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Monitoring pandemic influenza A(H1N1) vaccination coverage in Germany 2009/10 – Results from thirteen consecutive cross-sectional surveys

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ABSTRACT

To monitor pandemic influenza A(H1N1) vaccine uptake during the vaccination campaign in Germany 2009/10, thirteen consecutive cross-sectional telephone-surveys were performed between November 2009 and April 2010. In total 13,010 household-interviews were conducted. Vaccination coverage in persons >14 years of age remained low, both in the general population (8.1%; 95%CI: 7.4–8.8) and in specific target groups such as healthcare workers and individuals with underlying chronic diseases (12.8%; 95%CI: 11.4–14.4). Previous vaccination against seasonal influenza was a main factor independently associated with pandemic influenza vaccination (Odds ratio = 8.8; 95%CI: 7.2–10.8). The campaign failed to reach people at risk who were not used to receive their annual seasonal influenza shot.

1. Introduction

After the first description of a novel influenza A(H1N1) virus in Mexico and the United States in April 2009, the virus rapidly spread worldwide [1]. While many countries suffered their first autochthonous pandemic influenza A(H1N1) wave in the middle of 2009, Germany was at that time primarily affected by imported cases with a peak in case numbers in July 2009 [2]. Subsequently, the number of cases declined in August and September, and an increase in autochthonous pandemic influenza A(H1N1) 2009 cases was observed since October [3]. Case numbers peaked in the middle of November and finally fell to low case counts at the beginning of 2010 [4].

With the declaration of the pandemic phase 6 by World Health Organization (WHO) in June 2009, the production of a pandemic vaccine was enhanced. By October 2009 three vaccines against pandemic influenza A(H1N1) authorised by the European Medicines Agency (EMA) were available in Europe [5]. In Germany the federal states purchased the AS03-adjuvanted H1N1-vaccine Pandemrix® to be given to risk groups and the general population, and exclusively for pregnant women a non-adjuvanted monovalent vaccine manufactured by CSL. On the 12th of October 2009 the German Standing Committee on Vaccination (STIKO) recommended to give priority to the vaccination of primary target groups such as healthcare workers, persons with underlying chronic diseases, and pregnant women. The vaccination campaign started on the 26th of October. With the availability of sufficient numbers of H1N1-vaccine doses, the STIKO expanded its recommendation to the general population on the 14th of December 2009. However, priority was still given to the target groups mentioned above [6]. At that time, a total 40 million doses of the AS03-adjuvanted H1N1-vaccine were available or soon to be distributed, which would have been sufficient to vaccinate approximately half of the German population, since the German regulatory authority recommended one full dose of this adjuvanted vaccine for the immunization against pandemic influenza A(H1N1) for persons over 10 years of age.

The implementation of the vaccination campaign was under the responsibility of the German federal states. Therefore, the distribution of the 10 shot vaccine vials was organized and documented on the state level. Distribution, administration, and reimbursement procedures depended on local and federal regulations. Vaccines were mainly administered by primary healthcare physicians, but in some places also by public health departments or company physicians.

Because of the lack of a centralised register for pandemic influenza A(H1N1) vaccinations in Germany, we established a

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monitoring tool to collect data on the nationwide progress of the vaccination campaign. In addition, we used this tool to assess and monitor knowledge, attitude, and behaviour regarding pandemic influenza A(H1N1) vaccination in the German population during the vaccination campaign. Here we present results from the analysis of achieved pandemic influenza vaccination coverage and factors associated with the receipt of a shot against pandemic influenza A(H1N1), which are important parameters for pandemic response planning and evaluation.

2. Methods

Computer-assisted telephone interview (CATI) surveys were carried out on a bi-weekly basis starting in the middle of November 2009 (calendar week [cw] 47) shortly after the initiation of the vaccination campaign against pandemic influenza A(H1N1) in Germany. Each survey was conducted with a sample of approximately 1000 households. At the end of March 2010 a final survey was carried out including a total of 4005 households with approximately 1000 being interviewed per week. For each survey, households were randomly selected. Interviews were conducted by forsa (Gesellschaft für Sozialforschung und statistische Analysen mbH), a large professional market research company with experience in health-related surveys, as part of forsa's daily omnibus survey in Germany. From Monday to Wednesday of each survey week experienced interviewers surveyed representatively selected German speaking individuals, aged 14 years and older, living in private households equipped with a telephone. On a household level the last birthday selection method was applied. To prevent non-response bias, the survey samples were weighted for geographic region, age, sex, and education on the basis of recent population projections of the Federal Statistical Office of Germany.

