Vaccine 33 (2015) 5188–5195

Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

From non school-based, co-payment to school-based, free Human Papillomavirus vaccination in Flanders (Belgium): A retrospective cohort study describing vaccination coverage, age-specific coverage and socio-economic inequalities

Eva Lefevere[a,*], Heidi Theeten[b], Niel Hens[c,d], Frank De Smet[e,f], Geert Top[g], Pierre Van Damme[b]

[a] Herman Deleeck Centre for Social Policy, University of Antwerp, St Jacobstraat 2, 2000 Antwerp, Belgium
[b] Centre for the Evaluation of Vaccination (CEV), Vaccine & Infectious Disease Institute (VAXINFECTIO), University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium
[c] Center for Statistics (CenStat), Hasselt University, Agoralaan, Building 3, 3590 Diepenbeek, Belgium
[d] Centre for Health Economics Research and Modelling Infectious Diseases (CHERMID), Vaccine & Infectious Disease Institute (VAXINFECTIO), University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium
[e] National Alliance of Christian Mutualities, Haachtsesteenweg 579, 1031 Brussel, Belgium
[f] Department of Public Health and Primary Care, Environment and Health, KU Leuven, Kapucijnenvoer 35 blok D, Box 7001, 3000 Leuven, Belgium
[g] Agency for Care and Health, Infectious Disease Control and Vaccinations, K. Albert II laan 35 Box 33, 1030 Brussels, Belgium

ARTICLE INFO

Article history:
Received 30 March 2015
Received in revised form 13 July 2015
Accepted 28 July 2015
Available online 5 August 2015

Keywords:
HPV vaccination
School
Co-payment
Coverage
Age-specific coverage
Socio-economic inequalities
Belgium

ABSTRACT

School-based, free HPV vaccination for girls in the first year of secondary school was introduced in Flanders (Belgium) in 2010. Before that, non school-based, co-payment vaccination for girls aged 12–18 was in place. We compared vaccination coverage, age-specific coverage and socio-economic inequalities in coverage – 3 important parameters contributing to the effectiveness of the vaccination programs – under both vaccination systems.

We used retrospective administrative data from different sources. Our sample consisted of all female members of the National Alliance of Christian Mutualities born in 1995, 1996, 1998 or 1999 ($N = 66{,}664$). For each vaccination system we described the cumulative proportion HPV vaccination initiation and completion over time. We used life table analysis to calculate age-specific rates of HPV vaccination initiation and completion. Analyses were done separately for higher income and low income groups.

Under non school-based, co-payment vaccination the proportions HPV vaccination initiation and completion slowly rose over time. By age 17, the proportion HPV vaccination initiation/completion was 0.75 (95% CI 0.74–076)/0.66 (95% CI 0.65–0.67). The median age at vaccination initiation/completion was 14.4 years (95% CI 14.4–14.5)/15.4 years (95% CI 15.3–15.4). Socio-economic inequalities in coverage widened over time and with age. Under school-based, free vaccination rates of HPV vaccination initiation were substantially higher. By age 14,the proportion HPV vaccination initiation/completion was 0.90 (95% CI 0.90–0.90)/0.87 (95% CI 0.87–0.88). The median age at vaccination initiation/completion was 12.7 years (95% CI 12.7–12.7)/13.3 years (95% CI 13.3–13.3). Socio-economic inequalities in coverage and in age-specific coverage were substantially smaller.

1. Introduction

Every year around 350 cases of cervical cancer are diagnosed in Flanders, the northern region of Belgium. This corresponds to an age standardized incidence rate of 10 per 100,000 persons years [1].

In the fight against cervical cancer opportunistic Papanicolaou screening was the only available preventive measure in Flanders

* Corresponding author. Tel.: +32 3 265 53 99.
E-mail addresses: eva.lefevere@uantwerpen.be (E. Lefevere), heidi.theeten@uantwerpen.be (H. Theeten), niel.hens@uhasselt.be (N. Hens), frank.desmet@cm.be (F. De Smet), geert.top@zorg-en-gezondheid.be (G. Top), pierre.vandamme@uantwerpen.be (P. Van Damme).

http://dx.doi.org/10.1016/j.vaccine.2015.07.088
0264-410X/

Table 1
Overview of OOP cost (in euros) under the non school-based, co-payment and school-based, free HPV vaccination system.

