2016 Academic Review for the New Zealand National Immunisation Schedule:
Varicella-zoster virus (chickenpox)

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NZ Immunisation Handbook 2014

The Australian Immunisation Handbook 10th Edition
Varicella Vaccines licensed in NZ

**Live attenuated**

**Monovalent**
- Varilrix®
- Varivax®

**Combination MMRV**
- Priorix-Tetra®

- Given in one or two doses from 9 months of age
- Subcutaneous 0.5ml
MMRV
(licensed but not currently available)
Varilrix®

- Live attenuated Oka strain of varicella-zoster virus
- Mono-dose vial with a separate diluent
- Each 0.5ml reconstituted contains
  - ≥ 10^{3.3} plague-forming units (PFU) attenuated varicella virus, human albumin, lactose, neomycin, polyalcohols
- Store 2-8°C
- Once reconstituted use as soon as possible
  - Hold at ambient temp not more than 90 minutes, or fridge not more than 8 hours
- 0.5ml subcutaneous
- From 9 months of age
  - 1 or 2 doses in children, 2 doses >12 years
- Minimal interval between doses: 4 weeks
- Can be given at the same time as
  - DTaP-containing vaccines, hepatitis B, Hib, MMR, Hepatitis A, pneumococcal conjugate vaccines
Effectiveness

• **Single Dose**
  - Approx. 80% effective
  - Against severe disease 95% +
  - Breakthrough cases less severe

• **Two dose**
  - 93% -100% against severe disease

• Breakthrough varicella in vaccinated people
  - Usually attenuated
  - Severity does not increase with time post vaccination

• **Immunocompromised**
  - Effectiveness unclear
  - Disease severity reduced
  - Mild immunosuppression still get seroconversion

SAGE. Systematic review of available evidence on effectiveness and duration of protection of varicella vaccines.: WHO; 2014
Available from: http://www.who.int/Immunization/sage/meetings/2014/april/presentations_background_docs/en/
Duration of protection

• One dose
  • Not yet defined, but breakthrough disease does not become more severe with time
  • US study VE declined from 88.8% to 81.8% after >10 years
  • Some effect from circulating wild disease causing boosting
    • Therefore reductions in circulating disease may reduce duration of protection

• Two-dose probably long lasting
  • NB second dose also acts as a booster
    (unlike measles vaccination)
  • No breakthrough after 14 years post two doses
  • Many countries introduce a few years after starting one dose
  • Universal 2 dose in US since 2006

SAGE. Systematic review of available evidence on effectiveness and duration of protection of varicella vaccines.: WHO; 2014
Available from: http://www.who.int/immunization/sage/meetings/2014/april/presentations_background_docs/en/
Impact of varicella vaccination programmes

Significant reductions in severity of disease, hospitalisations and circulation of varicella in all regions that have introduced varicella

• US (one dose in 1995, two doses in 2007)
  • 90-95% reduction in varicella in 5-19 yr olds
  • No evidence of shift in burden to older age groups
  • 10 fold reduction in varicella hospitalisations
  • 99% decline in mortality fur <20yrs
  • Declines in all age groups, including infants too young to be vaccinated

• Similar impacts in Germany (1 dose 2004, 2 dose 2007), Saudi Arabia (2 dose 1998) Canada (1 dose 2000-2007, six provinces dose 2), Italy and Spain region by region,

• Australia: Single dose 2005, second dose as MMRV 2013


Impact of varicella vaccination programmes (2)

Where varicella still in circulation, significant reduction in disease in younger age groups, disease incidence can be pushed to the older children, adolescents

• Therefore vaccination of non-immune adolescents is warranted
• Many countries have funded adolescent catch-up

Herd immunity

Where universal programmes have been implemented significant declines in cases and hospitalisations have been seen, including those not vaccinated – infants and immunocompromised

For example: Canada concluded that decreases in varicella circulation contribute significantly to decliners in varicella-related hospitalisations for young infants and adults aged 20 -39 yrs

AEFIs

• Generally mild and self limiting
  • Fever: Possible 5-12 days post vaccination
  • 1-3% localized rash
  • 3-5% generalized varicella-like rash
    • 5-26 days post vaccination
    • Usually 2-5 lesions, can be maculopapular

• ? Transmission of vaccine virus to others:
  • Possible but extremely rare
  • Err on the side of caution
    • If there is a post-immunisation rash isolate from any immunosuppressed contacts, cover rash

• Noted but not necessarily causally linked
  • Encephalitis, ataxia, thrombocytopenia, anaphylaxis <0.01%
Safety profile

Immunocompetent

- 2008 review AEFI 3.4/100 000 doses (based on 55.7 million doses during 1995 – 2005 worldwide)
- Post-market surveillance USA serious adverse events <4/100 000
- Most frequently reported reactions mild and primarily injection site reactions (systematic review SAGE)
- Site pain, swelling, redness: 28%
- Local or generalized rash fairly frequent
- ITP with adolescent vaccination, rare but possible – all mild and acute
- Anaphylaxis reported but very rare
- No increased risk of febrile seizures with monovalent varicella vaccine alone at 11 months of age
- No increase risk of cerebellar ataxia, encephalitis or ischaemic stroke

Safety profile (2)

Immunocompromised

• Higher risk in children with cell-mediated immunity deficiencies

• Can use cautiously in children closely monitored oncology situations, treatments regimes for juvenile arthritis

• Undiagnosed immunocompromised – rash, vaccine strain viral reactivation and subsequent infections dissemination, pneumonitis, meningitis, hepatitis, fatal outcomes

SAGE. Safety of varicella and MMRV vaccines: A systematic review 2014 Available from:  
http://www.who.int/immunization/sage/meetings/2014/april/presentations_background_docs/en/
**MMR-V**

- Increase in febrile convulsions in dose one if given 12 – 23 months: excess cases
  - MMR + V (separate injections) = 3-4/100 000
  - MMRV = 7-9/100 000 (excess of 4.2/100 000) ref 34
  - Peak age 16-18 months and incidence 5 – 12 days post vaccination
  - Overall one additional febrile seizure per every 2,300 doses
  - Incidence of seizures highest in 16 -18 months

- Use of MMRV doubles the risk of seizures at 12 -15 months and 16-23 months
- No increase in febrile convulsions when used as dose 2

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**NB delaying MMR dose one until 16 months or older increases relative risk of seizure by 3 times compared with on time vaccination**

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Post exposure prophylaxis

A single dose is highly effective when administered within 3-5 days of exposure (79 – 100%)

Break through cases tend to be more mild

Contraindications

• General Vaccine contraindications
  • Anaphylaxis to vaccine components
  • Acutely unwell

• Immunocompromised
  • Primary or acquired T-cell deficiency states
  • High dose steroids for >2 weeks
  • Know anaphylaxis to neomycin
  • Active untreated Tb
  • In pregnancy

• Relative contraindications
  • Children on salicylates (association with Reye syndrome)

• Precautions
  • On the advice of a specialist:
    • 2 years post bone marrow transplantation
    • 6 months post chemotherapy
    • HIV-positive with mild or mod immunosuppression

• Breast feeding – NO concerns, NOT a contraindication
Contraindications

• Pregnancy
  • Pregnancy register data for 17 years (928 reports when inadvertently given)
    • No congenital varicella syndrome
    • No increased birth defects
    • Register closed in 2013

• Immunocompromised
  • But limited capacity for virulence or replication:
  • Mild immunocompromised benefits probably outweigh risks eg HIV on treatment, one year post organ transplant recipients on maintenance immunosuppression
  • Closely monitored oncology patients, on Rx for juvenile arthritis

• CAUTION, TAKE ADVICE
• Can treat with antivirals

Refer page 502 NZ Immunisation Handbook 2014
Herpes zoster

- Zoster can occur post vaccination but lower rates
  - 48/100 000 in vaccinated versus 230/10 000 in unvaccinated
  - US study vaccinated children had 79% lower incidence of zoster

- If zoster is prevented by exogenous boosting (ie exposure to circulating varicella)
  - Theoretically stopping varicella circulating could increase the incidence of zoster in older groups
  - BUT - No definite increase has been demonstrated in countries that have introduced varicella vaccination. No definitive increase has been seen overall in the US or Australia

Delivery

• Private market
  • One or two doses from 9 months of age
  • 13 years plus: Two doses

• From July 2017 on National
  • Single dose at 15 months
    • Four injections
    • Alongside Hib, PCV10 and MMR

• Catch up in General Practice for 11 year olds with no prior history of varicella or vaccination
Evidence for effective multiple injections at one visits is around the CONFIDENCE OF THE PROVIDER, more than the parent
Adolescents and adults
- recommended not funded

ANYONE with no history of varicella and/or negative serology

PARTICULARLY

• Born and resided in tropical countries, with no history of varicella infection
• Those who live or work in environments where transmission is likely eg ECC, institutional settings, HCWs, military
• Non-pregnant of childbearing age
• International travelers
• Post exposure

Refer Page 500 NZ Immunisation Handbook 2014
Other National schedules

Variable

• 1 or 2 doses
  • Many countries start with one dose
  • Add in a second dose up to a decade later eg US, Canada

• Concomitant use with MMR
  • Usually with second dose

• ?role of catch up campaigns for adolescents and adults
  • unclear

• Surveillance variable
  • Notifiable in some countries eg Scotland, Northern Ireland
  • Not notifiable in England and Wales
  • Not currently notifiable in NZ
• I want to offer my child protection earlier than 15 months
  • Private market from 12 months

• I don’t wish to give 4 injections at once
  • Are they sure?
  • Concerns re toddler memories and multiple visits with injections
  • If sure: Given MMR and Varicella first
  • Hib and PCV can be given AT ANY TIME afterwards, no gap needed
• Why doesn’t the national schedule offer a two dose regime
  • As per earlier data

• I wish to use the MMRV, rather than separate injections
  • Not funded
  • Increased risk of fever and febrile convulsions
• How do I protect my immunosuppressed individual who has never had chicken pox
  • Ring protection

• How do I know if I need the vaccine, do I need a blood test?
  • History varicella is acceptable. Do not need serology
  • No clear history: 70-90% will still be immune, can choose serology or vaccination.
  • Serology availability varies from lab to lab, check costs