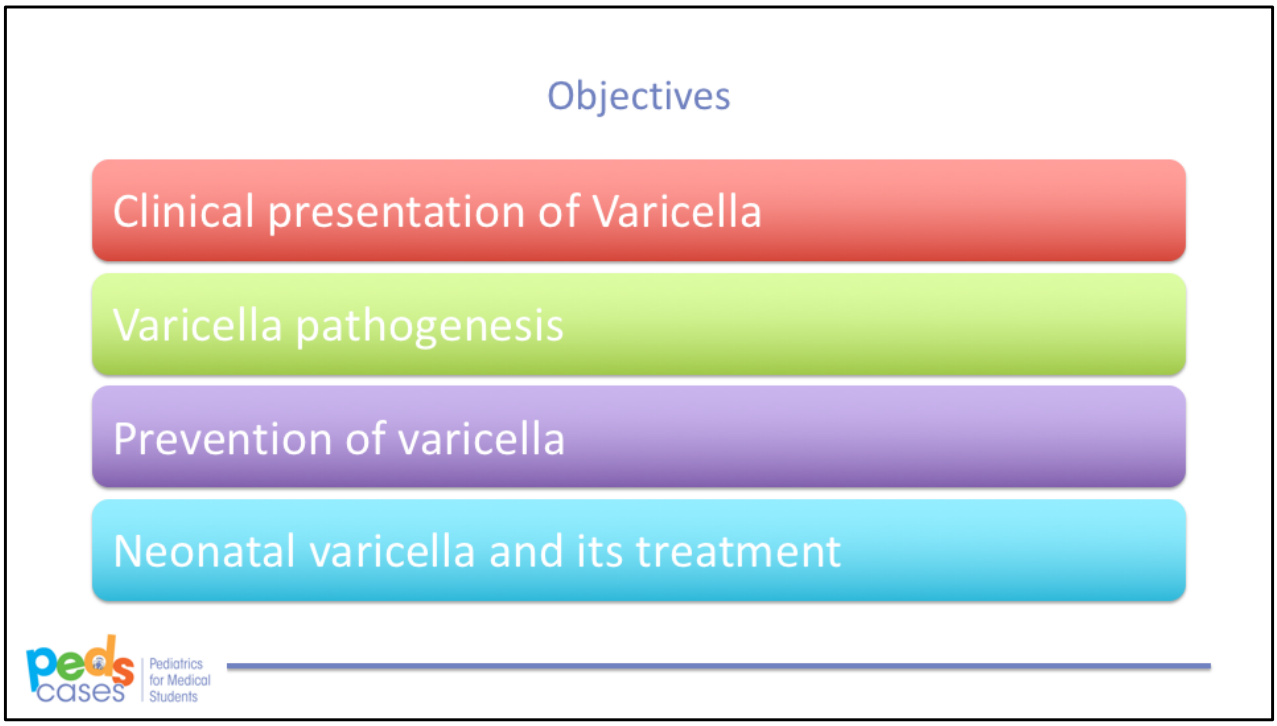



**Slide 1: Introduction**

Hello and welcome to Pedscases.com. I am Dr. Gauri Shah. I am an international medical graduate, a pediatrician and completed a fellowship in Pediatric Infectious Diseases at the University of Alberta. This podcast is in collaboration with Dr. Joan Robinson. She is a Pediatric Infectious Disease specialist at the Stollery Children's Hospital at the University of Alberta.

Today's podcast is about varicella, more commonly known as chickenpox. Before the introduction of immunization, varicella was an extremely common virus that almost everyone would catch once during childhood. While most patients would get through the infection unscathed, patients could develop serious complications such as necrotizing fasciitis. Today, universal immunization has made varicella much less common; however outbreaks still occur, and new entities such as breakthrough varicella have emerged.

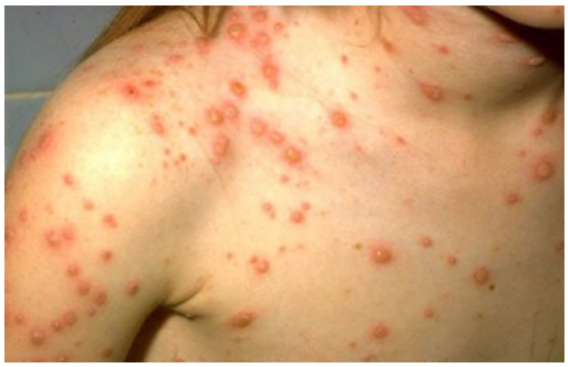



**Slide 2: Objectives**

After listening to this podcast, the learner should be able to:

- Recognize the clinical presentation of varicella
- Understand the pathogenesis of varicella infection
- Describe the importance of varicella vaccination, and post-exposure prophylaxis
- Finally, recognize the risk of neonatal varicella and know how to start initial treatment

## Case – Q/A Format



- 4 yr old Aly comes home from daycare with
  - fever, malaise and rash on her chest
- Otherwise a healthy child with no other major illness so far
- What is your differential diagnosis
  - Chickenpox (Varicella Zoster)
  - Drug reaction (Erythema multiforme)
  - Hand foot mouth disease (enterovirus )
  - Rickettsial pox
  - Disseminated herpes zoster (shingles involving more than one dermatome)
  - Disseminated herpes simplex

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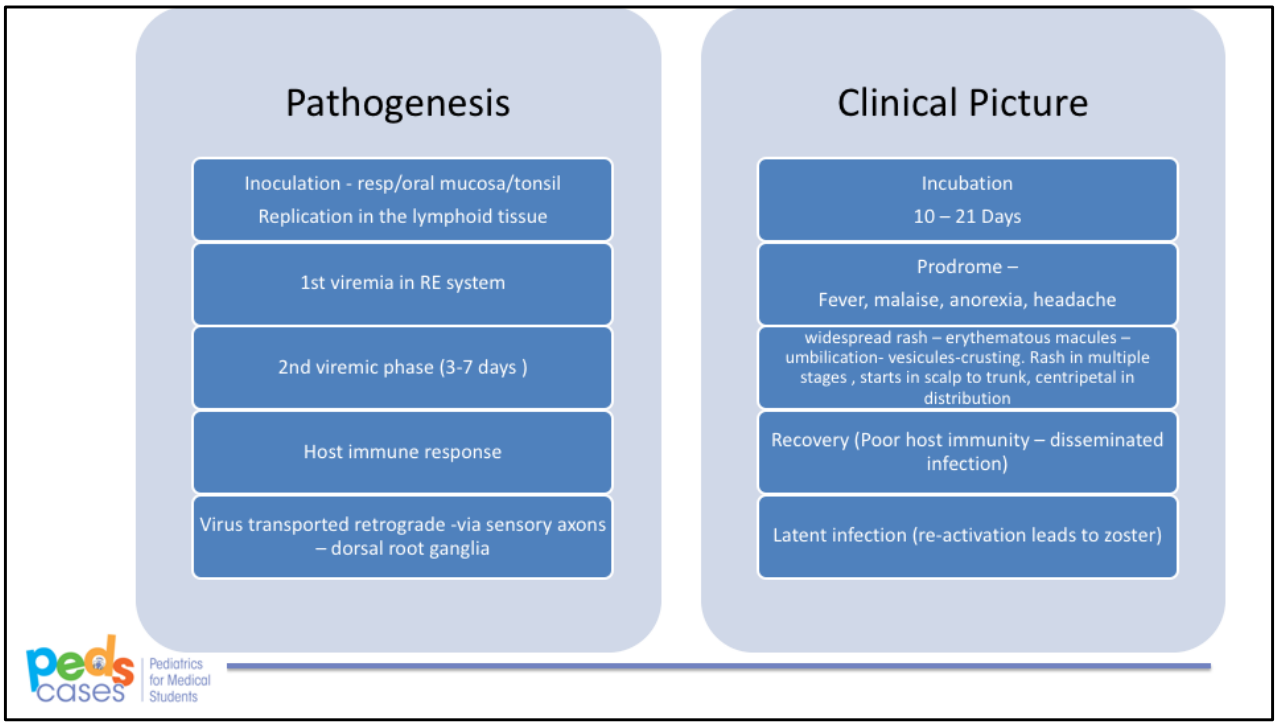
**Slide 3: Case**

