

EPIDEMIOLOGY OF CHICKENPOX/HERPES ZOSTER (Varicella/Shingles)

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chickenpox



gican (Old English):
“to itch”



chiche-pois (French):
“chick-pea”



Varicella zoster virus

- Herpes family double-stranded DNA virus (smallest genome of herpesviruses)
- Its Human herpes 3
- Produces two clinically distinct syndromes
- Acquired by inhalation or contact.

Herpesviruses

- > 130 herpesviruses
- Of these: 8 known to cause human disease as follows:
 1. Herpes simplex I & II (cold sores, genital herpes)
 2. Varicella zoster (chicken pox, shingles)
 3. Cytomegalovirus (microcephaly, infectious mono)
 4. Epstein-Barr virus (mononucleosis, Burkitt's lymphoma)
 5. Human herpesvirus 6 & 7 (Roseola)
 6. Human herpesvirus 8 (Kaposi's sarcoma)

1. Identification

- Chickenpox (varicella) is an acute, generalized viral disease with sudden onset of slight fever, mild constitutional symptoms and a skin eruption that is maculopapular for a few hours, vesicular for 3_4 days and leaves a granular scab.



Primary varicella

- Days 2-3: initial viral replication in regional lymph nodes
- Days 3-6: primary viremia
- Subsequent second round of viral replication in liver, spleen, other organs
- Secondary viremia seeds capillaries and then skin by day 14-16

- The vesicles are unilocular and collapse on puncture,
- In contrast to the multilocular, non collapsing vesicles of smallpox.
- Lesions commonly occur in successive crops.



- **The case-fatality rate is lower for children (1:100 000 infected in the 5–9 age group) than for adults (1:5000).**
- **Complications include pneumonia (viral and bacterial), secondary bacterial infections, hemorrhagic complications and encephalitis.**
- **Children with acute leukaemia, including those on chemotherapy, are at increased risk of disseminated disease, fatal in 5%–10% of cases.**

- Neonates who develop varicella between ages 5 and 10 days are at increased risk of developing severe generalized chickenpox.
- As are those whose mothers develop the disease 5 days before or within 2 days after delivery; prior to the availability of effective viral drugs, the case-fatality rate in neonates reached 30%.



- Infection early in pregnancy may be associated with congenital varicella syndrome in 0.7% of cases, and at 13–20 weeks gestation with a 2% risk.

Congenital Varicella syndrome

- Damage to sensory nerves
- Damage to optic nerve and lens vesicles
- Damage to cervical and lumbosacral cord
- Damage to brain



case scenario

- 11 year female, previously healthy
- Since 3 days prior to admission, noted to have fever and itchy crusted blisters on forehead, trunk
- Two brothers (7 and 13 year) noted to have similar rash three weeks before
- Several children at school also had chickenpox in past two-three weeks

case

- Came to outpatient due to confusion and increased work of breathing overnight
- At the causality, RR=30, PSaO₂= 70%, hypotensive

case

- **Labs**

- Vesicle swab positive for VZV
- Blood cultures 2/2 bottles with Group A Strep
- GPT= ALT=1066, GOT=AST= 538
- WBC= 3.1, PCV= 34%, Plts= 200,000
- Initial ABG pH= 7.18, HCO₃= 17

- **Studies**

- CXR showed diffuse bilateral pulmonary infiltrates

herpes zoster



herpes (Greek):
“creeping”



zoster (Greek):
“belt, girdle”

shingles



schingles (medieval Latin)



cingulum (Latin): “belt, girdle”

Chickenpox Rash vs. Shingles Rash

The Vaccine Mom

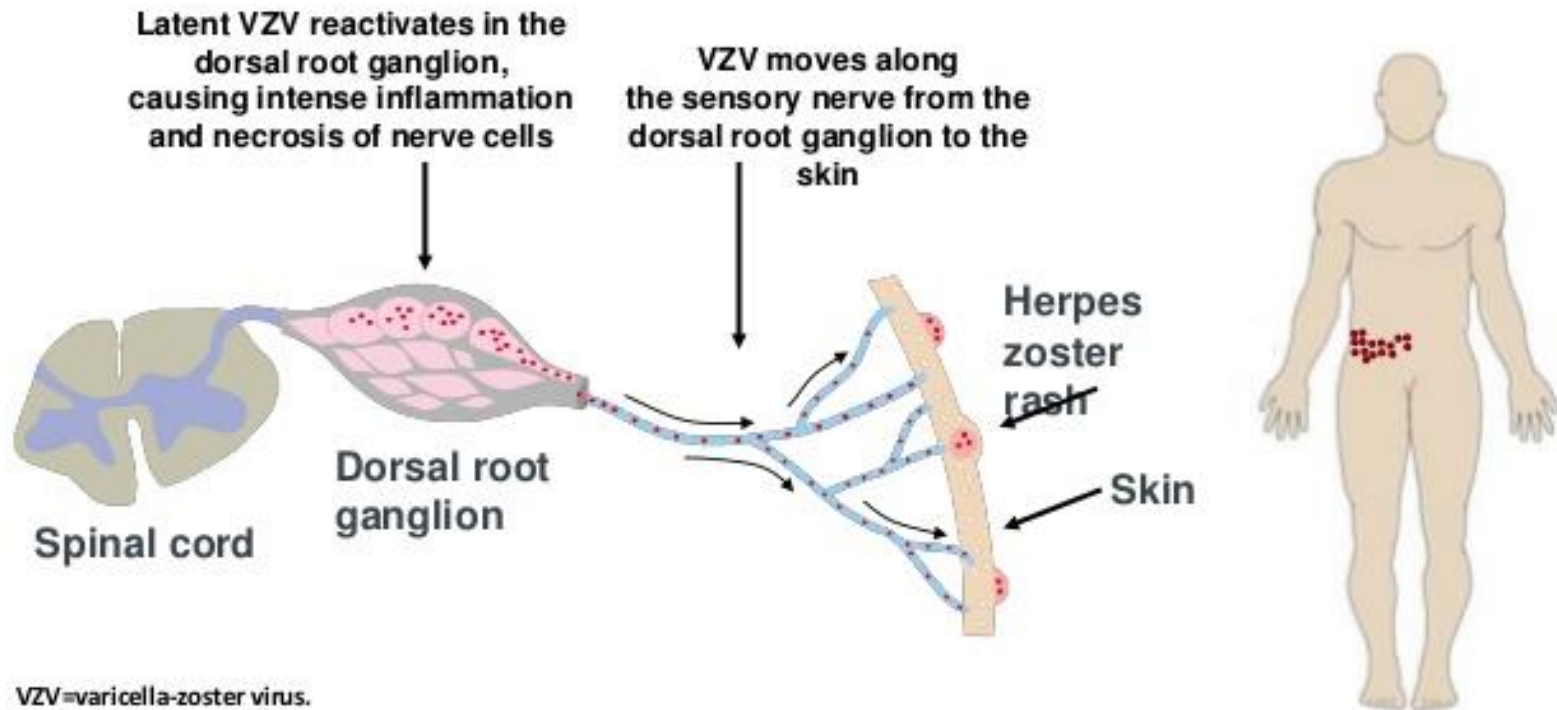


- Raised pink/red bumps appear over several days, and may cover entire body externally and internally
- Fluid-filled blisters form over bumps
- Blisters then break and ooze
- Blisters crust and scab, taking several days to heal



- Fluid-filled blisters over localized area (normally on one side of body- Typically torso/face (rarely on lower extremities))
- Pain, tingling sensation, itching
- Blisters may erupt and ooze, turn yellow and flatten
- Blisters dry out and scab over 1-2 weeks

Latent Varicella-Zoster Virus Reactivates to Cause Herpes Zoster^{1,2}



VZV=varicella-zoster virus.

