Has the time come for universal varicella (chicken pox) vaccination in New Zealand?

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In New Zealand it is generally accepted that varicella is a universal childhood illness, a necessary evil that is troublesome but usually benign. Those of us who work in hospital paediatrics have a different perspective on this highly transmissible viral infection. Severe morbidity from suppurative or neurological complications of varicella, necrotising fasciitis, or even death of immune-compromised children, is as unacceptable as tetanus or other vaccine-preventable disease when very effective varicella vaccines have been available for over a decade.

In this issue of the Journal, de Almeida et al report a case of life-threatening pericardial tamponade in a young child as a complication of primary varicella infection (http://www.nzma.org.nz/journal/123-1326/4436). She developed a secondary infection with *Staphylococcus aureus* and required pericardectomy and a lengthy course of intravenous antibiotics. It is likely that this illness could have been prevented had she received varicella vaccination.

Varicella is not a notifiable disease in New Zealand, but its annual incidence should approximate the birth cohort, currently 60,000 per year, with almost 90% of cases occurring in childhood. Approximately one to two cases per year result in long-term disability or death, and 0.5–1 cases result in severe congenital varicella syndrome.

In temperate climates the rates of hospitalisation with varicella are highest in children 0–4 years, more than 20 times that for those >15 years of age, although the risk of severe disease, usually with varicella pneumonitis, increases with age. New Zealand hospital admission numbers have increased from approximately 50 per annum in 1970 to approximately 300 in 2002. Most of these hospitalisations occur in people without underlying medical conditions, with only 4% of hospitalisations involving people with an underlying immune deficiency.

It is likely that these numbers are an underestimate: Some complications such as acute demyelinating encephalomyelitis (ADEM) or stroke occur after the rash has disappeared, and the risk of skin and soft tissue or invasive infections due to Group A *Streptococcus* and *Staphylococcus aureus* persists for several weeks after chicken pox, meaning some cases may not be linked to the prior infection in discharge documentation.

There are other costs associated with varicella in hospital that may go unrecognised. As the infectious period for varicella begins 2 days prior to the rash many inadvertent nosocomial exposures occur when children admitted for other reasons, or siblings visiting hospital, develop chicken pox. The ensuing infection control and disease prevention measures are time and resource-costly. A prospective survey a Starship Hospital in 2002 conservatively estimated the hospital costs of varicella at $70,000 in
6 months despite there being no death or severe complicated case during the survey period.4

A varicella vaccine has been available in New Zealand since 1996 and there are currently two licensed vaccines. Vaccination is recommended, but not funded, for adults and adolescents with no history of varicella infection who have lived in tropical countries (the virus does not circulate so efficiently in tropical climates and childhood infection may not have occurred), children with chronic liver disease, and children who are likely to develop severe immunosuppression. Parents may obtain the vaccine for their children but, at a cost of about $70, it is inaccessible to most.

In 1999 Scuffham et al5 investigated the cost-effectiveness of universal varicella vaccination in New Zealand. Based on high vaccine efficacy and assuming 90% immunisation coverage they concluded that varicella vaccination would be cost beneficial from a societal perspective, with a return of $2.79 for every dollar spent on the programme. The bulk of the savings came from reduction in loss of work productivity through time parents would be required to spend caring for children. This reflects the greatest burden of disease being in those mildly affected not requiring hospitalisation.

At the time the MOH Varicella Working Party did not recommend inclusion of varicella vaccine in the immunisation schedule1 partly to limit changes to a newly introduced schedule and partly because of limited international experience with universal varicella vaccination.

Over a decade later, universal varicella vaccination has been shown to be highly effective in reducing complications of varicella infection. It was introduced in the United States in 1995, and by 2001 coverage rates exceeded 75% in children 19 to 35 months of age. There has been a 66% and 53% decrease in varicella-related ambulatory and hospital discharges respectively, compared with the prelicense period.6

Following universal varicella vaccination introduction in Germany in 2004, a country-wide surveillance system showed a 63% reduction in reported cases of varicella between 2005 and 2009.7 Importantly, there was an 83% reduction in reports of varicella complications for children under 9 years of age. A large proportion (36%) of complications of varicella were bacterial superinfections, most commonly superficial skin infections.

A combined measles-mumps-rubella-varicella (MMRV) vaccine, licensed in the United States in 2005, allows delivery of two doses of varicella vaccine at the current scheduled times for MMR. Unfortunately this new vaccine appears to have a slightly higher rate of fever, rash and possibly febrile convulsions in the 7–10 day period post-vaccination when compared to MMR and varicella vaccines being given separately.8

Whilst the addition of varicella vaccination to the New Zealand schedule would not necessarily mean additional visits for children an extra injection might be required at the 15 month visit if the febrile convolution risk of MMRV were considered unacceptable.

Two factors make it important that New Zealand does not fall behind in use of this vaccine: firstly we know that we have a high burden of staphylococcal9 and
streptococcal disease, the commonest causes of secondary infection; in the absence of vaccines for these organisms varicella is a modifiable risk factor.

Secondly, we are sufficiently affluent to practise quaternary medicine resulting in increasing numbers of surviving solid organ and bone marrow transplant recipients as well as other immune-suppressed patients on chemotherapy and rheumatologic agents. These patients, in whom so much has already been invested, cannot be immunised themselves but we should be protecting them by immunising at least those closest to them, if not the whole community.

Chicken pox is generally thought of as a mild illness in children. However, as de Almeida’s case illustrates, a small proportion of children develop severe complications. The introduction of universal varicella vaccination in New Zealand has been recommended to the Ministry of Health by the Immunisation Technical Forum, and will be given further consideration. Vaccination now has a proven track record and is likely to be cost effective, significantly reduce secondary complications and severe disease, and prevent deaths.

Competing interests: None.

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References: