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 updates the evidence on the effectiveness of human papillomavirus (HPV) vaccination and renews the cost-effectiveness analysis results from previous report published in 2015. The impact of vaccination against HPV within the national immunization programme has been evaluated by comparing the costs and cost-effectiveness of 2-, 4-and 9-valent vaccines to non-vaccination in Estonia.

Methods: Literature reviews on current evidence of effectiveness and cost-effectiveness of HPV vaccination were carried out from January to March 2020. A previously developed Markov cohort model was updated and newly calibrated to perform the cost-effectiveness analysis. 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 on effectiveness and quality of life outcomes was obtained from the published literature. Similarly to the analysis published in 2015, the efficacy against all HPV types included in the vaccines was assumed to be 95% in the base-case analysis. Based on the update of effectiveness evidence, 2-valent vaccine was also assumed to have a cross-protection of 60% against HPV types 31, 33, 45. Estonian Health Insurance Fund costs from the 2015 report were adjusted to 2019 price levels using the healthcare price index 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).

Results: The vaccination of 10,000 12-year-old girls with 2-valent vaccine would prevent 116 cases of HPV-related cancers and 30 deaths from HPV-related cancers. Vaccination with 4-valent and 9-valent vaccine would prevent 105 and 127 cases of HPV-related cancers and 28 and 33 deaths from HPV-related cancers. A total of 509 cases of genital warts could be avoided with both 4-valent and 9-valent vaccines. In the base-case scenario ICER was estimated at €2,173 (2-valent), €3,452 (4-valent)and €3,655 (9-valent) per QALY compared to no-vaccination, ranging between €532–3,811, €1,070–5,916 and €1,279–6,110 in the sensitivity analysis. The results were most influenced by the discount rate, dosing regimen and vaccine prices. Comparing vaccines to each other, 9-valent vaccine was expected to prevent the most cases of CIN-s and HPV-related cancers, and 4-valent the least. At the same time both 4-valent and 9-valent vaccines were expected to prevent genital warts that 2-valent vaccine does not give the protection against. In terms of cost-effectiveness, compared to next best strategy 2-valent vaccine dominates over 4-valent vaccine and 9-valent vaccine is more effective and costlier than 2-valent vaccine resulting in an ICER of €8,091 per QALY.

Conclusions: Compared to no vaccination, HPV vaccination is expected to prevent a considerable number of HPV infections, subsequent premalignant lesions, genital warts and HPV-related cancers. The results of current HTA report serve as a guidance to decision makers.

Citation: Võrno T, Orumaa M, Raud T, Lutsar K, Kiivet R. *HPV-vastaste vaktsiinide kulutõhusus.* Tartu: Tartu Ülikooli peremeditsiini ja rahvatervishoiu instituut; 2022.