SHORT REPORT

Chickenpox, chickenpox vaccination, and shingles

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Chickenpox in the United Kingdom, where vaccination is not undertaken, has had a stable epidemiology for decades and is a routine childhood illness. Because of vaccination, chickenpox is now a rarity in the USA. In the UK vaccination is not done because introduction of a routine childhood vaccination might drive up the age at which those who are non-immune get the illness (chickenpox tends to be more severe the older you are), and the incidence of shingles may increase. The United Kingdom is waiting to see what happens in countries where vaccination is routine.

The pox illnesses have a long track record. Smallpox is now confined to two deep freezes; the greater pox, syphilis (as in the Shakespearean ''A pox on you'') is enjoying a minor resurgence. Chickenpox in the United Kingdom has had a stable epidemiology for decades, if not centuries, and has been accepted as a routine childhood illness, almost a necessary consequence of attending school. In contrast, because of a live attenuated vaccination, chickenpox is now a rarity in the USA.[1] The seroconversion rate is 95% in healthy children and less than 5% have a mild varicella-like illness.[2] In the USA the chickenpox vaccination policy, introduced in 1995, requires that, with a few exceptions, between 19 months and 12 years ''proof of vaccination should be provided before entry into childcare or elementary school.'' Transmission of vaccine virus does not occur in the absence of a rash. Vaccine strains are, as far as we know, less likely to reactivate to cause shingles. It is not necessary to vaccinate everyone to reduce chickenpox to very low levels—to cause an infection to die out in a community it is only necessary to vaccinate a sufficient proportion such that the average case on average transmits the infection to less than one person. Vaccination can also be used after exposure and should, provided there are no contraindications, ideally be given within three days of exposure and will prevent or lessen the severity of chickenpox. The extent of decline in vaccination induced immunity to chickenpox over future years is not, of course, known and neither is the proportion of those vaccinated in the USA from 1995 that will become susceptible to ''geriatric chickenpox.''

In the United Kingdom chickenpox vaccination is not recommended for routine use in children and only recommended for susceptibles over the age of 12 and younger contacts of high risk subjects (such as leukaemic children). Non-immune healthcare workers who work in primary care and in hospitals and who have direct patient contact should also be vaccinated. So why the transatlantic difference in policy for routine vaccination?

It seems that in the United Kingdom we have two major concerns.

Firstly, introduction of a routine childhood vaccination drives up the age at which those who are and remain non-immune get the illness and chickenpox tends to be more severe the older you are.

The age related complications of chickenpox include:

- Chickenpox has a higher morbidity and mortality post-childhood
- Congenital and neonatal chickenpox will increase (mothers, even in these times, are likely to be post-childhood).
- Chickenpox pneumonia
- Chickenpox encephalitis

There is a general principle that it is best to acquire childhood illnesses (including, chickenpox, measles, and glandular fever) in childhood. One possible advantage of acquiring chickenpox in later life is that this might reduce the risk of shingles and there is some ''nearly statistically significant'' evidence for this in tropical countries.

Secondly, what will happen to the epidemiology of shingles if chickenpox vaccination is introduced in the United Kingdom?

Shingles is caused by reactivation of latent varicella zoster virus, which is thought to occur when specific cell mediated immunity declines. The lifetime risk of shingles is 10%–30% and increases with age, affecting up to half of people who live to 85 years.[3–5] We know that exposure to chickenpox can significantly prevent or delay shingles (by exogenous boosting of immunity).[6] Increased annual chickenpox rates in children under 5 are associated with reduced shingles in the 15–44 age group. Having a child in the household reduced the risk of shingles for about 20 years, the more contact with children the better, and general practitioners and paediatricians have a statistically significant lowering of risk,[7] possibly because of their contact with sick children (teachers did not have a significantly reduced rate).[8 9]

If there is less chickenpox in children then there will be no boosting of immunity by exposure to chickenpox for middle and older aged people and thus there will be more shingles, at least until all the elderly have been vaccinated as children but this assumes that immunity conferred by vaccination is lifelong. The morbidity of shingles in later life is greater that that associated with chickenpox in childhood. Twenty per cent of those over 50 with shingles, even if they receive treatment, will have pain six months later.[10] Mathematical models predict that shingles in the unvaccinated would initially increase by 30%–50% if childhood vaccination rates were high, and would decrease thereafter. Combined results from three studies suggest the increased incidence of shingles would last for 30–50 years and would affect mostly those aged 10–44 years at the time of vaccine introduction.[8 11 12] The greater the chickenpox vaccination rates the higher the initial incidence of shingles would be until everyone was vaccinated (in other words until those of us my age who harbour varicella zoster virus in our nervous ganglia die off).

It may be that a less than 100% cover by vaccination might reduce the combined chickenpox and shingles morbidity by allowing the virus to circulate in the population with only minor increases in the age of chickenpox while boosting immunity to shingles.

Key points 1

There is an increased risk of shingles if:

- Chickenpox is acquired at an early age
- Chickenpox is acquired in utero or within the first 12 months of life[14 15]
- Patients are HIV positive[16–18] (in areas of high HIV positivity shingles is a 85%–95% predictor)[19 20]
- There has been recent trauma

Key points 2

With shingles there is no:

- Sex difference in incidence
- Consistent evidence of seasonality. Chickenpox tends to be seasonal, shingles is not, so contact with chickenpox does not offer high level immunity immediately.
- Increased risk of cancer.[21] We all know that in hospital practice there is a high incidence of shingles in those with cancer or haematological malignancies but shingles occurs in patients whose underlying diagnosis is already known: shingles is rarely a presentation of previously undiagnosed malignancies. In the community shingles is common and is not an indication for ''hunt the neoplasm.'' However, shingles in young people should raise the possibility of underlying HIV. In certain areas of high HIV prevalence, shingles has a predictive value for HIV infection.
- Consistent relation with smoking or alcohol

Do we wish to start a vaccination programme that will disadvantage the middle aged and elderly but that will benefit our grandchildren—our children will presumably mostly have had chickenpox already? One approach to minimise this middle aged and elderly increase in shingles would be to vaccinate, say, all 60 year olds at about the time that their grandchildren are being vaccinated? Similar approaches have been shown to be effective.[13] Why are we waiting? The answer is that in the United Kingdom we are, as is our characteristic communal disposition, being cautious and waiting to see what happens in the USA and in Japan (where vaccination is also routine).

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