Vaccine xxx (2018) xxx–xxx

Contents lists available at ScienceDirect

Vaccine

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

The impact on vaccination coverage following introduction of a routine pneumococcal vaccination programme for the elderly in Japan

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ARTICLE INFO

Article history:
Received 26 December 2017
Received in revised form 7 June 2018
Accepted 9 August 2018
Available online xxxx

Keywords:
Elderly
Pneumococcal
Vaccination
Routine programme

ABSTRACT

In October 2014, a routine pneumococcal vaccination programme in the elderly aged 65–100 years old was initiated in Japan. Currently, this programme is within a transitional period. Eligibility for subsidy under the programme is granted for target ages in 5-year increments, over a 5-year roll-out period. We assessed the impact of the routine vaccination programme on vaccination coverage and explored the factors relating to pneumococcal vaccine uptake. We conducted a cross-sectional web-based survey in 2015 for respondents aged 65–79 years. A total of 3889 respondents answered the survey. The vaccination coverage in this study was estimated as 33.5%. Of the total respondents, 3327 were not vaccinated at initiation of the routine vaccination programme. The uptake of vaccination after implementation of the programme among them was 22.3%. There was a significant relationship between vaccination and eligibility for subsidy under the routine vaccination programme (adjusted odds ratio: 16.7). While there are some limitations to this study, introduction of the routine vaccination programme might affect pneumococcal vaccination coverage in the elderly.

1. Introduction

Pneumococcal infection carries the risk of serious infection, hospitalisation and even death, especially in older people [1,2]. Pneumococcal vaccines are effective in prevention of invasive pneumococcal disease (IPD) in healthy adults [3,4]. Pneumococcal polysaccharide vaccine (PPSV) 23 and/or pneumococcal conjugate vaccine (PCV) 13 are recommended for vaccination of older people in many countries, including the USA [5], UK [6], Germany [6], Canada [7], Singapore [8], and Taiwan [9].

In Japan, pneumonia is the third leading cause of death (96.5 per 100,000 population in 2015), and this type of death is particularly high in the older population (death caused by pneumococcal disease among those aged ≥65 years comprised 97% of the total deaths in 2015) [10]. In October 2014, a routine vaccination programme for the older people, targeting individuals aged 65–100 years, aimed to prevent IPD was initiated by an amendment of the Immunisation Act [11]. During the five-year from 2014 to 2019, this programme has been in a transitional period; eligibility for subsidy under the programme is granted for those newly of ages 65, 70, 75, 80, 85, 90, 95 or 100 in the fiscal year [11]. Individuals falling within these age criteria are eligible for a subsidised single vaccination per person. The routine vaccination programme is nationwide, but its implementation is decentralised to municipalities which set differing payment amounts, with some municipalities adding their own subsidy schemes such as granting subsidy without age criteria from the first year. While both PCV13 and PPSV23 pneumococcal vaccines are available in Japan, only PPSV23 is subsidised for use in the routine vaccination programme [11].

The national vaccination coverage of pneumococcal vaccines in older people (≥65 years) was reported as 38.3% in 2014 (vaccination counts under the national programme divided by eligibility for subsidy for the fiscal year) after the programme started [12]. Vaccination coverage under the new programme was low compared with the influenza vaccine in 2014 (50.6%) [12], and was also lower than the USA (63.6%) [13], UK (69.8%) [14], and Australia (56.0%) [15]. The vaccination coverage in Japan is higher than that in other Asian countries that introduced it as a recommendation, including Taiwan (20.7%, ≥75 years) [16] and Singapore (6.1%) [17].

Currently in Japan, the routine pneumococcal vaccination programme represents an ongoing nationwide experiment during

Abbreviations: PCV, pneumococcal conjugate vaccine; PPSV, pneumococcal polysaccharide vaccine; IPD, invasive pneumococcal disease.

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https://doi.org/10.1016/j.vaccine.2018.08.023
0264-410X/

the five-year transitional period. In this study, therefore, we assessed the effect of this programme on vaccination coverage in older people. We have also explored the factors relating to pneumococcal vaccine uptake.

2. Methods

We conducted a cross-sectional web-based survey in December 2015. The target population involved those who were registered throughout Japan with a private web survey company because there is no official behavioural surveillance system in Japan. Therefore, this was a closed survey that was only open to individuals that were registered and invited by the survey company [18].

Respondents were aged 65–79 years at the time of this research. This target age was chosen for feasibility of collecting data. For the recruitment process, an invitation was provided to the registered target population through personal websites and e-mail, and people could access the research website. Those who answered the question could obtain some incentives from the survey company, such as points that are exchangeable for gift cards once they reach a certain value.

The respondents were within the target population for the routine vaccination programme, both already eligible for subsidy (i.e. aged 65, 70, 75, 80, 85, 90, 95 or 100 at the end of fiscal year 2014/2015) and not yet eligible for subsidy (all other ages from 65 to 100 years).

