Vaccine 30 (2012) 1425–1433

Contents lists available at SciVerse ScienceDirect

Vaccine

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

Review

Introduction of human papillomavirus vaccination in Nordic countries

Bente Braad Sander[a,*], Matejka Rebolj[a], Palle Valentiner-Branth[b], Elsebeth Lynge[a]

[a] Department of Public Health, University of Copenhagen, Øster Farimagsgade 5, DK-1014 Copenhagen K, Denmark
[b] Department of Epidemiology, Statens Serum Institut, Ørestads Boulevard 5, DK-2300 Copenhagen S, Denmark

ARTICLE INFO

Article history:
Received 11 September 2011
Received in revised form
25 November 2011
Accepted 27 November 2011
Available online 7 December 2011

Keywords:
Cervical cancer
HPV vaccination
Nordic countries
Coverage

ABSTRACT

Introduction: Cervical screening has helped decrease the incidence of cervical cancer, but the disease remains a burden for women. Human Papillomavirus (HPV) vaccination is now a promising tool for control of cervical cancer. Nordic countries (Denmark, Finland, Greenland, Iceland, Norway and Sweden) are relatively wealthy with predominantly publicly paid health care systems. The aim of this paper was to provide an update of the current status of introduction of HPV vaccine into the childhood vaccination programs in this region.
Methods: Data on cervical cancer, cervical screening programs, childhood immunization and HPV vaccination programs for Nordic countries were searched via PubMed and various organizations. We furthermore contacted selected experts for information.
Results: The incidence of cervical cancer is highest in Greenland (25 per 100,000, age standardized, World Standard Population, ASW) and lowest in Finland (4 per 100,000 ASW) and rates in the other Nordic countries vary between 7 and 11 per 100,000 ASW. Greenland and Denmark were first to introduce HPV vaccination, followed by Norway. Vaccination programs are underway in Sweden and Iceland, while Finland has just recently recommended introduction of vaccination. HPV vaccination has been intensively debated, in particular in Denmark and Norway.
Discussion: In Nordic countries with a moderate risk of cervical cancer and a publicly paid health care system, the introduction of HPV vaccination was a priority issue. Many players became active, from the general public to health professionals, special interest groups, and the vaccine manufacturers. These seemed to prioritize different health care needs and weighed differently the uncertainty about the long-term effects of the vaccine.
Conclusion: HPV vaccination posed a pressure on public health authorities to consider the evidence for and against it, and on politicians to weigh the wish for cervical cancer protection against other pertinent health issues.

Contents

1. Introduction 1426
2. Materials and methods 1426
3. Results 1426
   3.1. Denmark 1426
   3.2. Finland 1428
   3.3. Greenland 1428
   3.4. Iceland 1428
   3.5. Norway 1428
   3.6. Sweden 1429
4. Discussion 1429
5. Limitations of the study 1429

* Corresponding author. Tel.: +45 35 32 73 82; fax: +45 35 32 73 83.
E-mail addresses: bbsa@sund.ku.dk, bentesander@hotmail.com (B.B. Sander), mare@sund.ku.dk (M. Rebolj), pvb@ssi.dk (P. Valentiner-Branth), elsebeth@sund.ku.dk (E. Lynge).

0264-410X/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.vaccine.2011.11.097

6. The cost of HPV vaccination 1429
7. HPV vaccine debate in Nordic countries 1429
8. Comparison with other countries 1430
9. Conclusion 1430
Conflicts of Interest 1430
Acknowledgements 1430
References 1431

1. Introduction

Cervical cancer is the second most common cancer among women worldwide. Currently almost 80% of cases occur in developing countries. Only 50 years ago the burden of cervical cancer was high also in developed countries but here organized cervical screening has helped to decrease the incidence and mortality from the disease [1].

Persistent infection with oncogenic types of Human Papillomavirus (HPV) is a necessary cause of cervical cancer [2]. Since 2006, two vaccines against HPV have been available. The bivalent vaccine, produced by GlaxoSmithKline (GSK), contains virus-like particles of HPV types 16 and 18 [3], whereas the quadrivalent vaccine, produced by Merck, contains virus-like particles of HPV type 6, 11, 16 and 18 [4]. HPV type 16 and 18 cause about 70% of all cervical cancers [5] whereas types 6 and 11 are low-risk viruses cancer-wise but cause nearly 90% of genital warts [6], although with some variation [7]. Both vaccines are given in three doses [3,4]. The effect of vaccines in preventing cervical intraepithelial neoplasia grade 2 or higher (CIN^{2+}) has been found to extend more than 7 years for the bivalent and 5 years for the quadrivalent vaccine, but it is still not known whether booster doses will be needed [8,9]. HPV vaccines do not have therapeutic benefits. As HPV is sexually transmitted it is therefore essential that the vaccines are given before sexual debut [10]. The HPV vaccines were marketed in Nordic countries in 2006 and 2007 [3,4,11,12].

