Vaccine 31 (2013) 5687–5692

Contents lists available at ScienceDirect

Vaccine

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

Determinants influencing self-paid vaccination coverage, in 0–5 years old Polish children

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ARTICLE INFO

Article history:
Received 31 May 2013
Received in revised form
17 September 2013
Accepted 24 September 2013
Available online 8 October 2013

Keywords:
Self-paid vaccines
Combination vaccines
Coverage
Immunization
Determinants
Children

ABSTRACT

Immunization is an important and cost-effective public health intervention to protect the population from illness. In Poland, in addition to free of charge vaccines, listed in the national program on immunization, self-paid vaccinations for pneumococcal, meningococcal, rotavirus, varicella, influenza infections and combination vaccines are recommended. The study objective was to measure the coverage and influencing determinants of self-paid vaccinations in 0–5-year-old children seen between June 2009 and January 2010 at 3 randomly selected GP practices located in one region in the south-western part of Poland. Parents of the children who were seen consecutively were invited to participate and complete questionnaires on socio-demographic data and other factors related to paid vaccination. The response rate: 93.3%. Among the 308 parents (18–50 years old, median 31 years) who agreed to participate, 77.9% (95%CI: 73.0–82.2%) had their child vaccinated with at least one paid vaccine. Combination vaccines were most commonly chosen (62.3%), followed by a pneumococcal (36.4%), influenza (14.3%), meningococcal (13.3%), and rotavirus (12.7%) vaccine. Most parents admitted that their decision was based on a health-care worker's initiative informing them about the topic. The multi-variable regression model revealed that parent's factors: age $\geq$ 25 years, high socio-economic status, having one child, and health system factor, i.e. practice location were each associated with greater odds of child immunization The high cost of a vaccine was associated with more than five times lower chance to immunize a child. Observed high coverage rate regarding self-paid vaccines among young children was influenced mostly by combination vaccines. As the cost of a vaccine was an important barrier for the immunization, the gradual introduction of some of currently self-paid vaccines in a national program would be of value. Future interventions on self-paid vaccination coverage should be more tailored, focusing especially on young parents with low income who have more than one child.

1. Introduction

Immunization is an important and cost-effective public health intervention which has the power to protect countless children from infectious diseases. In 2013 WHO Regional Office for Europe edited the "Guide to tailoring immunization programs" with the aim of assisting national immunization programs design targeted strategies to attain high levels of vaccination among young children and to provide protection at the earliest possible age [1]. In Poland immunization coverage for the six major vaccine-preventable diseases – pertussis, childhood tuberculosis, tetanus, polio, diphtheria and measles – has risen significantly since the national program of free of charge immunization began in the 1950s. The program has been expanded recently to include hepatitis B, mumps, rubella and Haemophilus influenzae b vaccinations. The uptake of vaccines in infancy in Poland is generally high. DTP3 coverage was estimated 99%, hepatitis B 98%, polio 96%, and BCG 93% by the end of 2011 [2].

In addition to free of charge vaccines, listed in the basic, mandatory immunization schedule, self-paid vaccinations are also recommended for Polish children, like pneumococcal, meningococcal, rotavirus, hepatitis A, varicella, and influenza vaccine or combination vaccines. These immunizations are voluntary, however healthcare staff strongly encourage uptake; this is endorsed by the Ministry of Health and various scientific societies. Sadly, Poland

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http://dx.doi.org/10.1016/j.vaccine.2013.09.056

is among those not numerous European Union countries, where pneumococcal vaccine is not included in the national program on immunization [3].

The uptake of self-paid vaccination among children has not yet been assessed in Poland, or in Central Europe. Criticism observed among a fraction of parents, exacerbated during the controversy over the mumps, measles and rubella vaccine and the high cost of immunization suggests that vaccination rates regarding self-paid shots may not meet targets. Many parents remain uncertain about the benefits and potential risks of newly introduced vaccines. Additionally, some myths around immunization still exist as well as skeptical opinions widely published on the various internet forums.

Although determinants influencing obligatory vaccination in children and adolescents were assessed by many authors [4–8], studies on factors responsible for an uptake of self-paid vaccinations among children are rather scant. The objective of the study was to measure the coverage and influencing determinants of self-paid vaccinations in 0–5-year-old children seen at GP practices in Poland.

