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

The BEST[*] Study

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ABSTRACT

Background: Cervical cancer is the second most frequent cancer among women worldwide. Each year, 500,000 new cases of cervical cancer are estimated, resulting in about 260,000 deaths in 2005. The risk of been diagnosed with cervical cancer for a woman over her life course (0-74 years) is 6,2‰ (1 in 163 women), whereas the risk of death is 0,8‰. Human Papilloma Virus (HPV) infections are the *primum movens* of cervical cancer. The effectiveness of different HPV vaccination programmes has already been confirmed throughout a large number of studies. 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 impact of a quadrivalent-based HPV vaccination strategy in the life expectancy of Italian women using a statistical Bayesian approach.

Methods: 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. One cohort of girls vaccinated at age 12 was the followed-up population. The model extrapolated the estimated number of deaths for each year of simulation and for each strategy of prevention (None, Sreening, Screening+Vaccination) and, through multistate life tables, we could compare their different life expectancies.

Results: Vaccination seems to improve women's life expectancy at birth of 0.78 year with respect to screening . The largest increase in life expectancy (+0.81) was at 26 years old. Comparison among prevention and non-prevention policies are still under investigation but we expect major improvements in life expectancy at all ages.

Conclusions: This study highlights the features of a methodological research approach that could be taken to reduce the uncertainty associated with HPV vaccination. The quadrivalent-based HPV vaccination programme can provide excellent effectiveness results and the life expectancy of the Italian vaccinated women will improve.