Let us start with a case. Aly is a 4-year-old female who was sent home from daycare with a mild fever, malaise and a rash on her chest. Her parents bring her to see you the next day as her rash continued to progress. She has a very itchy rash that has mixed lesions with macules, papules, and vesicles with some crusting. She is otherwise a healthy child with no previous major illness.
What differential diagnosis would come to your mind?
I would think about various conditions that can present with such rash like chickenpox, erythema multiforme, hand foot mouth disease, rickettsial pox, and rarely disseminated herpes zoster/herpes simplex infection.
Given the rash is itchy and has papules and vesicles in all different stages, you recognize the rash as most likely being varicella.




**Slide 4: Pathogenesis & Clinical Picture**

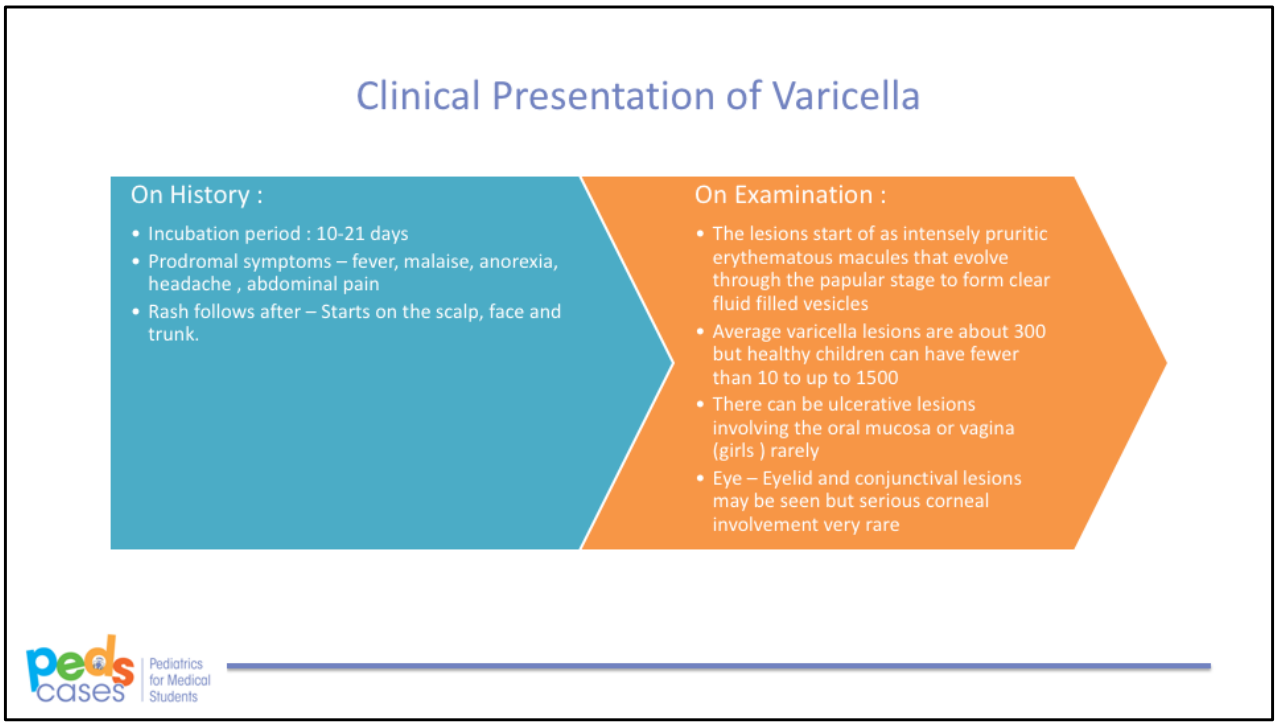
Ok, so let's dive into the topic of Varicella.

Varicella is a highly contagious infection. It is spread from person to person via inhalation of aerosols from vesicular fluid and respiratory secretions. Airborne transmission has also been reported, which means that N95 masks, gowns and gloves are required if the patient is in the hospital. The virus enters via the respiratory or oral mucosa. During the incubation period, the virus travels to lymphoid tissues – most commonly the tonsils, and begins to replicate. The incubation period, defined as the time between when the patient is exposed and when they get the rash, lasts 10-21 days. Patients develop a first episode of viremia during the incubation period which spreads the virus throughout the reticuloendothelial system. This first viremia presents as a prodrome of fever, malaise, anorexia and headache. Then in the next 3-7 days patients develop a second viremia which causes the classic rash.

The next journey of the virus depends on the host immune response. In a healthy immunocompetent host, varicella travels in a retrograde fashion via the sensory axons to end up in the dorsal root ganglia causing latent infection. This virus lies

dormant, however, can reactivate later in life to cause herpes zoster, more commonly known as shingles.

In an immuno-compromised patient, the virus can disseminate and land in multiple organs thus causing serious, disseminated varicella infection.

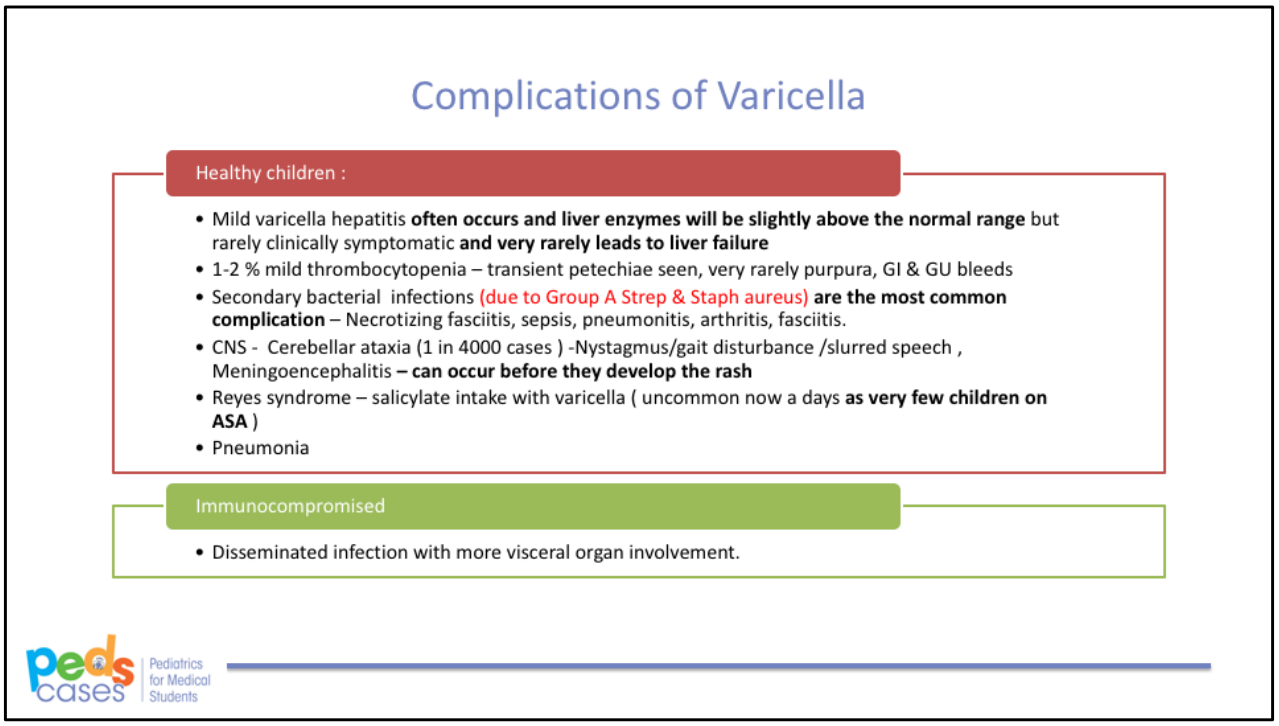



**Slide 5: Clinical Presentation of Varicella**

Now that we understand the pathophysiology of the virus let's review the clinical presentation. On history, after incubation of 10-21 days; the patient may experience a prodrome (fever, malaise, anorexia, headache and abdominal pain). Incubation is then followed by a rash, that typically starts on the scalp or face and spreads to the trunk classically described as centripetal in distribution.

On Examination; the lesions start of as intensely pruritic erythematous macules that evolve through the papular stage to form clear fluid-filled vesicles and then within a few days crust over. The average number of varicella lesions is about 300, but healthy children can have fewer than 10 to up to 1500.

Rarely, there can be ulcerative lesions involving the oral mucosa or vagina in girls. Eyelid and conjunctival lesions are seen but serious corneal involvement is very rare.




**Slide 6: Complications of Varicella**

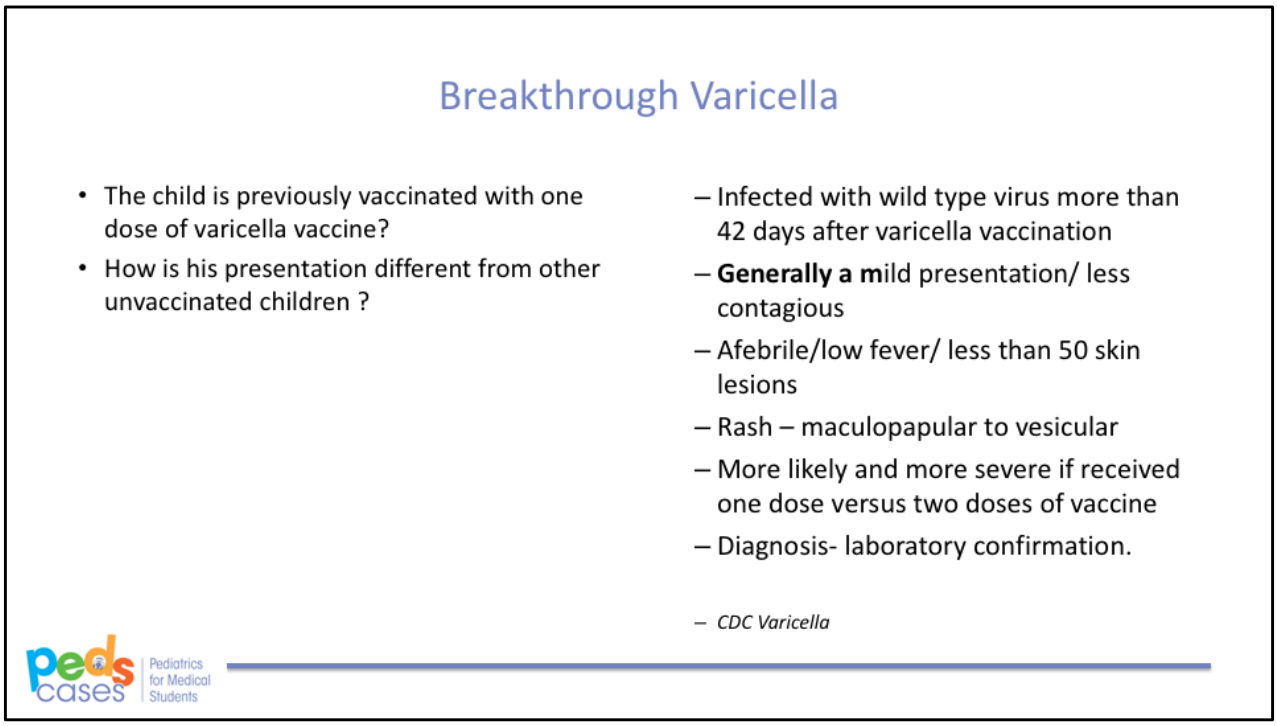
Let us discuss some complications of varicella -

The most common complication in healthy children is secondary bacterial infection due to group A Strep or Staph aureus. This usually presents like impetigo and is readily treated with antibiotics that can even be used topically if the infection is minor. More serious infections include necrotizing fasciitis, bacterial sepsis, septic arthritis and bacterial pneumonia or varicella pneumonitis.

A non-infectious complication seen even in healthy children is mild varicella hepatitis which is rarely clinically symptomatic. About 1-2 % of children may get mild thrombocytopenia manifested mostly as transient petechiae. Some develop purpura or GI or GU bleeds. In the CNS - Cerebellar ataxia occurs in 1 in 4000 cases and may lead to symptoms like Nystagmus/gait disturbance /or slurred speech. Most fully recover within a few days. In rare cases varicella meningoencephalitis can have serious sequelae.