2. Materials and methods

2.1. Design & setting

A cross-sectional study was conducted from June 2009 to January 2010 among parents of 0–5-year-old children who were seen consecutively at GP practices located in one region in the south-western part of Poland. As the vaccination coverage is poorer outside larger cities, especially in rural areas [4,9], we aimed to select only GP practices serving patients in urban areas equal or less than 75,000 inhabitants and also in villages.

2.2. Sampling

Multistage stratified sampling was used. Firstly, with the use of a random-number table, 2 counties (lubinieckie and zgorzeleckie) were selected randomly out of 26 counties in the Dolnośląskie region, Poland. Then, with the help of a list of GP practices obtained from local health departments, 2 urban (Lubin, Zgorzelec) and 1 rural (Trójca) practices were selected to ensure a representation of different levels of service.

The finite population of children 0–5 years old, living in lubinieckie and zgorzeleckie counties in Dolnośląskie region for the day 31.12.2008 according to the National Statistics Bulletin [10] was $n = 11{,}319$. With no data available of the average of self-paid vaccination coverage among children in Poland (proportion; P), we followed Macfarlane's suggestion [11] that if there is any doubt about the value of P, it is best to err toward 50% (which would lead to a larger sample size). With a confidence level (CI) of 95% and with arbitral relative precision of 6% points on each side, a sample of 267 parents of children 0–5 years old was needed for the purpose of this study. Three hundred thirty parents were invited to participate. Therefore, the required condition for a minimal sample size has been fulfilled.

2.3. Study instrument

A self-administered questionnaire was designed using a literature review and then administered by trained nurses. It included questions that anonymously queried parents on the following:

(1) Demographic: age, literacy, place of residence, socio-economic status, number of children
(2) Healthcare facility location
(3) Vaccination history of the respondents 0–5 years old child
(4) Preferable and factual sources of information on self-paid vaccines
(5) The cost of a vaccine as a potential barrier to self-paid child vaccination

Vaccination records in a booklet were used to determine a child's vaccination status.

Once developed, the survey tool was pilot-tested on 50 parents from a GP practice in Zgorzelec (results included in the study). Written informed consent was obtained from all participants. The study received approval from the local Ethical Committee.

2.4. Statistical analysis

Data were entered and validated using a customized program STATISTICA PL Version 10 (StatSoft Inc., 2005). Our main outcome was child vaccination with at least one self-paid vaccine and we aimed to define variables influencing this outcome. In univariate analysis, for categoric variables groups were compared using the chi-square test with Yates correction factor and Fisher's exact test; the Mann–Whitney test was used for numeric variables. All variables significant ($p < 0.05$) at the univariate level were used to build a logistic regression model (i.e. the enter model was used; Table 1) and a decision tree model presented in Fig. 2, with the help of R software (R Development Core Team 2012) [12]. A small number of responses were missing for some questions. The actual number of responses for each item was included in the results, so the sample sizes vary from 300 to 308 respondents.

3. Results

3.1. Demographics

Of the total 330 parents eligible, 308 individuals (93.3%) consented to participate, 262 mothers (85.1%) and 46 fathers. Age for parents ranged from 18 to 50 (median 31 years). More than a half of the parents (183/308, 59.4%) were from towns < 75.000 inhabitants, the remainder – from rural areas. Almost a half of the

Table 1
Logistic regression model: association of self-paid vaccination among children 0–5 years old with selected variables (OR's estimates, significance of coefficients using Wald's *z*-test; Dolnośląskie region, Poland, $n = 308$; 2009/10).

Variable/category	OR[a]	95% CI
Parent age		
≥25	2.60	1.03–6.83
<25	1.00	
Parent education		
University degree	1.70	0.70–4.50
<University degree	1.00	
Parent residency		
Town	1.42	0.80–2.52
Village	1.00	
Parent socio-economic status		
High	3.46	1.95–8.48
Low	1.00	
Number of children in the family		
One	3.64	1.96–7.14
More than one	1.00	
Facility location		
Zgorzelec	3.94	1.95–8.48
Other	1.00	
Cost of a vaccine		
High	0.18	0.09–0.36
Low	1.00	

[a] Odds ratio = vaccination ratio between the two categories tested in each variable, controlling for other variables.