

EDITORIALS

HPV vaccination—reaping the rewards of the appliance of science

National programmes could virtually eliminate certain diseases and substantially reduce costs

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The optimism generated by scientific breakthroughs often turns to disappointment when applied to the real world of clinical care. It is therefore worth celebrating the extraordinary success of Australia's national human papillomavirus (HPV) vaccination programme, which was implemented five years ago, as reported in the linked paper by Ali and colleagues (doi:10.1136/bmj.f2032).¹ This analysis of data on 85 770 new patients from six Australian sexual health clinics shows a remarkable reduction in the proportion of women under 21 years of age presenting with genital warts—from 11.5% in 2007 to 0.85% in 2011 ($P<0.001$). Only 13 cases of genital warts were diagnosed in women under the age of 21 across all six health clinics in 2011. Such a reduction in this distressing disease caused by a sexually transmitted virus is a major public health achievement. Furthermore, the near eradication of genital warts in young Australian women will probably have a major impact on the costs of sexual healthcare.

In 2007, Australia became one of the first countries to implement a nationally funded HPV vaccination programme for girls and young women with the quadrivalent vaccine. It started with the vaccination of girls aged 12 years in schools and a catch-up programme for girls and women aged 13-26 years. Quadrivalent vaccine protects against HPV types 6 and 11, which cause more than 90% of genital warts, in addition to HPV types 16 and 18, which cause cervical cancer. Vaccination coverage rates were exemplary, averaging almost 80% for all three doses.

Ali and colleagues also found a significant decline in the proportion of women aged 21-30 years presenting with genital warts—from 11.3% in 2007 to 3.1% in 2011 ($P<0.001$). As might be expected, the rate of diagnoses of genital warts in women over 30 did not drop. The proportion of men under 21 years presenting with genital warts also decreased sharply, from 12.1% in 2007 to 2.2% in 2011 ($P<0.001$). From 2007 to 2011, there was no significant decrease in the prevalence of genital warts in heterosexual men over 21 years or in men who have sex with men.

In the United Kingdom, policy makers chose a bivalent HPV vaccine (effective against HPV types 16 and 18) for the national

vaccination programme. This was judged the best option on economic grounds—economic analyses during the tendering process found that the bivalent vaccine was substantially cheaper than the quadrivalent one. At the time, there was much debate about whether the benefits of preventing genital warts had been properly assessed, given the current high rate of new and recurrent genital warts—more than 150 000 cases a year—in the UK, which cost more than £50m (€59m; \$76m) to manage.² This seemingly short sighted policy decision caused consternation among experts in sexual health services.^{3 4} However, in September 2012, the UK national programme began to use the quadrivalent vaccine. Given Ali and colleagues' findings, the number of young women presenting with genital warts to sexual health services should drop substantially in five to nine years' time, reducing the workload in sexual health clinics.

What about including boys in the national vaccination programme in the UK? In 2013 the Australian government began a publicly funded HPV vaccination programme for 12-13 year old boys, with a catch-up for 14-15 year old boys. This decision was prompted by two important considerations. The first was the increasing incidence of HPV related oropharyngeal cancers in men.⁵ The second was the realisation that young men who have sex with men, who would not benefit from heterosexual herd immunity, would be unfairly discriminated against under a vaccination programme targeted only at girls. Ali and colleagues state that, in addition to helping prevent genital warts and anal, penile, and oropharyngeal cancers in men, "the vaccination programme is expected to increase herd immunity and provide further indirect protection to unvaccinated women." They comment that this may lead to control, if not elimination, of the target HPV types in Australia.¹

Throughout Europe, there has been regional tendering to use quadrivalent or bivalent vaccines in young women only. Doctors in sexual health would obviously favour the quadrivalent vaccine because new and recurrent genital warts are the most common sexually transmitted diseases managed in clinics.

It remains to be seen whether we will see similar dramatic reductions in HPV-16 and HPV-18 associated diseases, such as cervical cancer, vulval cancer, other anogenital cancers, and head and neck tumours as a result of national vaccination programmes. This is likely given the reported evidence for the efficacy of the vaccines. It is hoped that future vaccines will protect against other HPV types, such as types 31 and 45, which are also involved in the genesis of genital cancer. Countries should carefully explore whether it is economically feasible to vaccinate young men.

Do HPV vaccines have a role to play in treatment? It is scientifically plausible that they do, because wart virus infection and recurrence are caused by failure of immune recognition. The immunity induced by vaccination is four or five times greater than that induced by natural infection. Recent treatment studies indicate benefit.^{6 7}

These are exciting times in the science of HPV and the world can confidently look forward to the virtual elimination of genital warts, recurrent laryngeal papilloma, most genital cancers, and some 60% of head and neck cancers. The interruption of transmission of a major sexually transmitted infection through a public health initiative offers the prospect of substantial cost

savings. Countries should consider these data seriously and act decisively.

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