Immunocompromised children, on the other hand, are at higher risk of having

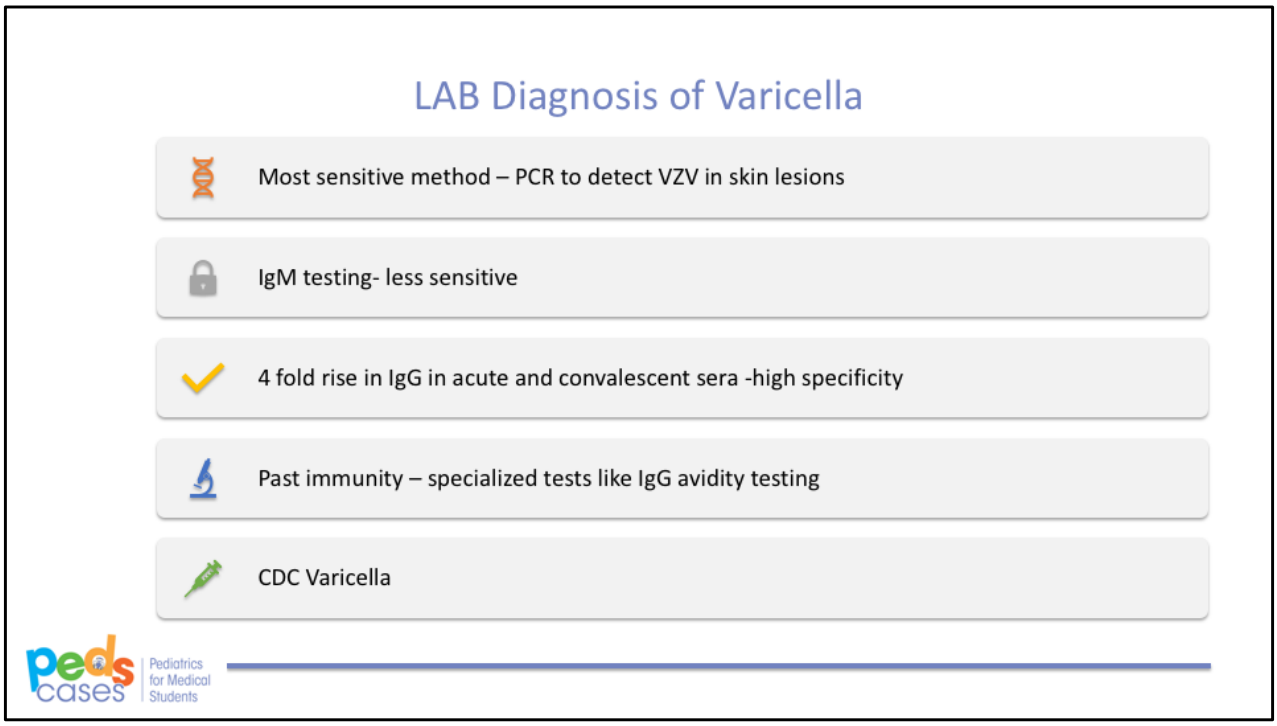
disseminated infection, especially hepatitis and pneumonitis.




**Slide 7: Breakthrough Varicella**

With the introduction of universal vaccination, varicella is now primarily seen in unimmunized children, or in children too young to be immunized. However, there is now a new entity that has emerged called breakthrough varicella.

It is defined as varicella infection with wild type varicella virus that occurs 42 days or more after vaccination. Essentially it is a failure of vaccination to protect against infection fully, however, most patients will have at least partial immunity and have a milder presentation. Breakthrough varicella occurs much more commonly in children who have received only one dose of varicella vaccination but can rarely occur after the recommended two doses.
It is often mild and less contagious, and the rash can range from maculopapular to vesicular and typically has less than 50 skin lesions. The child can be afebrile or have a low-grade fever.

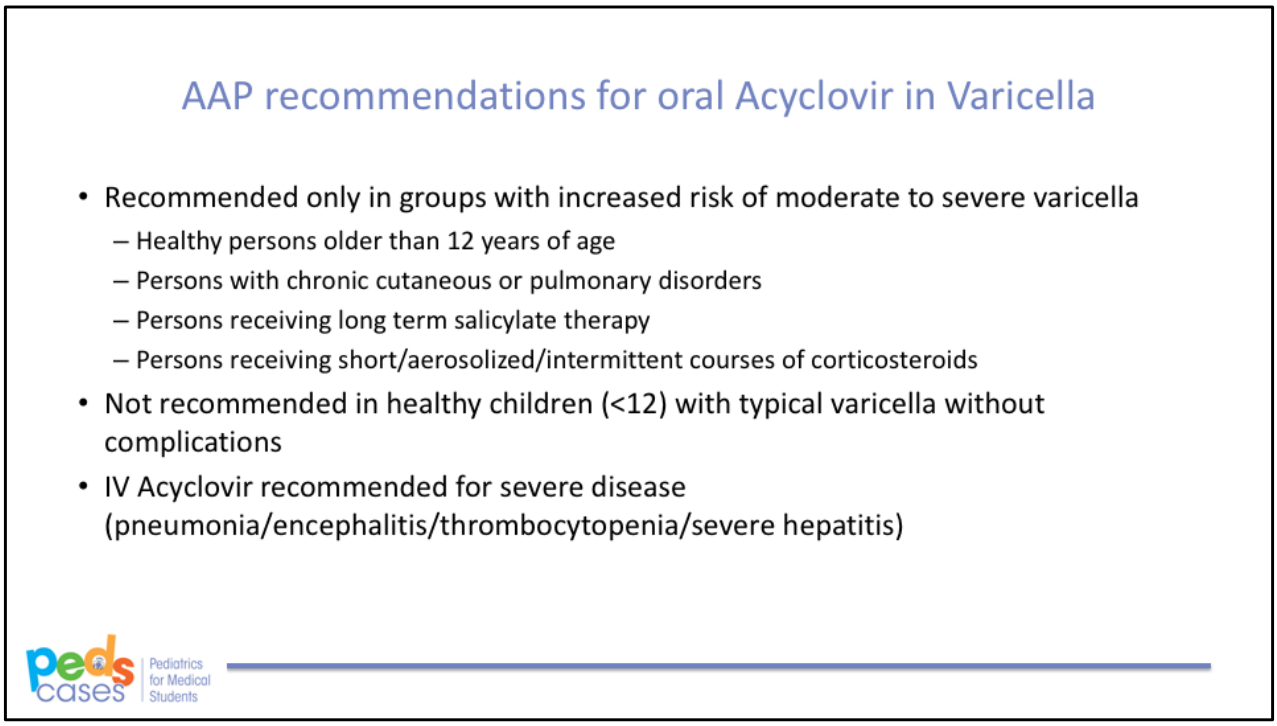



**Slide 8: Lab Diagnosis of Varicella**

Nowadays, widespread vaccination leads to the milder and atypical presentation of varicella, so laboratory confirmation is needed in most cases, although a child with a classic presentation may not need it. The most sensitive method of diagnosis is the detection of VZ virus in skin lesions by PCR.

In case of non-availability of this test, a four-fold rise in IgG in acute and convalescent sera can prove active infection. IgM; on the other hand, takes a few days to rise and can cross-react with other viruses; hence it can be difficult to interpret.

Other investigations may show mild leukocytosis (lymphocytosis) and mildly elevated liver enzymes. Both occur in many viral illnesses and are not specific findings in varicella. In cases with neurological involvement – CSF may show moderate rise proteins and /or mild lymphocytic pleocytosis