The questionnaire mainly comprised 15 queries and was categorized into two parts involving a general part and a health-specific part, including vaccination status. The general part of the questionnaire assessed the following: age (birth month, year), gender, marital status, household income, education background as the final level of education completed, employment status, and children living in the same household. The health-specific part assessed smoking status, pneumococcal and seasonal influenza vaccination status, and any disease under treatment. The queries regarding pneumococcal vaccination also included the timing of vaccination (calendar year and month of vaccination) and the reason for seeking this vaccination. The reason for vaccination was queried to obtain information on the influence of the media and other resources. We did not differentiate between PPSV23 and PCV13 in this study because we aimed to focus on the vaccination trend and ease of response.

Firstly, we estimated the vaccination coverage (vaccinated population divided by target population) to investigate the effect of the routine vaccination programme. Second, we analysed the relationship between pneumococcal vaccination after programme implementation and the factors affecting vaccination uptake using a logistic regression model. These factors were as follows: eligibility for subsidy, age, gender, marital status, education, employment status, smoking status, seasonal influenza vaccination status, any disease under treatment, children within the same household, and household income. In addition, the main reason for vaccination was analysed as summary statistics.

Only respondents who provided informed consent were included in this study. This study was approved by the ethical committee at Meiji Pharmaceutical University.

3. Results

The total number of valid responses was 3889 (total respondents). The median amount of time to complete the questionnaire was 2 min and 23 s. Summary statistics are shown in Table 1. The average age of respondents was 70.8 years old at the time of survey, with males accounting for 1830 (47.1%). The proportion of respondents with a marital status was 77.1%, high school graduate was the most common educational background, and the proportion of employed respondents was 24.4%. The proportion answering "never smoked" was 60.6% and "ever smoked but currently do not smoke" was 29.6%. Influenza vaccination status was as follows: 44.3% for "annual vaccination", 36.0% for "never vaccinated". The proportion of respondents with any disease under treatment was 59.2% and that for having children within the same household was 2.7%. Household income data was available for 3090 respondents (79.5%), with a mode and median of 3–4 million yen (27,000–36,000 USD, 1USD = 110JPY) and 4.2 million yen (38,000 USD), respectively.

We estimated the vaccination coverage in this study from the total respondents and from those who were not vaccinated at introduction of the routine vaccination programme. A total of 1304 (33.5% of the total respondents, 1304/3889) respondents answered that they had been vaccinated with the pneumococcal vaccine at the time of the survey (vaccinated respondents) (Table 1). The vaccination coverage of the total respondents by age is shown in Fig. 1.

Of the total respondents, 3327 (85.5%, 3327/3889) were not vaccinated at initiation of the routine vaccination programme. During the second fiscal year after introduction, a total of 1368 respondents aged 65, 66, 70, 71, 75, 76 or 80 comprised the eligible population within our survey (41.1%, 1368/3327). Seven hundred and forty-two respondents (22.3%, 742/3327) were vaccinated after implementation of the programme. While 619 of 742 (83.4%) vaccinated respondents were eligible for subsidy under the programme, 123 (16.6%, 123/742) vaccinated respondents were not.

The effect of programme implementation was explored as a regression model based on the 3327 respondents who were not vaccinated at programme initiation (Table 2). There was a significant relationship between vaccination and eligibility for subsidy under the routine vaccination programme in the unadjusted and adjusted models (odds ratio: 12.3; 95% confidence interval: 10.0–15.2 for unadjusted and 16.7; 12.6–22.0 for adjusted). There were also relationships between vaccination and the following factors: age, employment status, influenza vaccination status, any disease under treatment, and household income in the adjusted model.

The main reason for vaccination after introduction of the routine vaccination programme was notification by post from municipalities (49.7%), followed by recommendation by a family doctor (16.7%), and commercial information from pharmaceutical companies through television (12.9%) (Table 1). Those who were already eligible for the routine vaccination programme answered that notification by post from municipalities was the main reason for vaccination. The main reason for vaccination in those who were not eligible was the family doctor, followed by notification by post.

4. Discussion

Currently in Japan, the routine pneumococcal vaccination programme for older people (≥65 years old) is within a transitional period. At the time this survey was performed, the programme was in its second year of a 5-year roll-out and 41.1% of respondents in this study were eligible for subsidised vaccination. Eligibility for subsidy under the routine vaccination programme was found to have an effect on coverage (Fig. 1), and it had the largest odds ratio (adjusted odds ratio:16.7) among the factors affecting vaccination uptake. Therefore, introduction of the routine vaccination programme has had an effect on pneumococcal vaccination coverage in older people, similar to the effect observed in Australia following introduction of universal funding [15].

In this study, vaccine uptake differed according to the respondents' factors, such as any disease under treatment, household

Please cite this article in press as: Shono A et al. The impact on vaccination coverage following introduction of a routine pneumococcal vaccination programme for the elderly in Japan. Vaccine (2018), https://doi.org/10.1016/j.vaccine.2018.08.023