The primary objective of our study was to assess the uptake of pandemic H1N1-vaccines in different target groups during the vaccination campaign in real-time. We used a core set of questions over the total study period of 13 surveys including questions on recent vaccination against pandemic or seasonal influenza, self-determination as risk-group for the development of severe pandemic influenza, or criteria for the categorization into specific risk-groups for targeted vaccination as defined by the STIKO, e.g. healthcare worker, policeman, fireman, pregnant women, or the prevalence of specific underlying chronic diseases. The latter group included persons with chronic respiratory diseases, cardiovascular diseases, diabetes mellitus, metabolic disorders, chronic renal diseases, chronic hepatic diseases, diseases or therapies leading to immuno-suppression, as well as chronic neurological and neuromuscular diseases.

Socio-demographic information (e.g. age, sex, education, size of the household) was assessed as part of the omnibus survey structure. Due to the use of an omnibus survey we were able to change questions on short notice. In the last 5 surveys, persons older than 18 years were asked about the vaccination against pandemic influenza of each child living in the same household.

2.1. Statistical methods

Collected data were analyzed for each individual cross-sectional survey, but also for trends of specific outcome parameters such as vaccination coverage over the study period. Because of the increase in vaccination coverage early after campaign initiation (week 47–49) and a stabilisation of the vaccination coverage beginning with week 51, we decided to pool data from all cross-sectional surveys from week 51 in 2009 to week 15 in 2010. The pooled data set of 11,009 interviews was used for further univariate and multivariate analysis of potential factors associated with vaccination against pandemic influenza A(H1N1). The analysis was performed by using complex survey data analysis procedures in STATA 11® (StataCorp, College Station, TX, USA). We calculated proportions with 95% confidence intervals (CI) and p-values using logistic regression statistics for complex survey data. Multivariate analysis was performed by using multiple logistic regression models with combined stepwise backward removal and forward selection. Odds ratios (OR) and 95%CI were calculated. Variables categorized as follows: Age-group (14–24, 25–59, ≥60 years of age), sex (male/female), healthcare worker (yes/no), underlying chronic diseases defined by STIKO (yes/no), geographic region (north, middle, south, east), children living in the household (yes/no), degree of education (low = 9 years of school education or less; middle = 10 years of school education; high = university entrance diploma), size of residency (≤5000; 5001–20,000; 20,001–100,000; 100,001–500,000; >500,000 inhabitants), and previous vaccination against seasonal influenza in season 2009/10 (yes/no). Essential Services was defined as self reported profession as policeman or fireman (yes/no). All statistical analysis where weighted with respect to the inclusion probability depending on geographic region, age, sex, and education of the participants.

3. Results

Between cw 47 in 2009 and cw 14 in 2010, a total 13,010 telephone-interviews were conducted in thirteen cross-sectional surveys: The first nine bi-weekly surveys comprised of approximately 1000 per survey and the final weekly surveys of a total of 4005 interviews. The median age of all respondents (n = 13,010) was 48 years (range: 14–93 years). 52.5% of the interviewed persons were female.

Vaccination coverage against pandemic influenza A(H1N1) in persons ≥14 years of age increased from 4.6% (95%CI: 3.2–6.6) in week 47 to 6.0% (95%CI: 4.3–8.3) in week 49. In the third survey, which was conducted in mid-December (cw 51), vaccination coverage reached a plateau of approximately 8%. Subsequent surveys revealed no significant increase in coverage. Moreover, the proportion of participants who still intended to receive a vaccination or who did not take a final decision yet was declining from 21% in cw 47 to 3% in cw 10 (Fig. 1).

After pooling data collected in cw 51 and later (n = 11,009), overall vaccination coverage in persons >14 years of age was 8.1% (95%CI: 7.4–8.8). Vaccination coverage increased with age, and the highest coverage (10.4%; 95%CI: 9.1–11.8) was found in persons 60 years and older. Persons with underlying chronic diseases revealed a vaccination coverage of 12.3% (95%CI: 10.8–13.9), and healthcare workers a coverage of 15.9% (95%CI: 12.7–18.6) (Fig. 2). A total of 65 pregnant women were included in the pooled dataset and revealed a vaccination coverage of 8.8% (95%CI: 3.1–22.7). Vaccination coverage in the combined STIKO target-population (people with underlying chronic diseases, pregnant women and Essential Services) was 12.8% (95%CI: 11.4–14.4).

To assess vaccination coverage in children less than 18 years of age, a total 1408 persons 18 years and older, who reported to have at least one child living in the same household, were interviewed in the last five surveys about their children's H1N1-vaccination status. The indirect questioning provided information on 2069 children. Overall vaccination coverage in the age-group under 14 years was 7.8% (95%CI: 6.1–10.0). Since for the age-group 14–17 years both methods (indirect and direct questioning) were used we were able to compare these two methods. Using the indirect question method (n = 376) revealed a slightly lower vaccination coverage in this age-group (4.0%; 95%CI: 2.6–6.4) when compared to the direct interviews (n = 488) in the total sample starting cw 51 (6.0%; 95%CI: 3.6–9.9).