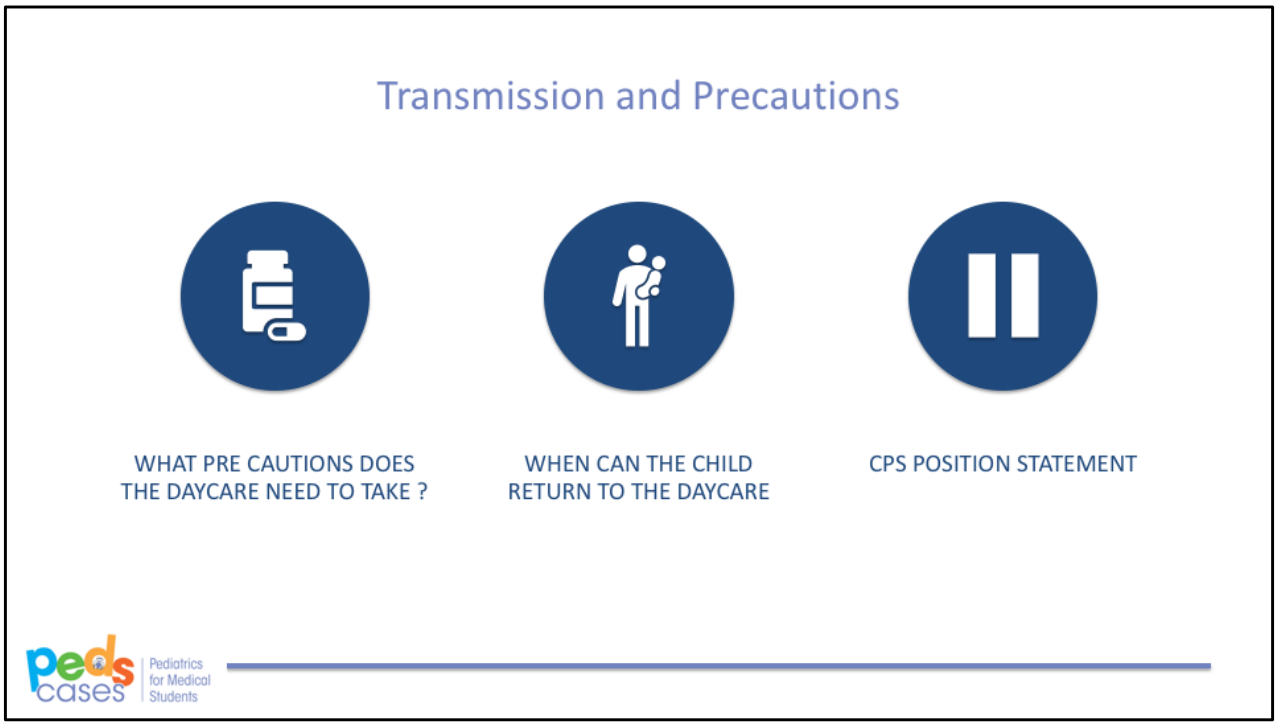

**Slide 9: AAP Recommendations for Oral Acyclovir in Varicella**

Let's talk about the recommendations around Acyclovir -

The American Academy of Pediatrics (AAP) recommends oral acyclovir in groups with a higher risk of severe varicella including healthy persons > 12 yrs, those with chronic cutaneous /pulmonary disorders, those on long term salicylate therapy and those on steroids.

**AAP does not recommend oral acyclovir for young healthy children with chickenpox (< 12 yrs).**

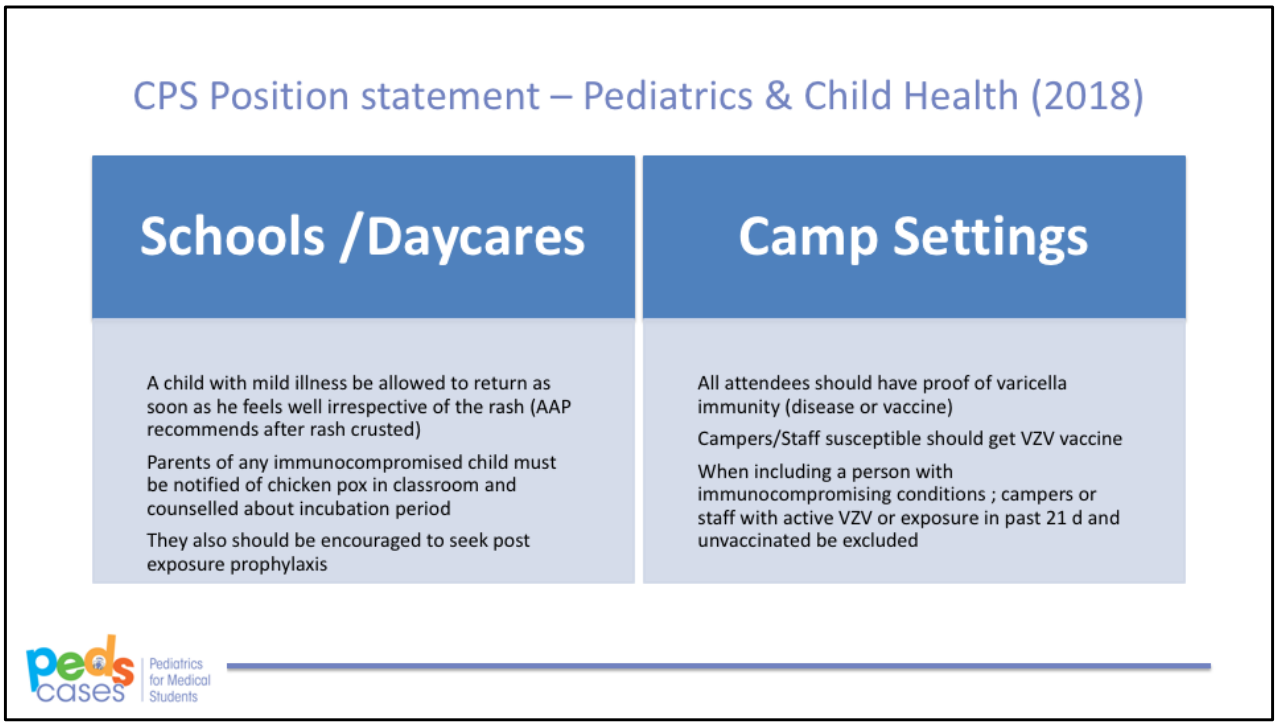
IV Acyclovir should be used for immunocompromised hosts with varicella and for severe disease with complications like pneumonia, encephalitis, thrombocytopenia or severe hepatitis.




**Slide 10: Transmission & Precautions**

The vast majority of children with varicella are managed as outpatients. For families, one of their most important questions is when the child can return to school or daycare?

The Canadian Pediatric Society provides guidance in its position statement updated in 2018.
Let's have a look.