1. Schmader K et al. *J Infect Dis.* 2008;197 Suppl 2:S207–S215.

2. Gershon AA et al. *Clin Microbiol Rev.* 2013;26:728–743.

Adult image courtesy of: Weaver BA. Herpes zoster overview: natural history and incidence. *J Am Osteopath Assoc.* 2009;109(suppl 2):S2–S6. Reprinted with permission.

Spinal image adapted from Johnson RW, Herpes zoster and postherpetic neuralgia, *Expert Review of Vaccines*, Vol. 9, supplement 3, copyright © 2010, Informa Healthcare. Reproduced with permission of Informa Healthcare.

- **Herpes zoster (shingles) is a local manifestation of reactivation of latent varicella infection in the dorsal root ganglia.**
- **Vesicles with an erythematous base are restricted to skin areas supplied by sensory nerves of a single or associated group of dorsal root ganglia.**
- **Lesions may appear in irregular crops along nerve pathways; they are histologically identical to those of chickenpox but usually unilateral, deeper seated and more closely aggregated.**

VZV reactivation
from ganglionic neurons

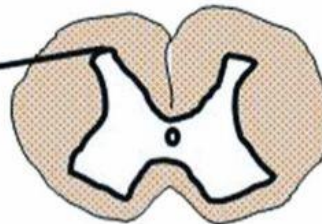
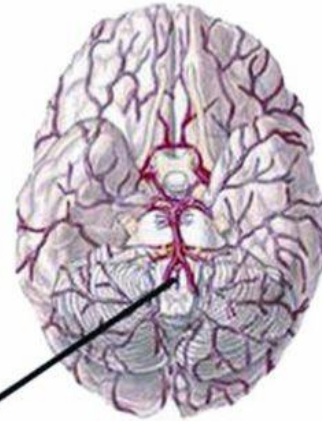
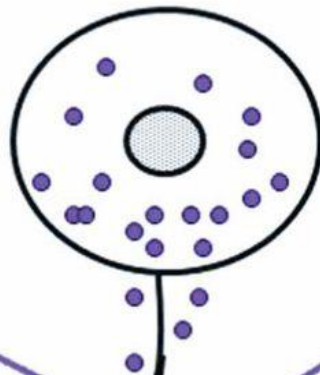
Central spread
to brain
meningoencephalitis

