

Can we make better use of a cost-effective anti-cancer vaccine? The case of HPV vaccination in NZ girls

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[In a just published study](#) (and accompanying [evaluation summary](#) and [media release](#)), we found that the NZ Government's investment in HPV vaccination for girls is clearly a "good value-for-money" way to protect health – even at the modest 47% coverage. Because of slightly higher coverage for Māori girls, and higher anticipated future HPV-related diseased rates, the programme makes a contribution to reducing health inequalities. But a more intensive school-only vaccination programme (73% coverage as in Australia) would achieve more health gain and still be cost-effective. In this blog we discuss these findings and how the country could catch-up to the much higher HPV vaccination coverage levels seen in Australia and the UK.

**evaluation
summaries**

Human papillomaviruses (HPV) are common sexually transmitted viruses. They can cause

several types of cancer (such as cancers of the cervix, anus, and oropharynx) and conditions like genital warts. Primarily to prevent cervical cancer, the NZ Government began funding a vaccination programme against HPV infection in 2008 [1]. After various catch-up phases, vaccination has been routinely offered since 2011. It is offered through schools (in year 8) or through primary care (age 12 to 20 years). Young women need to have received the first of the three doses before their 20th birthday to be eligible for the free vaccination programme. In 2011, the observed coverage was about 47%.

The funded HPV vaccine in NZ is a quadrivalent one which includes protection against virus types known to cause at least 90% of genital warts [1]. The vaccination programme is currently for young women only, but there are health benefits to both men and women from herd immunity. Since introduction, sentinel surveillance clinics around the country (sexual health, family planning and student and youth health clinics), report a declining number of first presentations for genital warts, with the steepest reductions occurring in young women aged 15-19 years [2]. Analysis of pharmaceutical data for genital warts treatment also indicates a favourable downward trend [3].

HPV vaccination is cost-effective

We developed a Markov macro-simulation model for 12-year-old girls and boys to compare the cost-effectiveness of different delivery programmes (including NZ's current vaccination programme). The model included the effect of the vaccination on cervical cancer, pre-cancer (CIN I to III), genital warts, and 3 other HPV-related cancers (oropharyngeal, anal, vulvar cancer).

The main result of running this model ([just published in the journal *Vaccine*](#) [4]) was that NZ's current HPV vaccination programme has a cost-effectiveness of \$18,800 per quality-adjusted life-year (QALY) gained (95% uncertainty interval: NZ\$7,300 to \$35,400). This result was for the current programme when compared to the status quo in NZ prior to 2008 (ie, no vaccination, and cervical cancer screening alone). These cost-effectiveness figures can all be considered to be good value-for-money if we use the rule-of-thumb that gaining a QALY for less than a country's GDP per-capita (\$45,000 for NZ) is "cost-effective". Also the current programme was found to generate more QALYs per 12-year-old for Māori and people living in deprived areas – so HPV vaccination is currently helping to reduce health inequalities.

We also modelled the cost-effectiveness of moving from the status quo (the current vaccination programme with 47% coverage) to a more intensive school-based only programme of vaccinating girls (at 73% coverage as in Australia). This shift in coverage achieved more health gain and was also still cost-effective (at \$34,700 per QALY gained).

How might HPV vaccination coverage be increased?

It is reassuring that these HPV vaccination benefits are occurring in NZ, that it is good value-for-money, and that it is helping to reduce health inequalities. Nevertheless, there is considerable scope for NZ to increase its vaccination coverage. For example, in the Australian school-based only programme, coverage is 73% for dose 3 for 12-13 year old girls (with dose 1 being at 83%) [5]. Furthermore, England has achieved 84% coverage in their school-based only programmes for girls (for dose 3, ages 12-13 years) [7].

Paradoxically, part of the problem might be that NZ parents are given too many options (ie, either school-based or through general practice) for getting free HPV vaccination – making

delaying the vaccination decision for their daughters more likely. So one possible way to achieve higher coverage might be to have *only* a school-based programme (as in Australia). At all other times and in other health care settings (such as primary care), parents and caregivers could be required to pay the full market price of the vaccine and vaccination delivery. Such a change to “an only one opportunity for free vaccination” may help focus parental decision-making and reduce delaying the decision, with higher coverage rates being a likely result.

Another possibility is to enrich the information to school girls and parents about HPV vaccination. Our examination of informational materials on HPV vaccination, makes us suspect that greater emphasis could be given to explain that this vaccination: (i) will protect against multiple other cancers that affect both women and men; and (ii) that it is best given well before the typical age of sexual debut in the population (mid-teens) – to maximise its benefit. This is far more than a vaccine against just cervical cancer (see the photo of Michael Douglas below – though he later denied saying this).



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MICHAEL DOUGLAS SHOCKER

SEX GAVE ME CANCER

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Oscar-winner Michael Douglas has revealed that his life-threatening throat cancer was not the result of smoking or drinking — but of oral sex. “Without wanting to get too specific, this particular cancer is caused by HPV, which actually comes about” from performing oral sex, the 68-year-old actor said, referring to the human papillomavirus.

Only new post

These ideas could be investigated through qualitative research and from reviewing the delivery mechanisms used by such successful overseas programmes (eg, work by Garland et al [7]). Care is certainly needed given population sensitivities about anything linked to sexual behaviour – but also recognising that preventing cancer is also given a high value by New Zealanders. Changes to the current programme and informational materials should also involve careful consideration around sustaining the relatively high levels of HPV vaccination coverage for Māori and Pacific peoples – and how best to enhance these further.

Improving cost-effectiveness even more

Options could also be explored for also boosting the cost-effectiveness of HPV vaccination in NZ even further. One way could be to deliver it to girls at the same time that the current diphtheria/tetanus/pertussis (DTP) booster is given to both 11-year-old boys and girls at school. But vigorous negotiating by PHARMAC with vaccine producers to get the HPV vaccine price even lower is probably even more important (eg, when the current supply contract is up for re-negotiation).

We suspect that improving coverage for school-aged girls should be a much higher priority than extending coverage to boys at school (as recently adopted by the Australian Government). Even so, as HPV vaccine prices continue to fall, vaccinating boys may also become a cost-effective investment in the long-term (and we will report on our yet to be published modelling work on HPV vaccination in boys in this blog in coming months).

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