Vaccination system:	Non school-based, co-payment vaccination system		School-based, free vaccination system	
Income group[c]:	Higher income girls	Low income girls	Higher income girls	Low income girls
Item				
HPV vaccine (per dose)	10.80	7.20	0	0
Consultation[a]				
General practitioner	5.43	1.40	5.43	1.40
Gynecologist[d]	7.24	2.47	7.24	2.47
Pediatrician[d]	7.24	2.47	7.24	2.47
School Health Service	NA[b]	NA[b]	0	0

Legend: Fees as valid on January 1st, 2007.
[a] The choice of the vaccinator could be determined by the girls or their parents.
[b] Not applicable.
[c] Income groups were determined on the basis of the Beneficiary of Increased Reimbursement (BIR) statute on September 30th, 2007. Within the Belgian Health Insurance the BIR statute is assigned to people from low income households, who consequently pay lower co-payments.
[d] Allowed to charge supplements.

until November 2007, when non school-based, co-payment Human Papillomavirus (HPV) vaccination was introduced. In September 2010 school-based, free HPV vaccination was implemented.

Under the non school-based, co-payment vaccination system girls themselves (potentially guided by their parents or physician) had to take the initiative to be vaccinated. The system was open to girls aged 12–15 from November 1st, 2007 on, and to girls aged 12–18 from December 1st, 2008 on. Girls had to obtain a prescription from their physician, buy the vaccine at the pharmacy and go back to their physician three times to receive the recommended three vaccine doses. For both the consultations at the physician and the vaccine an Out Of Pocket (OOP) cost had to be paid (Table 1). Girls with a so-called BIR (Beneficiary of Increased Reimbursement) status (see further) paid lower co-payments.

Under the free, school-based HPV vaccination system all girls in the first year of secondary school (except for a very small minority attending private schools) were systematically invited for and informed on HPV vaccination via the School Health Services (SHS). The parents could choose to let their daughter be vaccinated by the SHS (during school hours), by another physician (pediatrician, gynecologist or general practitioner GP) (outside school hours) or to refuse vaccination. The vaccines were free of charge. Consultations at the SHS were free as well; for consultations at another physician there was an OOP cost (Table 1). We speak of "school-based vaccination" as this term is frequently used in articles on the theme [2,3] and as many aspects of the vaccination program were organized via schools. However, this "school-based" vaccination was part of a larger HPV vaccination program that also entailed, among others, a systematic briefing of all vaccinating physicians on HPV vaccination and on-demand availability of the vaccines at the different physicians.

To achieve effective control of vaccine-preventable diseases overall coverage, coverage among high-risk groups and age-specific coverage are important. In Flanders, as in many other regions, women from lower socio-economic backgrounds are at higher risk of contracting cervical cancer [4–6] and participate less in cervical cancer screening [7,8]. Therefore, coverage among these women should be closely monitored. Further, for HPV vaccination, vaccination at a younger age is preferable, as the vaccine's effectiveness increases when administered before the first sexual intercourse [9]. In Flanders about 5% of girls aged 13–14 report already having experienced sexual intercourse [10]. The age at first sexual intercourse is lower among girls from lower socio-economic backgrounds [11].

We used retrospective administrative data from different sources to compare the non school-based, co-payment vaccination system and the school-based, free system with regard to their effect on HPV vaccination coverage, age-specific coverage and socio-economic inequalities. We considered both HPV vaccination initiation and completion (administration of the first or all three doses of the vaccine, respectively).

2. Materials and methods

2.1. Study population

Our study population consisted of members of the largest sickness fund in Flanders, the National Alliance of Christian Mutualities (NACM), covering 53% of the Flemish population.

From its membership files the NACM selected all girls born in 1995, 1996, 1998 or 1999 who were member on September 30th, 2007 and who were living in Flanders (N = 66,794). Girls born in 1995 and 1996 were vaccinated under the non school-based, co-payment system. Girls born in 1998 and 1999 were vaccinated under the school-based, free vaccination system. Girls born in 1997 were vaccinated under a mixture of both systems and were excluded from the analyses.

We excluded girls for whom a vaccine was reimbursed before they had become eligible for reimbursement, assuming this to be the consequence of inaccuracies in the data. We also excluded girls for whom we had no information on the socio-economic background (BIR status on September 30th, 2007, see further). The final sample consisted of 66,664 girls.

3. Variables

Data from different administrative data sources were linked to the girls. Permission for this data linkage was obtained from the Health Section of the Sector Committee of Social Security and of Health on July 17th 2012 (reference SCSZG/12/210).

Vaccination data came from two sources: the NACM reimbursement claims (non school-based system) and Vaccinnet (school-based system).

The NACM reimbursement claims entail information on all pharmaceuticals reimbursed to NACM members within the Belgian health insurance. They are a complete, objective source on HPV vaccination behavior under the non school-based, co-payment system. As the partial reimbursement of the vaccination is organized through a third-party arrangement with the sickness funds, each vaccine bought at the pharmacy is automatically registered in the reimbursement claims.

Vaccinnet is the web-based ordering and registration system for vaccines administered to people officially residing in Flanders. All vaccines administered to people living in Flanders can be registered. In practice, at the time of our analysis, all vaccines