Central spread
to arteries
vasculopathy
temporal arteritis

Central spread
to spinal cord
myelitis

Central spread to
spinal cord arteries
spinal cord infarction

Peripheral spread
herpes zoster

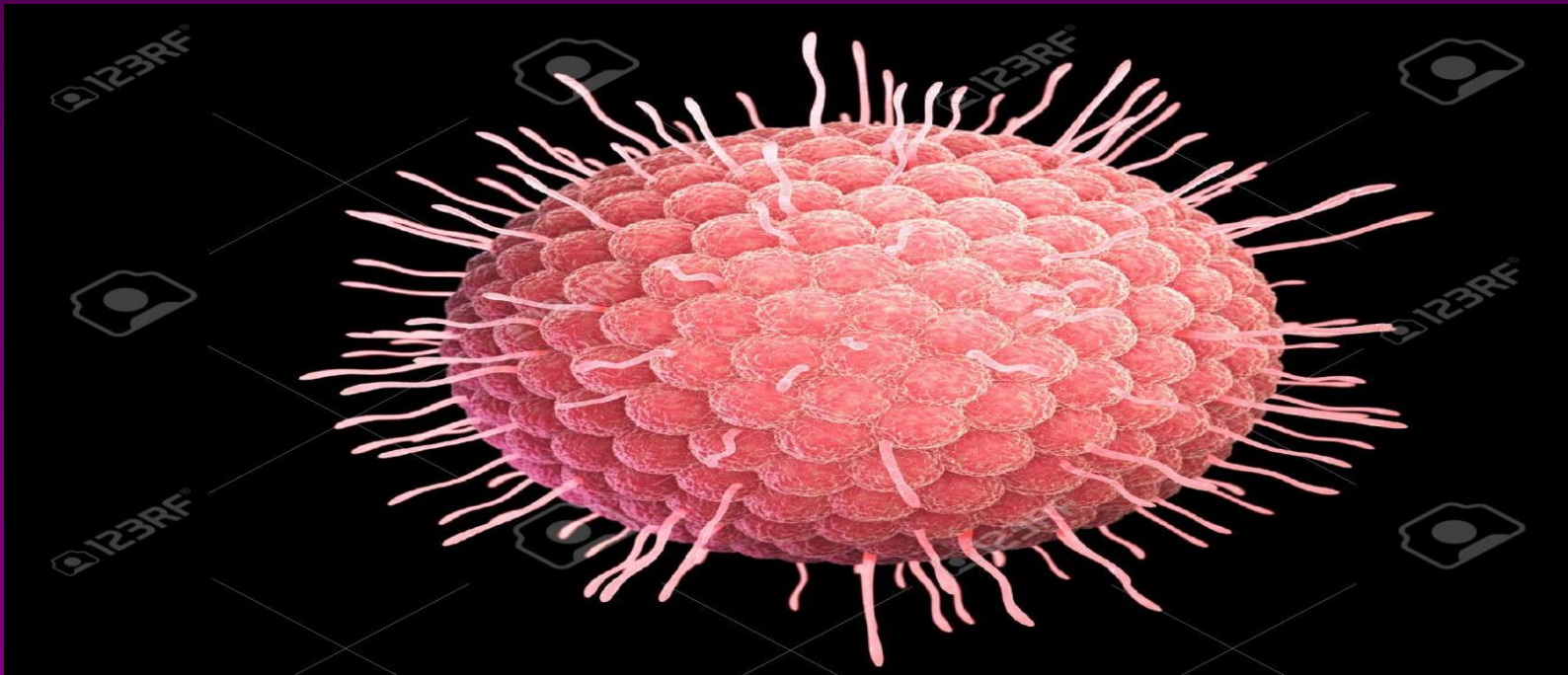


- Severe pain and paraesthesia are common, and herpes zoster may result in permanent neurological damage such as cranial nerve palsy and contralateral hemiplegia, or visual impairment following zoster ophthalmia.



2. Infectious agent

- Human (alpha) herpesvirus 3 (varicella-zoster virus, VZV), a member of the *Herpesvirus* group.



3. Occurrence

- Worldwide.
- In temperate climates, at least 90% of the population has had chickenpox by age 15 and at least 95% by young adulthood.
- The epidemiology of varicella in tropical countries differs from temperate climates, with a higher proportion of cases occurring among adults.
- Zoster occurs more commonly in older people.