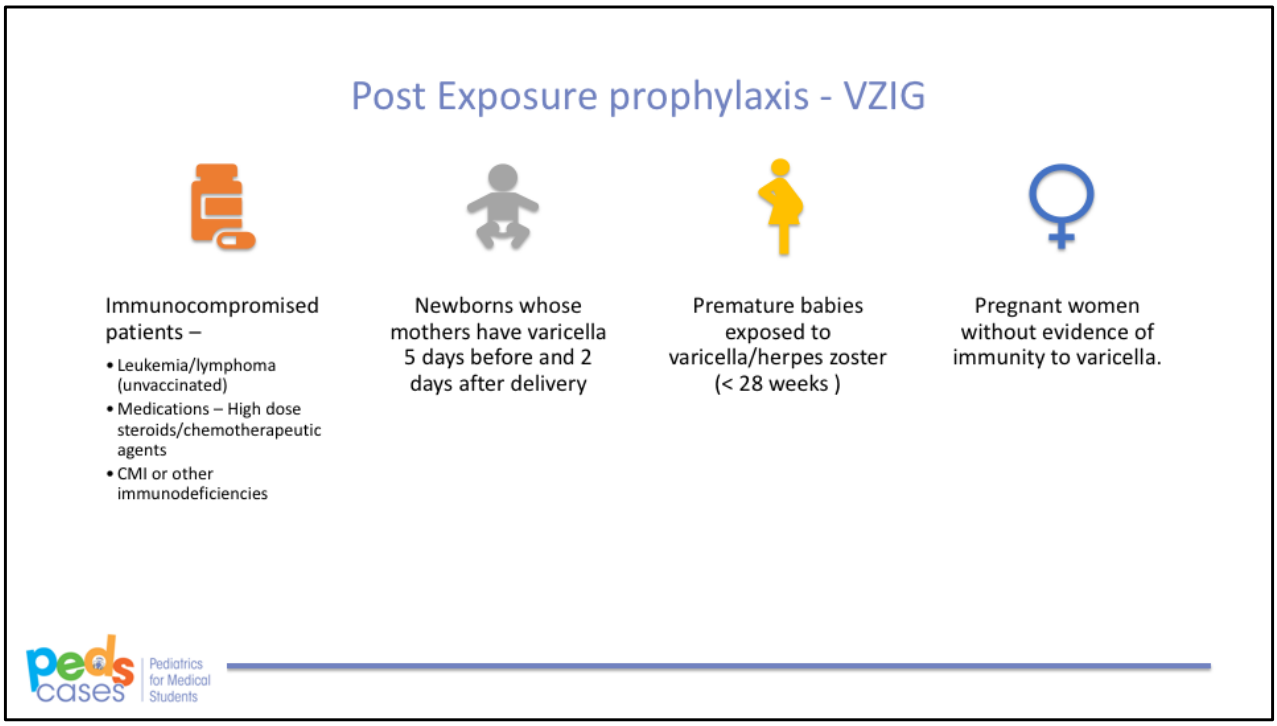

**Slide 11: CPS Position Statement – Pediatrics & Child Health (2018)**

The CPS recommends that the child with mild illness should be allowed to return to school as soon as he/she feels well irrespective of the crusting of the rash. The reason for this is that the child is most infectious before the onset of rash plus there may be other children in the class incubating varicella so there is minimal advantage to keeping them at home after the rash appears. That way the child does not miss school days and parents work days if the child is otherwise feeling well. However, they will still be contagious until all lesions crust over.
This differs from the American Academy of Pediatrics recommendation to keeping the child at home until the rash has fully crusted.

If there are any immunocompromised children in the class who have not either had chicken pox or had two doses of vaccine before they became immunocompromised, their parents should be notified about the case. Usually the immunocompromised child should stay home until there are not thought to be any contagious children in the class.

The CPS statement also lays down guidelines for camps as follows:

1. All attendees should be asked to demonstrate proof of immunity against varicella
2. Those who are not immune should get the VZV vaccine before the camp.
3. When an immunocompromised child will be attending the camp, other campers/staff who are not immune but have had Varicella exposure in the previous 21 days, should not be allowed to attend.

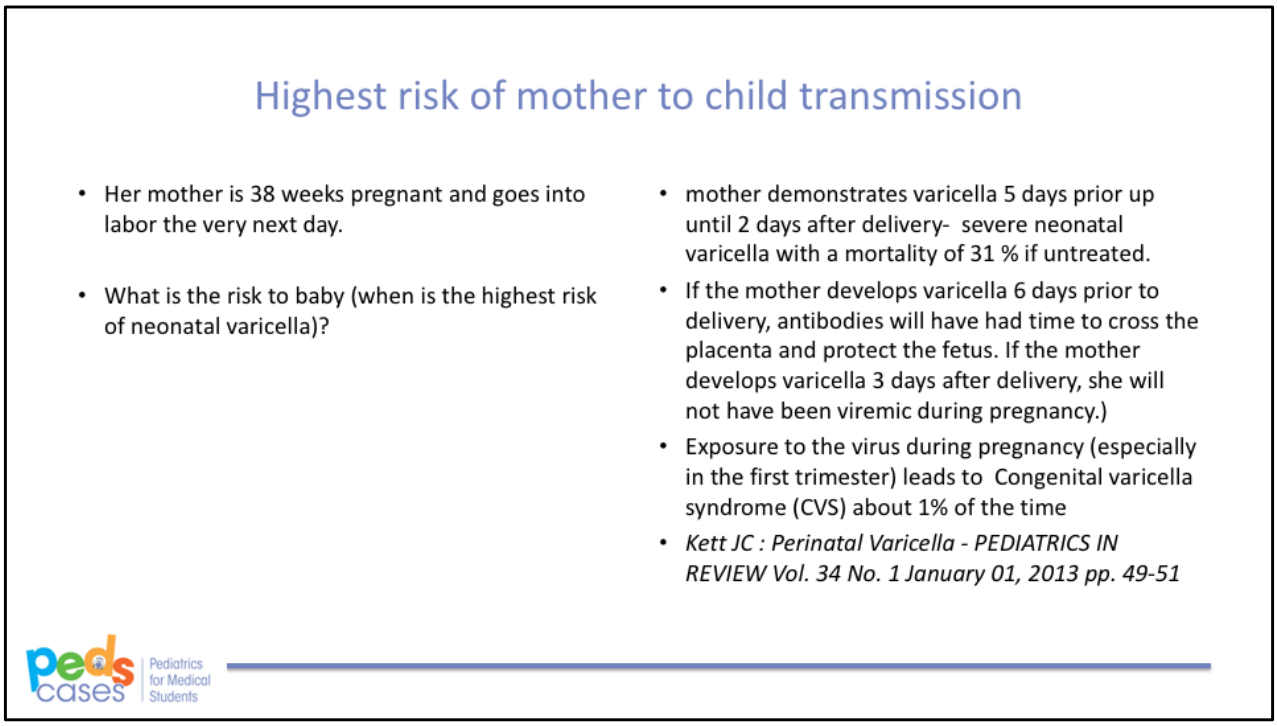



**Slide 12: Post Exposure Prophylaxis – VZIG**

Varicella immune globulin or VZIG is a monoclonal antibody available against varicella that can be used for post-exposure prophylaxis in high-risk patients. What are the recommended indications for using VZIG?

VZIG is indicated in:

1. Exposed persons at high risk of severe varicella including immunocompromised patients (Ex. leukemia/lymphoma if unvaccinated, on high dose steroids/chemotherapy or those with congenital immunodeficiency especially related to the cell-mediated component.
2. Infants at risk for neonatal varicella; like newborns whose mothers have varicella around the time of delivery and premature infants exposed to varicella
3. Lastly exposed pregnant women without evidence of previous immunity to varicella



