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Presentation: BAYESIAN MODELLING ASSESSING THE EFFECTIVENESS OF A VACCINATION STRATEGY TO PREVENT HPV -RELATED DISEASES The BEST Study

When: Mon 11 Jul 2011 3 p.m - 4:15 p.m
Room: Ballroom East

Session: [Bayesian Method](#)

Presenter: Francesco Saverio Mennini (University of Rome "Tor Vergata". CEIS Sanitc (CHI- Centre for Health Economics and Management Faculty of Economics)

Abstract (463 words)

Background: Human Papillomavirus (HPV) is the primus movens both in the etiopathogenesis of invasive cervical cancer and in other neoplastic malignant and benign lesions. The cost-effectiveness of different HPV vaccination programmes was already confirmed throughout a large body of modelling studies. However, considering that new vaccines are generally more costly, the cost-effectiveness of vaccination strategies should be properly evaluated to avoid concerns about their value for chosen immunization programmes. 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.

Methods: A full Bayesian Markov model was used, where 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 we considered a vaccination of 2 cohorts of girls aged 12 and 15 years.

Results: 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, 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 short time required for expected results with a multi-cohort 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 expected value of information showed that the uncertainty was always kept at a low level among different multi-cohort strategies. The cost associated with the achievement of the expected value of information (which is able to limit uncertainty) ranged between €9 and €13 per patient.

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 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 program's true value.

Key Terms: Bayesian modelling cost-effectiveness, HPV vaccination, multi-cohort strategy, variability of parameter

Authors (12): Francesco Saverio Mennini (University of Rome "Tor Vergata". CEIS Sanitc (CHE - Centre for Health Economics and Management) Faculty of Economics), Gianluca Baio (University College London (UK). Department of Statistical Science), Alessandro Caporin (University of Reading, UK. Henley Centre for Value Improvement, Henley Business School), Andrea Marcellusi (University of Rome "Tor Vergata". CEIS Sanitc (CHEM - Centre for Health Economics and Management), Faculty of Economics), Giampaolo Favato (Kingston University, Kingston, UK. Department of Accounting and Finance), Silvano Costa (University of Bologna, Bologna, Italy. Department of Gynecology and Obstetrics, S. Orsola-Malpighi Hospital), Giorgia Garganes (Catholic University of the Sacred Heart, Rome, Italy. Association Columba Department of Obstetrics and Gynecology), Mauro Picardo (San Gallicano Dermatological Institute (IRCCS), Rome, Italy. Laboratory of Cutaneous Pathophysiology), Mike Drummond (York University, York, UK), Bengt Jonsson (Stockholm School of Economics, Stockholm, Sweden), Giovanni Scambia (Catholic University of the Sacred Heart, Rome, Italy. Department of Obstetrics and Gynecology) and Peter Zweifel (Zurich University, Zurich, Switzerland)

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