Incidence of Chickenpox in Iraq in 2012



Incidence of Chickenpox in Iraq in 2013



Incidence of Chickenpox in Iraq in 2014



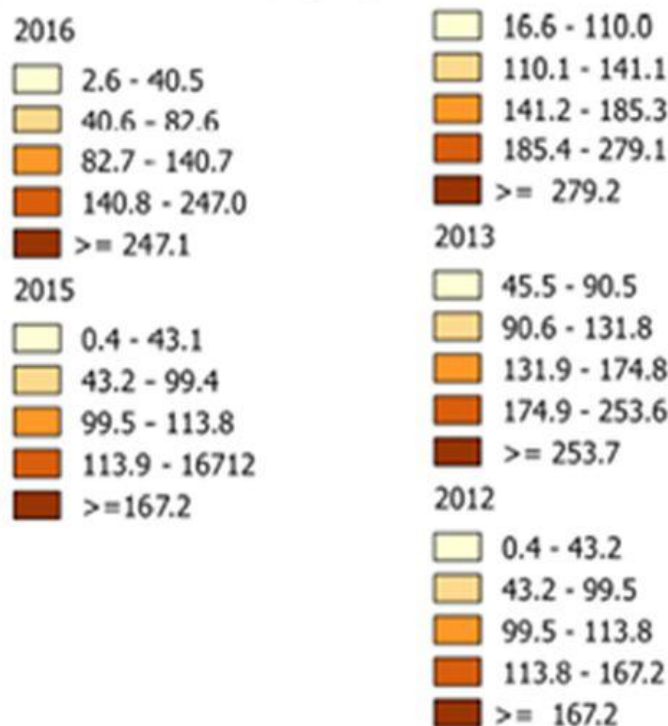
Incidence of Chickenpox in Iraq in 2015



Incidence of Chickenpox in Iraq in 2016



Incidence of Chickenpox/100,000 2014



Seasonal distribution of Chickenpox cases in Iraq from 2007-2011

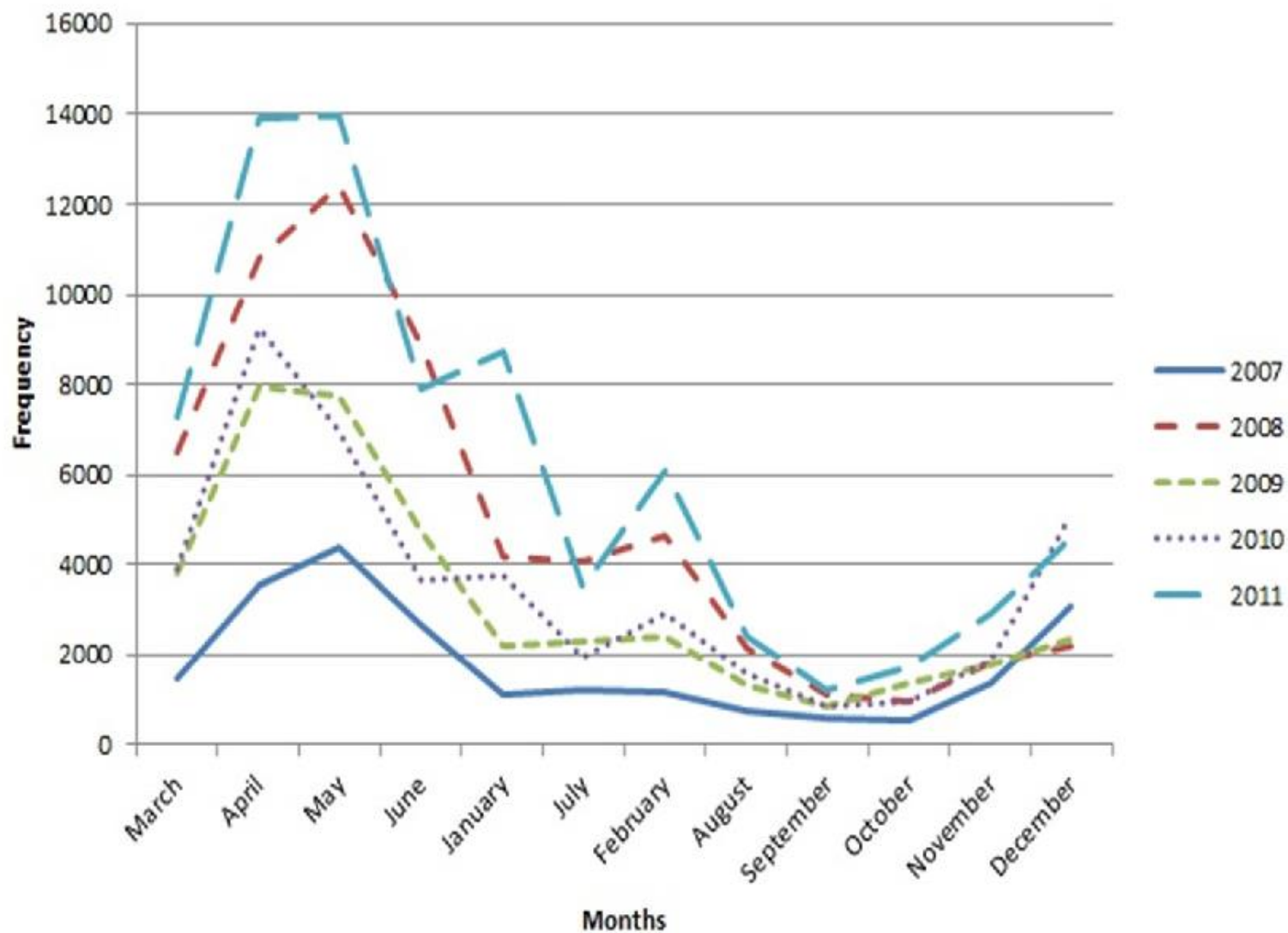


Figure 3. Seasonal distribution of clinically diagnosed chickenpox in Iraq from 2007-2011

5. Mode of transmission

- Person-to-person by direct contact, droplet or airborne spread of vesicle fluid or secretions of the respiratory tract of cases or of vesicle fluid of patients with herpes zoster
- Zoster has a lower rate of transmission .

Regarding chickenpox all are true except:

- A. Premature delivery is risk factor for severe disease among neonates.
- B. Adults have the same case fatality of child .
- C. Foetuses infected at 16–20 wk. may have eye and brain involvement.
- D. Reactivation causes shingles in adults.

6. Incubation period

- 2 to 3 weeks; commonly 12–16 days.

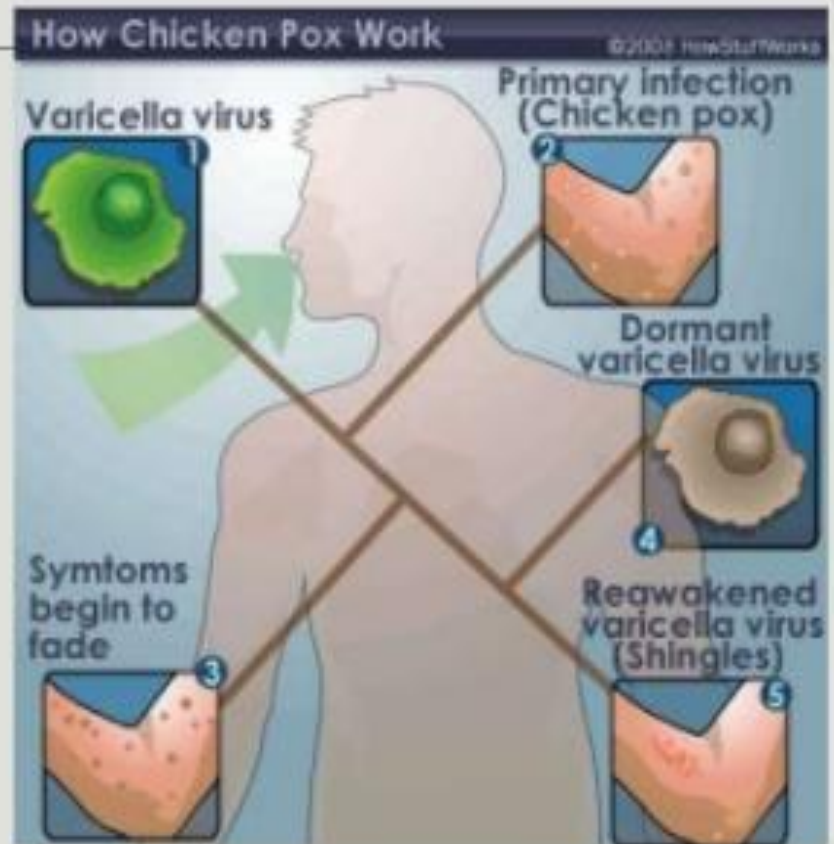
7. Period of communicability

- As long as 5 days
- But usually 1–2 days before onset of rash, and continuing until all lesions are crusted (usually about 5 days).
- Contagiousness may be prolonged in patients with low immunity.

