The Health Technology Reports Series have been developed by the Tartu University Department of Public Health

# The cost-effectiveness of HPV vaccination

# Summary

**Objectives:** Current HTA report evaluates the impact of vaccination against human papillomavirus (HPV) within the national immunization programme by comparing the costs and cost-effectiveness of 2-, 4- and 9-valent vaccines to non-vaccination in Estonia.

**Methods:** Literature reviews for current evidence on effectiveness, safety and cost-effectiveness of HPV vaccination were carried out from September to October 2015. An independent Markov cohort model was constructed to compare the cost-effectiveness of vaccination with different HPV vaccines to no vaccination. The model implements a likely scenario of vaccinating (two doses) the cohort of 12-year-old girls with either 2-, 4- and 9-valent vaccines with 70% coverage in a national school-based vaccination programme. The model follows the natural progression of HPV infection into subsequent genital warts, premalignant lesions (CIN 1-3), cervical, oropharyngeal, vulvar, vaginal and anal cancer based on disease transition probabilities obtained from the literature. Data for effectiveness and quality of life outcomes was obtained from the published literature. Costs were calculated based on data from Estonian Health Insurance Fund and expert opinions. Costs and effects were discounted using an annual discount rate of 5%. The model evaluated the differences in costs and quality-adjusted life-years (QALYs) using incremental cost-effectiveness ratios (ICER). Additional budget impact analysis for the HPV vaccination within national immunization programme was performed.

**Results:** The vaccination of 10,000 12-year-old girls would prevent 116–157 cases of HPV-related cancers and 33–44 deaths from HPV-related cancers. A total of 504 cases of genital warts could be avoided with both 4-valent and 9-valent vaccines. In the base-case scenario, ICER was estimated at €14,164 (2-valent), €14,229 (4-valent) and €11,794 (9-valent) per QALY ranging between €2,893–21,868, €5,652–21,962 and €4,652–18,303 respectably in the sensitivity analysis. The results were most influenced by discount rate, dosing regimen and vaccine prices. Compared to no vaccination, all three vaccines had similar ICERs and therefore no difference can be made between the vaccines. The yearly costs of vaccination programme without catch-up programme ranged from €1,016,596 –1,285,839 depending on the vaccine used. If a 2-year catch-up programme is implemented, costs of the two first years will be tripled.

**Conclusions:** Adding HPV vaccination into national immunization programme would prevent considerable number of HPV infections, subsequent premalignant lesions, genital warts and HPV-related cancers. Although the ICER varies slightly depending on the vaccine used, their cost-effectiveness ratios in Estonia are comparable to results from previously published data. Budget impact analysis indicated that the costs of vaccination will substantially exceed the savings from the treatment costs. The results of current HTA serve as a guidance to decision makers in future reassessments of national vaccination plans.

**Citation:** Võrno T, Nahkur O, Uusküla A, Padrik L, Raud T, Reile R. *HPV-vastaste vaktsiinide kulutõhusus*. Tartu: Tartu Ülikooli tervishoiu instituut; 2015.