Nordic countries, i.e. Denmark, Finland, Greenland, Iceland, Norway and Sweden, have a total population of 26 million [13]. All countries are relatively wealthy and their health care systems are mainly publicly financed [14,15]. Childhood vaccination programs have high coverage; ranging from 80% (Greenland) to 97% (Finland) for the second dose of the measles, mumps and rubella (MMR) vaccine given at age 6–14 years [16–23].

Nordic countries have a long history of organized cervical screening, and as a consequence the incidence of cervical cancer has decreased by 50–75% over the last 50 years [1]. Nevertheless, 1300 women are diagnosed with cervical cancer and 400 die from it annually [24]. The incidence is highest in Greenland at 25 per 100,000 (age-standardized rate by World Standard Population, ASW) (Gorm Nørgaard Pedersen, personal communication, 2011), and lowest in Finland at 4 per 100,000 (ASW) [24].

The aim of this paper was to provide an update of the current status of introduction of HPV vaccine into the childhood vaccination programs of Nordic countries, and to describe the positions of the main stakeholders during this process.

This region is particularly interesting to investigate. The countries are wealthy, implying that the high price of the vaccine would not be a major barrier, and the incidence of cervical cancer varies across the countries.

2. Materials and methods

We have collected incidence data on cervical cancer for Denmark, Finland, Iceland, Norway, Sweden [24] and Greenland (Gorm Nørgaard Pedersen, personal communication, 2011). We searched PubMed using keywords: cervical cancer screening; cervical cancer; HPV; vaccine; vaccination program; introduction; policy; implementation; uptake; coverage; compliance; Nordic; Denmark; Finland; Greenland; Iceland; Norway and Sweden. Much of the potentially relevant information was, however, difficult to find on PubMed. We therefore expanded the search to include the websites of the health authorities responsible for vaccination in the different Nordic countries; the World Health Organization (WHO); European Cervical Cancer Association (ECCA); European Centre for Disease Control (ECDC); European Surveillance Network for Vaccine-preventable Diseases (EUVAC); and Vaccine European New Integrated Collaboration Effort (VENICE). We furthermore searched for gray literature through Google. The sources were searched continuously until this article was submitted in September 2011. Where information was not available through any of the above sources, we contacted local, centrally placed experts. Especially for Iceland and Greenland much factual information on cervical cancer incidence, HPV vaccination and screening was obtained in this way. The factual information collected for the present work consequently came primarily from non-peer reviewed sources.

3. Results

3.1. Denmark

Denmark has a relatively high incidence of cervical cancer at 11 per 100,000 (ASW) (Table 1) [24]. Local screening programs started in the 1960s. Screening became nationwide in 1996 [1], now recommended from age 23 to 65 years (Table 2) [25].

A medical technology assessment on HPV vaccination was published in May 2007 [26], and HPV vaccination was recommended in October 2007 [27]. On 1 January 2009, quadrivalent HPV vaccination of 12-year old girls was introduced as part of the general tax-financed childhood vaccination program, supplemented by a catch-up program targeting 13–15 year old girls starting in October 2008 (Table 3) [28]. Initially the National Board of Health sent personal invitations and information leaflets [28], but now this responsibility rests with the regional health authorities (Maja Barfod Hørsving, personal communication, 2011).

General practitioners administer childhood vaccinations in Denmark, including HPV vaccination [28], and are reimbursed for reporting vaccinations to the National Health Insurance. Program coverage was calculated from these data [29]. Three-dose coverage was 81% for the catch-up program, and will be $\geq$79% for the first targeted cohort of 12-year old girls (born in 1996) [30]. A comprehensive register, i.e. including non-program vaccinations, will start in 2011 [31].

Vaccination is free of charge, and was mainly funded by lowering reimbursement for other drugs [32], which affected people depending on drugs and caused uproar from the Danish Diabetes Society [33]. The vaccine was purchased centrally by the National Serum Institute following a public tender [34]. The expenses for the quadrivalent vaccine were budgeted to around 11 million Euro per year for the general program and 28–34 million Euro for the two years of the catch-up program [27]. With the second tender