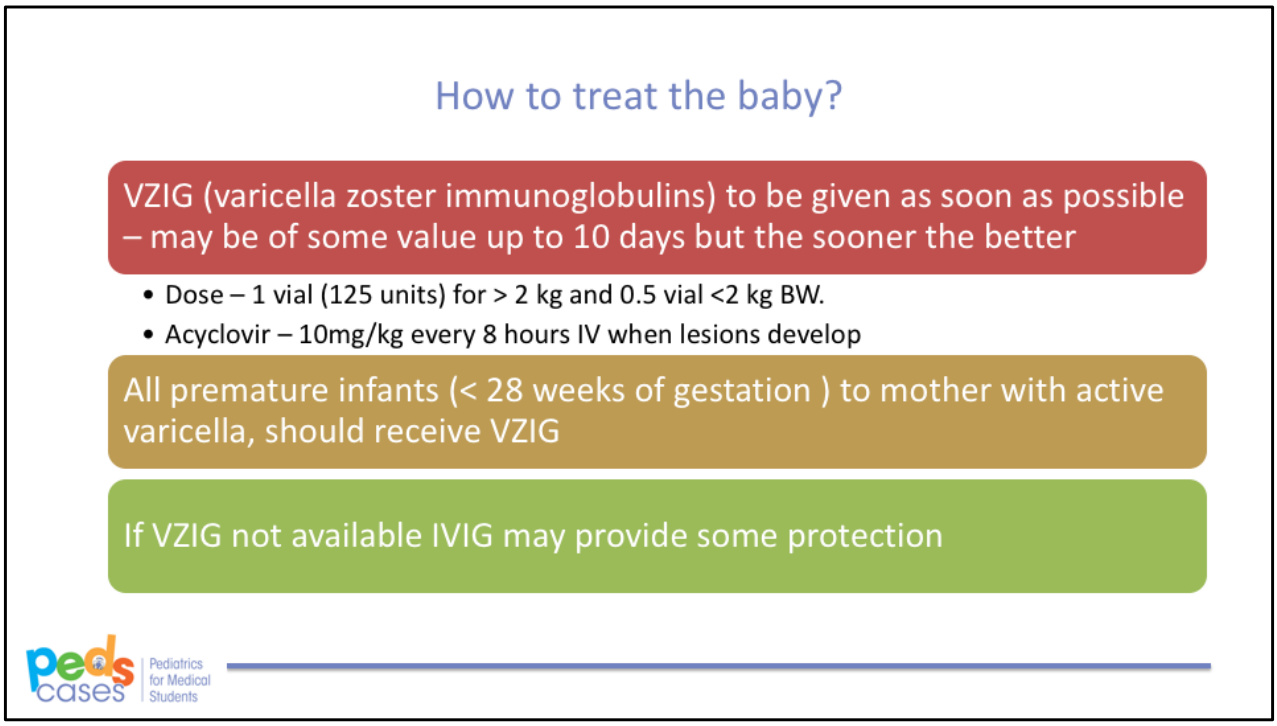

**Slide 13: Highest Risk of Mother to Child Transmission**

Can't resist one more twist –

Let's say, our little Aly's mother is 38 weeks pregnant, and she goes into labour the very next day.
Interesting right??

What is the risk to the baby?
So the highest risk of severe varicella infection to the newborn is when the mother has rash five days before or up to 2 days after delivery as the baby may have got a huge dose virus across the placenta but not enough time to acquire anti-VZV antibodies yet. If she develops rash six days before delivery, the baby will have enough antibodies to avoid severe VZ. Perinatal varicella is a very serious infection for the newborn - The risk of mortality can be as high as 31 %. .

On a related topic, first-trimester exposure to varicella can cause congenital varicella syndrome; that consists of cicatricial scarring, limb defects from a pox covering a limb bud, microcephaly, and/or chorioretinitis.

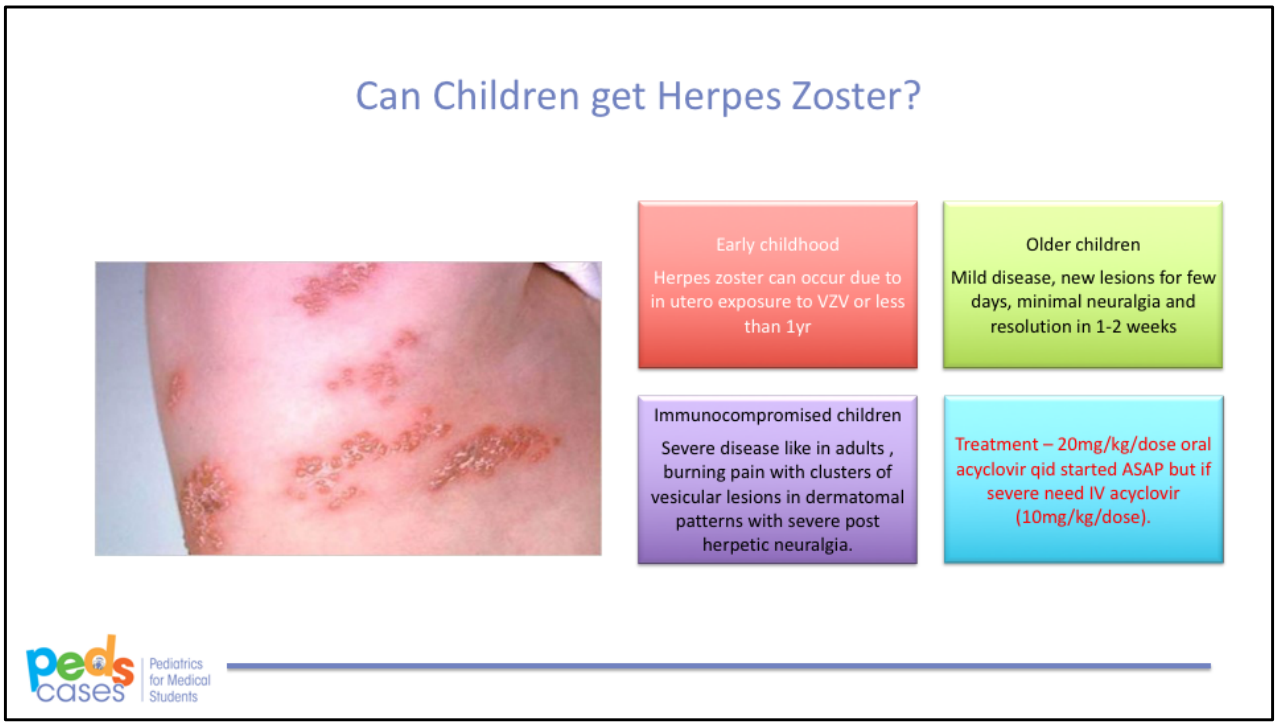



**Slide 14: How to Treat the Baby**

Q- Perinatal Varicella is a big deal – How do we treat the baby?
A-Babies at high risk of severe varicella should receive VZIG as soon as possible after birth (at least within 72-96 hours of birth) and the dose being 1vial (125 units) > 2kg or ½ vial <2 kg.
They should also be treated with IV acyclovir (10mg/kg) every 8 hours when lesions develop. Some experts would treat with acyclovir right from birth.

For the patients meeting any of the criteria for VZIG; some pediatricians may prescribe acyclovir prophylaxis after seven days of exposure in addition to the VZIG (RED BOOK – Pediatric infectious diseases AAP 2018).

IVIG can be used if VZIG is not available.



