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BAYESIAN MODELLING ASSESSING THE EFFECTIVENESS OF A VACCINATION STRATEGY TO PREVENT HPV-RELATED DISEASES. THE BEST STUDY

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Abstract Text:

Purpose: Human Papillomavirus (HPV) is the *primum movens* both in the etiopathogenesis of invasive cervical cancer and in other neoplastic malignant and benign lesions. HPV vaccination has three potential goals: to prevent infection, to prevent disease, and to prevent transmission. Unfortunately, at present not all the sequential phases of this complex process are perfectly known. Consequently, an excess of uncertainty associated with the main parameters of commonly utilized models can be observed. The aim of this study was to assess the cost-effectiveness of a quadrivalent -based multi-cohort HPV vaccination strategy using a statistical Bayesian approach.

Method: A full Bayesian Markov model was used, where all unknown quantities were associated with suitable probability distributions reflecting the state of science currently available. These distributions were updated by the observation of any Italian available data, and uncertainty was propagated through the entire model with a Markov Chain Monte Carlo procedure. The model was calibrated using age-specific incidence of invasive cervical cancer data derived from Italian female population. As base case was considered a vaccination of 2 cohorts of girls aged 12 and 15 years.

Result: Base case and other multi-cohort vaccination strategies under evaluation (3 and

4 cohorts) were cost-effective with a discounted cost per QALY gained corresponding to €12,013 (95% range €2,364 - €22,481), €13,232 (95% range €4,432 - €22,939), and €15,890 (95% range €7,179 - €25,139) for vaccination programmes based on 2, 3 and 4 cohorts, respectively. The overall expected effect of vaccination seems to be linked with the number of cohorts targeted. With a multi-cohort vaccination the combined reduction of HPV-related events occurred progressively early (range 3 - 6.5 years) compared with the vaccination of a single cohort. The shorter time required for expected results with a 4-cohorts vaccination strategy could not offset the higher decrease of HPV-related events observed with base case (62% of reduction with 4 cohorts versus 72% of base case). The analysis of the expected value of information showed that the uncertainty was always kept at a low level among different multi-cohort strategies.

Conclusion: The quadrivalent-based multi-cohort HPV vaccination programme can provide excellent value for money spent and the Bayesian expected value-of-information analysis provides the most appropriate and feasible representation of this programme's true value.

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