- The secondary attack rate among susceptible siblings is 70%–90%.
- Patients with zoster may be infectious for a week after the appearance of vesiculopustular lesions.
- Susceptible individuals should be considered infectious for 10–21 days following exposure.

Epidemiology

Communicable Disease
World wide prevalence
Common in < 10 year olds.
Zoster in Adults
Droplet spread is common



8. Susceptibility

- Susceptibility to chickenpox is universal among those not previously infected; ordinarily a more severe disease of adults than of children.
- Infection usually confers long immunity. **subclinical reinfection is common.**
- Viral infection remains latent; disease may recur years later as herpes zoster in about 15% of older adults.

9. Methods of control

Preventive measures:

A live attenuated varicella virus vaccine has been licensed for use .

A single 0.5 ml SC dose is recommended for routine immunization of children aged 12 to 18 months and for children up to 12 years who have not had varicella.



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 Taiwan

Regarding VZ vaccine one of the following is true :

- A. It is toxoid
- B. Killed vaccine given early in life.
- C. Live attenuated
- D. Mixed with rubella vaccine

Tip to remember

Chicken pox vaccine not included in
Iraqi schedule of vaccination.

Control of patient, contacts and the immediate environment:

- 1) Report to local health authority: In many countries, not a reportable disease.
- 2) Isolation: Exclude children from school, medical offices.
- 3) Quarantine: Usually none.

prevention of VZV infections.

- **live attenuated varicella vaccine is recommended for all children >1 year of age (up to 12 years of age) who have not had chickenpox**
- **for adults known to be seronegative for VZV.**
- **Two doses are recommended for all children: the first at 12–15 months of age and the second at ~4–6 years of age.**
- **VZV-seronegative persons >13 years of age should receive two doses of vaccine at least 1 month apart.**

TABLE 193-1 Recommendations for VZIG Administration**Exposure Criteria**

1. Significant exposure to a person with chickenpox or zoster
 - a. Household: residence in the same household
 - b. Playmate: face-to-face indoor play
 - c. Hospital
 - Varicella: same 2- to 4-bed room or adjacent beds in a large ward, face-to-face contact with an infectious staff member or patient, visit by a person deemed contagious
 - Zoster: intimate contact (e.g., touching or hugging) with a person deemed contagious
 - d. Newborn infant: onset of varicella in the mother ≤ 5 days before delivery or ≤ 48 h after delivery; VZIG not indicated if the mother has zoster
2. Patient should receive VZIG as soon as possible but not >96 h after exposure.

Candidates (Provided They Have Significant Exposure) Include

1. Immunocompromised susceptible children without a history of varicella or varicella immunization
2. Susceptible pregnant women
3. Newborn infants whose mother had onset of chickenpox within 5 days before or within 48 h after delivery
4. Hospitalized premature infant (≥ 28 weeks of gestation) whose mother lacks a reliable history of chickenpox or serologic evidence of protection against varicella
5. Hospitalized premature infant (< 28 weeks of gestation or ≤ 1000 -g birth weight), regardless of maternal history of varicella or VZV serologic status

Abbreviation: VZIG, varicella-zoster immune globulin.

- Lastly, antiviral therapy can be given as prophylaxis to individuals at high risk who are ineligible for vaccination or who are beyond the 96-h window after direct contact.
- While the initial studies have used acyclovir, similar benefit can be anticipated with either Valacyclovir or famciclovir

Don not forget.....

Reye Syndrome

- Mechanism (exact cause) is unknown
- Affect children and teenagers **after recovering from viral infections** (flu or chicken pox); associated with aspirin intake to treat viral infection
- **Systemic (Serious) condition causing swelling of liver & brain**: Fatty change in liver; Edematous encephalopathy in brain
- Fatal – 30% mortality in US (1981 – 1997)

Thank you