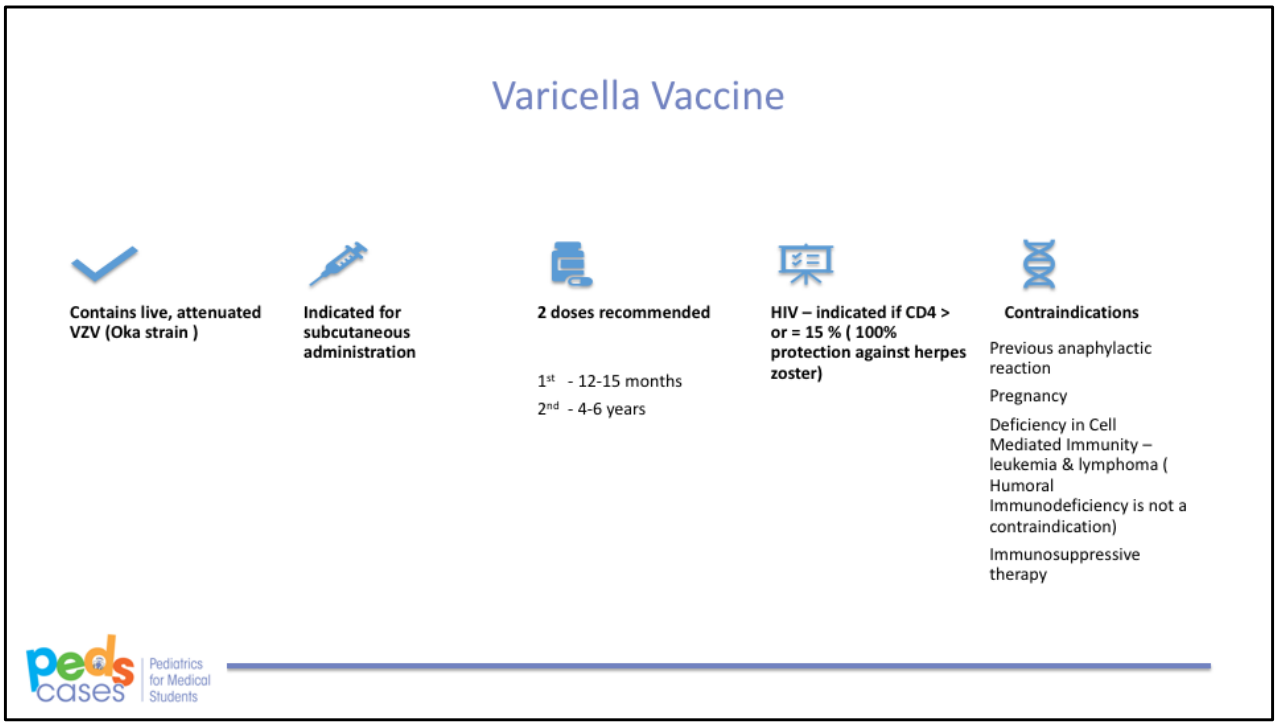

**Slide 15: Can Children Get Herpes Zoster?**

We have seen adults with classic dermatomal Zoster – but what about children – can they get zoster too?

Herpes zoster sometimes occurs in a child who had chickenpox before or even in a child who received the vaccine. They are at higher risk of zoster very early in life if there has been an in utero exposure to VZV or if they got chicken pox before 1 year of age. Zoster in healthy children is usually mild with very few new lesions and minimal post herpetic neuralgia unlike adults. The recovery is also very fast in healthy children

Immunocompromised children, on the other hand, may get very sick with severe burning pain and a typical zoster rash in dermatomal distribution (like in the picture) with severe post herpetic neuralgia. They are also at risk of disseminated disease to the liver or lungs.

Zoster only need to be treated if it is severe or occurs in an immunocompromised child. Treatment is with acyclovir. It should be given IV in the immunocompromised host unless the zoster is very mild.



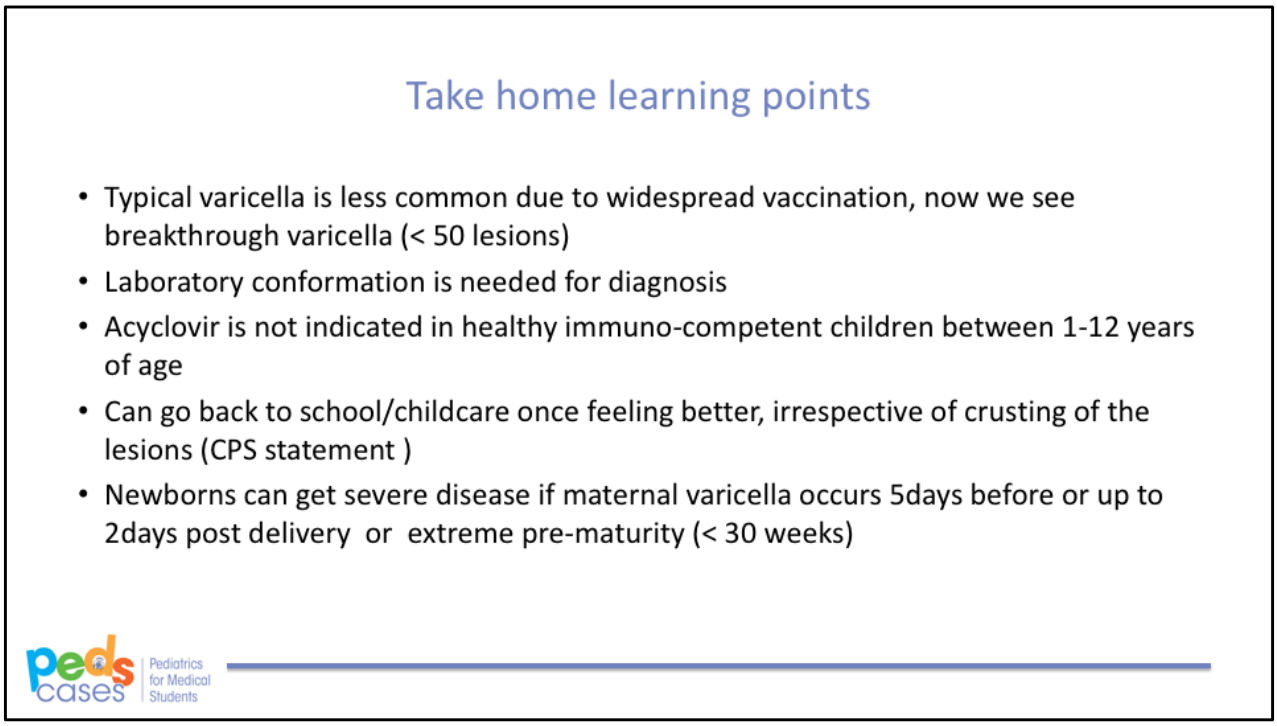

**Slide 16: Varicella Vaccine**

Given the significant complications of varicella, a highly effective vaccine was developed to prevent it. By 2007 every province in Canada adopted universal vaccination for varicella.

The vaccine that is used is a live attenuated vaccine administered subcutaneously.

There are two recommended doses; first at 12-15 months of age and second at 4-6 years although in some provinces across Canada the second dose is given at 18 months.

The vaccine has some Contra- indications including a previous anaphylactic reaction. Because it is a live vaccine, it should not be given during pregnancy or to a child with a congenital immunodeficiency. In case of patients with HIV infection - VZV vaccine is recommended if the HIV is well-controlled.




**Slide 17: Take Home Learning Points**

Some take home points –
Typical varicella is less common due to widespread vaccination; now we see breakthrough varicella (< 50 lesions)
Laboratory confirmation is needed for diagnosis of all but classic cases.
Acyclovir is not indicated in healthy immuno-competent children between 1-12 years of age
Children can go back to school/childcare once feeling better, irrespective of crusting of the lesions (CPS statement )
Newborns can get the severe disease if maternal varicella occurs 5 days before or up to 2 days post delivery.


**Slide 18**

And that's all folks!!
Thank you for listening to this case presentation and discussion from PedsCases.

I am Gauri Shah, signing off, until next time!

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