VARICELLA-ZOSTER (CHICKENPOX) VACCINES FOR AUSTRALIAN CHILDREN: INFORMATION FOR GPS AND IMMUNISATION PROVIDERS

FACT SHEET

National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases

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Varicella-zoster virus (VZV)

VZV is one of eight herpes viruses that cause infections in humans. It is a double-stranded DNA virus and is most closely related to herpes simplex virus types 1 and 2. These viruses rapidly proliferate, invade and destroy infected cells. Like other herpes viruses, VZV has the unusual ability to establish a latent infection in nerve ganglions, which can later reactivate causing shingles (herpes zoster).

Epidemiology and burden of varicella and herpes zoster (shingles).

In unvaccinated populations, varicella (chickenpox) is primarily a childhood illness with more than 90% of the population in temperate countries developing clinical or serological infection by adolescence.[1] Varicella is generally a benign, self-limiting illness in children. Severe illness causing hospitalisation, or even death, becomes more likely with increasing age,[2] or with a suppressed immune system.[3] There are about 240 000 cases, 1500 hospitalisations and seven deaths each year from varicella in Australia.[4-6] Although the risk of severe disease is greater in adolescents and adults, the majority of hospitalisations are in children because disease incidence is far higher in childhood.

Herpes zoster (HZ) or "shingles" is a sporadic disease, caused by the reactivation of latent VZV. It is usually self-limiting and is characterised by severe dermatomal pain. This pain can persist (post-herpetic neuralgia), especially in the elderly.[7] Although HZ can occur at any age, incidence increases with age (in contrast to chickenpox) and most cases occur after the age of 50.[7,8]

Vaccine efficacy and recommendations for use

Available vaccines

Two vaccines containing live attenuated (weakened) varicella-zoster virus are currently available in Australia (Varilrix^{O} and Varivax Refrigerated^{O}). A single dose of 0.5ml is sufficient from the age of 12 months to 13 years but two doses at least 1 month apart are required from 14 years of age. Detailed information about them is available on page 280 of the Australian Immunisation Handbook (AIH).[9] These vaccines are derived from distinct genetic variants of the Oka varicella-zoster virus strain.

Recommendations

Varicella vaccination has been recommended by the National Health and Medical Research Council (NHMRC) for all non-immune Australian children at the age of 18 months since 2003. From November 2005, varicella vaccine will be provided free under the National Immunisation Program for all children at 18 months of age and as part of a catch-up program for children aged 10–13 years who have not received the vaccine and/or have not had chickenpox. Further detailed information on the national varicella vaccination program in Australia for both immunisation providers and the general public is available at http://immunise.health.gov.au/varicella/index.htm.[10]

Among those not eligible for funded vaccine, it is particularly recommended for non-immune persons at high risk of exposure to, or complications from, varicella, such as health care workers, child care workers, non-immune women before pregnancy and parents. Vaccination of non-immune household contacts of immunosuppressed persons is also important to minimise opportunities for transmission of varicella to the immunocompromised person (see page 284 AIH).[9]

Vaccine efficacy

Vaccine efficacy in children is reported to be 88%–98% from clinical trials,[11] but vaccine effectiveness measured in outbreaks has ranged from 44%–100%.[12] A younger age at vaccination (below 15 months) may increase the risk of vaccine failure, probably because maternal antibodies are still present in some children at 12–15 months, reducing immunogenicity of the vaccine.[13] This is one reason why the vaccine is recommended at 18 months of age in Australia. The response to a single dose of varicella vaccine decreases as age increases; hence, healthy adolescents (14 years and older) and adults require two doses, 1–2 months apart.[14]

Breakthrough disease (natural varicella infection in vaccinated individuals)

Varicella vaccine is up to 90% effective at preventing chickenpox. However, "breakthrough varicella" (infection with wild-type varicella in vaccinees) is expected to occur in 3%–4% of a vaccinated cohort each year.[15] Studies have indicated that the rate of breakthrough disease is higher when vaccinees are exposed in a setting of close contact (such as in households). Cases that occur despite vaccination are usually mild and result in fewer skin lesions (usually <50). The skin lesions may not be vesicular and systemic symptoms, such as fever, occur less frequently.[16] Because of this, breakthrough disease may not be recognised, or may be misdiagnosed. However, breakthrough varicella can still be contagious and exclusion from child care/school is recommended.

