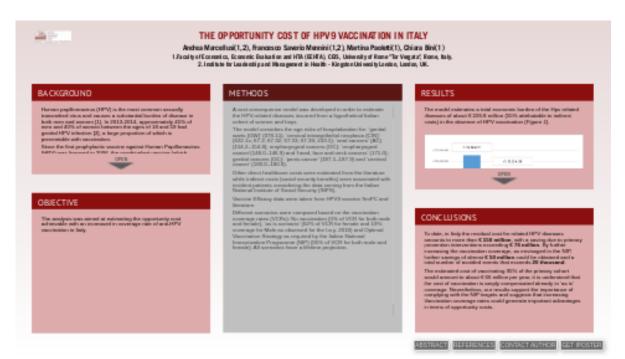# THE OPPORTUNITY COST OF HPV9 VACCINATION IN ITALY

Andrea Marcellusi(1,2), Francesco Saverio Mennini(1,2), Martina Paoletti(1), Chiara Bini(1)

1.Faculty of Economics, Economic Evaluation and HTA (EEHTA), CEIS, University of Rome "Tor Vergata", Rome, Italy.
2. Institute for Leadership and Management in Health - Kingston University London, London, UK.

PRESENTED AT:

BACKGROUND

Human papillomavirus (HPV) is the most common sexually transmitted virus and causes a substantial burden of disease in both men and women [1]. In 2013-2014, approximately 45% of men and 40% of women between the ages of 18 and 59 had genital HPV infection [2], a large proportion of which is preventable with vaccination.

Since the first prophylactic vaccine against Human Papillomavirus (HPV) was licensed in 2006, the quadrivalent vaccine (which protects against high-risk HPV types 16 and 18, and low-risk types 6 and 11, which cause 90% of genital warts) or bivalent vaccine (targeting HPV types 16 and 18) have been implemented in more than 28 countries as part of their national immunization programmes [3]. In December 2014, a nonavalent vaccine (9vHPV), was developed. The 9vHPV gained marketing authorization throughout the EU in June 2015; in Italy it was approved in February 2017.

Primary prevention of HPV-related diseases in Italy started in 2008, and the vaccination programme consisted of active and free service for all 12-year-old girls. Since 2017, the Italian Ministry of Health extended the immunization programme to 12-year-old boys, even though some regions had already started in 2014. [4]

OBJECTIVE

The analysis was aimed at estimating the opportunity cost achievable with an increased in coverage rate of anti-HPV vaccination in Italy.

METHODS

A cost consequence model was developed in order to estimate the HPV-related diseases incurred from a hypothetical Italian cohort of women and boys.

The model considers the age risks of hospitalization for: 'genital warts (GW)' (078.11); 'cervical intraepithelial neoplasia (CIN)' (622.1x; 67.2; 67.32; 67.33; 67.39; 233.1); 'anal cancers' (AC) (154.2–154.8); oropharyngeal cancers (OC): 'oropharyngeal cancer'(146.0–146.9) and 'head, face and neck cancers' (171.0); genital cancers (GC): 'penis cancer' (187.1–187.9) and 'cervical cancer' (180.0–180.9).

Other direct healthcare costs were estimated from the literature while indirect costs (social security benefits) were associated with incident patients considering the data coming from the Italian National Institute of Social Security (INPS).

Vaccine Efficacy data were taken from HPV9 vaccine SmPC and literature.

Different scenarios were compared based on the vaccination coverage rates (VCRs): No vaccination (0% of VCR for both male and female), 'as is scenario' (62% of VCR for female and 19% coverage for Male as observed for the l.a.y. 2018) and Optimal Vaccination Strategy as required by the Italian National Immunization Programme (NIP) (95% of VCR for both male and female). All scenarios have a lifetime projection.

RESULTS

The model estimates a total economic burden of the Hpv related diseases of about € 226.8 million (55% attributable to indirect costs) in the absence of HPV vaccination (*Figure 1*).

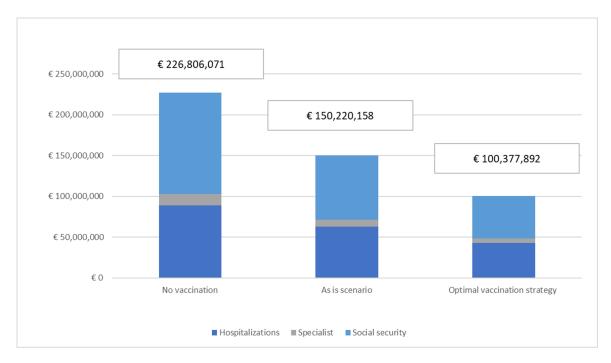*Figure 1: HPV related costs by scenarios*

The 'as is' VCRs are likely to reduce € 31.4 million of direct healthcare costs and € 45.1 million of indirect costs. An Optimal Vaccination Strategy could reduce over € 126 million of direct and indirect cost if compared to the no Vaccination strategy and € 49.8 million if compared to the Standard Vaccination Strategy (*Figure 2*).

