The human papilloma virus (HPV) prophylactic vaccine

South African HPV Advisory Board
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Introduction

Carcinoma of the cervix is the most common cancer of women in Africa comprising 23 percent of all reported cancers in women. The incidence rate in South Africa is approximately 35/100 000 women years, one of the highest incidence rates in the world. In the last two decades, the aetiological role of the human papilloma virus (HPV) infection in the development of pre-invasive and invasive lesions of the cervix, vagina and the ano-genital region has been conclusively established. The understanding of the oncogenesis of cervical cancer has improved to such an extent that new technologies to detect persistent HPV infection are available and are becoming part of clinical practice. HPV16 is associated with more than 50% of all invasive cervical carcinomas, HPV18 with 16% and HPV31 with 8%. Protection against the most potent carcinogen is a classic example of primary prevention. HPV6 and 11 cause genital warts.

Prophylactic vaccines

Vaccination against infection with specific high risk HPV types is now commercially available and is likely to change the future of the disease. It may prove to be the only cost-effective long-term strategy to combat cervical cancer. The HPV16 vaccine would prevent about half of all cervical cancer cases worldwide if the population coverage is adequate. However, a multivalent vaccine that would include HPV18 too could increase the percentage of prevented cases to two-thirds, or more if reports on cross-protection against other high risk HPV types remain accurate in the long run.

Virus-like particles are used in the manufacturing of currently available prophylactic vaccines. These vaccines contain no viral DNA and are therefore non-infectious. They may induce antibody titres much higher than natural occurring infections. The two available vaccines at present are the quadrivalent prophylactic vaccine Gardasil® that protects against HPV types 16 and 18 as well as 6 and 11, and the bivalent prophylactic vaccine Cervarix™, which protects against HPV16 and 18. Current data prove protection for the first six years after vaccination. Longer follow-up studies are ongoing.

Safety of the vaccines

The vaccine is evidently both safe and effective. The efficacy and safety of HPV vaccination in the immunocompromised population, for instance pregnant women, HIV-infected women and users of medicines such as steroids, has not been established. Furthermore, with attempts to vaccinate against common HPV types, it is unknown if other new HPV types would dominate or emerge. Therefore the impact of the vaccine on the future epidemiology of cervical cancer is not predictable.

Internationally, the vaccine is not marketed as a low-cost item. In a health economics equation, the cost of immunisation must be weighed against the cost of screening and treatment for cervical cancer with the understanding that the cost-saving benefits of immunisation will only become apparent in one or two decades and that ongoing screening will be needed for many decades.

Immunogenicity of the vaccines

Bridging studies of immunogenicity conducted among boys and girls aged between 9 and 15 years show that the vaccine is immunogenic across a wide age range, but the greatest immune responses were observed in prepubertal children. The vaccine was immunogenic in 100% of participants across the age range of 10 to 55 years, but antibody response decreases with increasing age.

Schedule for vaccination

It is advisable that vaccination for girls should be administered before sexual debut, the optimal age being 9 or 10. Six months are needed to complete the three doses in the currently available HPV immunisation schedule.

HPV vaccination in women with existing cytological anomalies has no known benefits. Males can also be immunised to reduce infection in the population further, though it is not yet universally licensed for them. However, the cost of such an intervention may be prohibitive and no important HPV related disease in males has been shown to be prevented. This strategy will, therefore, probably not be cost effective.

Ongoing cervical screening

Ongoing cervical screening of HPV vaccinated women is recommended and required as protection by either vaccine is approximately 75% and not 100%. It may be cost effective to have longer intervals than currently used and it is uncertain whether cytological screening will be the best approach. Primary screening with HPV testing may be the most appropriate screening policy with cytological testing then used for individuals with persistent infections. HPV DNA testing remains a very valuable test to detect infections with high risk HPV types after vaccination

Conclusion

The challenge in South Africa is to determine how best to bring this medical breakthrough to the greatest number of people. An essential step is to educate the public, policy makers, legislators and health care providers in order to promote informed decision making. Making HPV vaccination compulsory would have the advantage of creating high levels of immunity, which could indirectly protect other members of the community who have not received vaccines. The logistics of this venture also pose huge challenges.