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Vaccine administration

Varicella vaccines are safe to administer at the same time as all other recommended vaccines on the schedule (given subcutaneously at a separate site). Other live attenuated vaccines (eg. MMR) should either be administered at the same time or at least 4 weeks apart from varicella vaccine. There is evidence of higher vaccine failure rates if MMR is given within 4 weeks of varicella vaccine, unless given at the same visit.[17] In children less than 14 years, serology prior to vaccination is not necessary as a reliable history of varicella infection in this age group correlates well with immunity. If the history of past varicella infection is uncertain (or absent), the individual should be considered susceptible, and should be immunised. Vaccination of individuals who are already immune to varicella is well tolerated, so prior serologic testing is not essential, but is useful over the age of 14 years as many without a history of varicella will be seropositive.

Contraindications

Vaccination is contraindicated in pregnancy, and pregnancy should be avoided for 1 month following vaccination. However, in women inadvertently vaccinated during pregnancy, no adverse effects have been reported. The vaccine is also contraindicated for immunocompromised persons, but their household contacts should be vaccinated, if non-immune, to protect the immunocompromised person against infection. Previous anaphylactic reaction to neomycin is a contraindication to both vaccines and gelatin anaphylaxis is a contraindication to Varivax Refrigerated[Ó].[9]

Adverse events

Vaccine reactions are generally mild, and include fever and injection site reactions (7%–30%). Rashes (localised or generalised) following vaccination may be due to either coincident wild VZV infection or be related to the vaccine virus. The latter generally occur later following vaccination (median of 21 days for vaccine virus compared to 8 days for VZV; see page 285 AIH).[9] If a rash develops, vaccinees should avoid contact with immunosuppressed persons, although virus transmission is extremely rare and most rashes after varicella vaccination are due to other causes, especially in children. More serious adverse events occurring soon after vaccination have been reported at a rate of 2.9 per 100 000 doses by passive surveillance. A causal, as opposed to coincidental, relationship to vaccine is not established, but is plausible, for anaphylaxis following vaccination, thrombocytopenia, ataxia and encephalitis. These latter three are rare complications of natural varicella infection.[18]

Advice to parents

Varicella vaccine is recommended to prevent both chickenpox and the lifetime risk of shingles due to chickenpox infection. About 75% of Australian children will have chickenpox by the age of 10 and there are about 1000 hospitalisations a year in children aged 10 and under. Chickenpox poses particular dangers for certain members of the community, such as pregnant women and people with weak immune systems. The main benefit of vaccination for individual families is avoiding the illness in their children, and time off work caring for infectious children required to stay at home. The vaccine is a live weakened form of the virus, which is well tolerated in most people. The vaccine is up to 90% effective; some vaccinated children may still become infected with the chickenpox virus if exposed to it, but the disease is usually mild in that situation (see Breakthrough disease above). Choosing not to vaccinate with varicella vaccine does not currently impact on immunisation status for Centrelink payments, or commencing school, but may in the future. From November 2005, varicella vaccine will be provided free for all children at age 18 months through their immunisation provider (eg GP, clinic) and through a “catch-up” program at one age between 10–13 years.[10] The ‘catch-up' program for the 10-13 years age group will be administered by the State and Territory health departments and may differ in how the program is run and which age within 10-13 years will be eligible for free vaccine. Parents of eligible children can contact their State or Territory Health Department for more details.[10]

Herpes zoster

Since varicella-zoster virus may reactivate to cause herpes zoster (HZ or shingles), the impact of varicella vaccination on the incidence of herpes zoster in both children and adults is being closely studied. Although time will be needed to determine the long term impact of universal varicella vaccination, much information is already available from studies in the USA where universal varicella vaccination has been in place for 10 years. First, it is extremely rare for the vaccine strain of the virus to reactivate in vaccine recipients and cause shingles so, in vaccine recipients, the incidence of HZ is likely to be lower over time compared with those infected naturally with wild-type varicella.[15] Second, although mathematical modelling has suggested that rates of HZ in adults may temporarily increase over time following the introduction of universal varicella vaccination (because reduced exposure to virus in the community may reduce opportunities to boost immune responses in already-infected adults), preliminary studies show that rates of HZ in the US are so far unchanged and that mechanisms are in place to continue effective surveillance.[19] Third, a recent clinical trial using a high potency formulation of varicella vaccine, known as

the “zoster vaccine” has shown it to be effective in reducing the incidence and severity of HZ in elderly adults.[20] In Australia and elsewhere, ongoing surveillance of varicella and herpes zoster will determine whether there is a need for further interventions in the future, such as a second dose of varicella vaccine in children and/or high-dose varicella vaccine to prevent herpes zoster in older adults.

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