The Health Technology Report Series has been developed by the Institute of Family Medicine and Public Health, University of Tartu.

Cost-effectiveness of gender-neutral HPV vaccination in Estonia

Summary

Objectives: The effectiveness and cost-effectiveness of girls only HPV vaccination within the Estonian national immunization programme have been repeatedly evaluated by comparing the bi-, quadriva- and nonavalent vaccines to no vaccination. Current report updated the evidence based on recently published literature and evaluated the effectiveness and cost-effectiveness of gender-neutral HPV vaccination compared to girls only HPV vaccination.

Methods: Literature reviews on the evidence of effectiveness and cost-effectiveness of HPV vaccination were composed from October to December 2021. Burden of HPV-related diseases was assessed using data from the Estonian Cancer Registry and Estonian Health Insurance Fund (EHIF). To perform the cost-effectiveness analysis, a previously developed Markov cohort model was updated to include men; input parameters were upgraded and newly calibrated. The model implemented a likely scenario of vaccinating (two doses) the cohort of 12-year-old girls (coverage 50%) and boys (coverage 40%) with either bi- or nonavalent vaccines compared to girls only vaccination with nonavalent vaccine. The model followed the natural progression of HPV infection into subsequent HPV-related premalignant lesions, cancers and genital warts based on disease transition probabilities obtained from the literature. Data on vaccine effectiveness and quality of life estimates were also obtained from the published literature. Similarly to the previously published analysis, the efficacy against all HPV types included in the vaccines was assumed 95%; bivalent vaccine was also assumed to have cross-protection of 60% against HPV types 31, 33, 45. Actual effectiveness of different vaccines in preventing HPV-related disease was also affected by the prevalence of HPV types included in the vaccines and significance of these in causing HPV-related diseases. Inquired EHIF data was used to calculate the treatment costs of HPV related diseases. 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 12-year-old girls and boys with the bi- or nonavalent vaccines would enable to prevent 24% and 27% of HPV-related cancers, respectively. The nonavalent vaccine would also enable to reduce genital warts in men by 38%. Using the nonavalent vaccine for the gender-neutral HPV vaccination would result in drug, treatment and incapacity leave cost savings, but cost of vaccination would exceed the savings by more than five times. In the base-case scenario the ICER of gender-neutral vaccination with the nonavalent vaccine was estimated at €15,099 per QALY gained compared to girls only vaccination; reaching up to €18,724 euros per QALY gained in the sensitivity analysis. The cost-effectiveness results were most influenced by the discount rate, vaccine coverage and vaccine prices. Vaccinating 12-year-old girls and boys with the bivalent vaccine would cost less, but the health gains would also be lower than with the nonavalent vaccine.

Conclusions: Compared to girls only HPV vaccination, gender-neutral vaccination would enable to prevent considerable proportion of HPV-related cancers with either bi- or nonavalent vaccine and genital warts with nonavalent vaccine. If the analyses had also considered herd immunity, the results for gender-neutral vaccination would be even more favourable.

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