Figure 2: Costs avoided by 'as is' vaccination and avoidable costs with optimal coverage
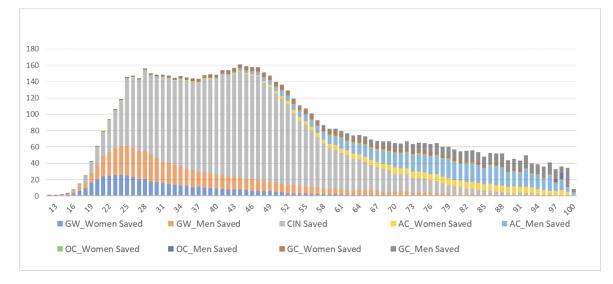
Figure 3: Events avoided with optimal coverage VS 'as is' vaccination

	GW Women	GW Men	CIN	AC Women	AC Men	OC Women	OC Men	GC Women	GC Men	CC Women	Total
optimal VS 'as is'	521	904	4,384	351	825	52	10	220	442	557	8,267
'as is' vs No vaccination	988	230	8,318	665	210	99	3	418	113	1,058	12,101
Tot. preventable events vs no vaccination	1,509	1,134	12,702	1,016	1,036	151	13	638	555	1,615	20,368

Table 1: Avoided events

CONCLUSIONS

To date, in Italy the residual cost for related HPV diseases amounts to more than **€ 150 million**, with a saving due to primary prevention interventions exceeding **€ 76 million**. By further increasing the vaccination coverage, as envisaged in the NIP, further savings of almost **€ 50 million** could be obtained and a total number of avoided events that exceeds **20 thousand**.

The estimated cost of vaccinating 95% of the primary cohort would amount to about € 66 million per year, it is understood that the cost of vaccination is amply compensated already in 'as is' coverage. Nevertheless, our results support the importance of complying with the NIP targets and suggests that increasing Vaccination coverage rates could generate important advantages in terms of opportunity costs.

AUTHOR INFORMATION

Andrea Marcellusi(1,2), Francesco Saverio Mennini(1,2), Martina Paoletti(1), Chiara Bini(1)

1.Faculty of Economics, Economic Evaluation and HTA (EEHTA), CEIS, University of Rome "Tor Vergata", Rome, Italy.

2. Institute for Leadership and Management in Health - Kingston University London, London, UK.

ABSTRACT

The opportunity cost of HPV9 vaccination in Italy

Andrea Marcellusi[1,2], Francesco Saverio Mennini[1,2], Martina Paoletti[1],Chiara Bini[1]

1. Economic Evaluation and HTA (CEIS- EEHTA) - IGF Department, Faculty of Economics, University of Rome "Tor Vergata", Italy.

2. Institute for Leadership and Management in Health - Kingston University London, London, UK

Abstract

INTRODUCTION: The objective of this study is to estimate the opportunity cost that are achievable with an increased coverage rate of anti-HPV9 vaccination in Italy.

METHODS: A cost consequence model was developed in order to estimate the HPV-related diseases incurred from a hypothetical Italian cohort of women and boys. The model considers the age risks of hospitalization for: 'cervical intraepithelial neoplasia (CIN)' (622.1x; 67.2; 67.32; 67.33; 67.39; 233.1); 'condyloma acuminatum' (GW) (078.11); 'anal cancers' (AC) (154.2–154.8); oropharyngeal cancers (OC): 'oropharyngeal cancer'(146.0–146.9) and 'head, face and neck cancers' (171.0); genital cancers (GC): 'penis cancer' (187.1–187.9) and 'cervical cancer' (180.0–180.9). Other direct healthcare costs were estimated from the literature while indirect costs (social security benefits) were associated with incident patients considering the data coming from the Italian National Institute of Social Security (INPS). Vaccine Efficacy data were taken from HPV9 vaccine RCP and literature.Different scenarios were compared based on the vaccination coverage rates (VCRs): No vaccination (0% of VCR for both male and female), 'as is scenario' (62% of VCR for female and 19% coverage for Male as observed for the l.a.y. 2018) and Optimal Vaccination Strategy (95% of VCR for both male and female). All scenarios have a lifetime projection.

RESULTS: The model estimates a total economic burden of the Hpv related diseases of about € 226.8million (55% attributable to indirect costs) in the absence of HPV9 vaccination. The 'as is' VCRs are likely to reduce € 31.4 million of direct healthcare costs and € 45.1 million of indirect costs. An Optimal Vaccination Strategy could reduce over € 126 million of direct and indirect cost if compared to the no Vaccination strategy and € 49.8 Mln if compared to the Standard Vaccination Strategy.

CONCLUSIONS: These results support the importance of primary prevention strategy in Italy and suggest that increasing Vaccination coverage rates could generate important advantages in terms of opportunity costs.

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