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Factors associated with parental acceptance of seasonal influenza vaccination for their children – A telephone survey in the adult population in Germany

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ABSTRACT

Introduction: Influenza vaccination of children with underlying chronic diseases is currently recommended in Germany, but targeting all children constitutes an alternative approach to control seasonal influenza. To inform the modelling of vaccination impact and possible communication activities, we aimed to assess among parents the acceptance of universal childhood vaccination against seasonal influenza and possible modifiers.

Methods: We conducted a telephone survey in households in Germany using random digit dialing. We interviewed parents with children aged <18 years by constructing three hypothetical scenarios in subsequent order: (1) hearing about the influenza vaccination recommendation through the media, (2) the vaccine being recommended by a physician, and (3) being informed about the availability of the vaccine as a nasal spray. We calculated the proportion of parents who would immunize their child and used univariable and multivariable logistic regression to identify factors associated with influenza vaccination intention.

Results: Response was between 22 and 46%. Of 518 participants, 74% were female, mean age was 41.3 years. Participants had on average 1.6 children with a mean age of 8.9 years. In scenario 1, 52% of parents would immunize their child, compared to 64% in scenario 2 ($p < 0.01$) and to 45% in scenario 3 ($p = 0.20$). Factors independently associated with vaccination acceptance in scenario 1 were previous influenza vaccination of the child or parent (adjusted odds ratio [aOR] 4.5 and 8.6, respectively), perceived severity of influenza (aOR = 5.1) and living in eastern Germany (aOR = 2.4).

Conclusion: If seasonal influenza vaccination was recommended for all children, more than half of the parents would potentially agree to immunize their child. Involving physicians in future information campaigns is essential to achieve high uptake. As intranasal vaccine administration is non-invasive and easily done, it remains unclear why scenario 3 was associated with low acceptance among parents, and the underlying reasons should be further explored.

1. Introduction

Seasonal influenza is associated with substantial morbidity among children, leading to high rates of outpatient visits and hospitalizations [1–3]. Since especially children with underlying comorbidities are at high risk of developing severe disease [4], many industrialized countries recommend annual vaccination of this vulnerable group [5]. As children also play a major role in the transmission of influenza viruses [6], some countries like the United States or the United Kingdom recommend annual influenza vaccination for all children [7,8]. This strategy does not only focus on direct benefits of the vaccinated child, but also accounts for indirect effects of the immunization program in total as several modelling studies have shown that routine influenza vaccination of children can considerably reduce influenza disease burden in

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other age groups by reducing virus transmission [9–11]. However, field studies have presented conflicting results regarding herd effects of influenza vaccination in children, which depend on the achieved vaccination coverage and other parameters [12–14].

In Germany, annual vaccination against seasonal influenza is recommended by the Standing Committee on Vaccination (STIKO), the independent advisory group developing the national immunization schedule, for children with underlying comorbidities [15], but influenza vaccination of healthy children is a strategy that is currently being considered as an alternative approach. As indirect effects require high vaccination coverage [16], it is important to estimate the magnitude of vaccination coverage that can be expected if a strategy of routine influenza vaccination for all children regardless of chronic medical conditions would be implemented. These data are essential to inform mathematical models for the prediction of vaccination impact as well as future communication activities. Therefore, the objective of this study was to estimate among parents in Germany the anticipated acceptance of annual influenza vaccination for their children and to identify factors associated with their intention to vaccinate.

2. Methods

2.1. Study design and population

Between May and June 2015, we conducted a cross-sectional survey in private households in Germany using computer-assisted, dual-frame telephone interviewing. We included German-speaking adults of at least 18 years of age, who were reachable by mobile or landline telephone and who had at least one child aged <18 years or were pregnant or had a pregnant partner, respectively. Assuming 5% confidence limits, a 95% confidence level, about 8.1 million households with children aged <18 years in Germany [17], and an unknown prevalence of acceptance of seasonal influenza vaccination for children, we calculated a sample size of 385 study participants. Expecting a small number of invalid or incomplete questionnaires, we opted for 500 telephone interviews.

For the landline telephone sample, numbers were randomly generated using the adaptive method of Gabler and Häder [18]. If more than one household member was eligible according to the inclusion criteria, participants were selected by the Kish Selection Grid, a method that uses a pre-assigned table of random numbers [19]. For the mobile phone sample, we randomly selected telephone numbers from a sample of 30,000 numbers of different providers that were obtained from the Leibniz Institute for the Social Sciences (GESIS) in Mannheim, Germany. Interviews were conducted with the person answering the mobile phone if the inclusion criteria were met. If participants had two or more children, the next-birthday method, where participants were asked which child's birthday would be next, was applied to select the child that questions should be answered for [20]. Interviews were held in German and took approximately 15 min. Calls took place Mondays through Fridays from 8.30 am to 9.00 pm and Saturdays from 10.00 am to 3.00 pm. The management of telephone calls and call-backs was automatically regulated by the computer-assisted telephone interviewing software VOXCO Command Center Version 2.1.3.1109 (VOXCO©, Montréal, Canada). If the number called was not answered or the line was busy, up to 10 further calls were made. Data were collected by experienced interviewers from an external research institute (USUMA GmbH, Berlin, Germany) using a standardized computer-assisted interviewing (CATI) system. Response and Cooperation Rates were calculated as defined by the American Association for Public Opinion Research (AAPOR) [21]. Response Rate 3 estimates the proportion of complete interviews on all units (households) in the sample, including cases of unknown eligibility. Cooperation Rate 3 calculates the proportion of complete interviews on all units ever contacted, which in our survey represents the proportion of complete interviews on all contacts and refusals from known respondents. Considering the fact that only around 20% of all households in Germany were eligible for our survey because of the presence of children aged <18 years [17], we also calculated adjusted response and cooperation rates by reducing the number of units with unknown eligibility in our sample to the estimated proportion of eligible units of 20%. We assumed that the true response and cooperation rates were between the rates defined by AAPOR and the adjusted rates.

2.2. Questionnaire

We used a structured questionnaire to collect data on (i) attitude regarding seasonal influenza disease, (ii) attitude and behavior towards seasonal influenza vaccination, (iii) attitude regarding vaccinations in general and (iv) sociodemographic characteristics. Some survey items had been used in previous studies conducted by the Robert Koch Institute and were adapted to our setting [22,23]. Further survey items were developed by an internal expert group. The study questionnaire was pilot-tested with 25 eligible persons.

To assess participants' attitude regarding seasonal influenza disease, we asked for the perceived probability that the child would acquire influenza during the following season and for the perceived severity by using 10-point Likert-scales from "very unlikely" to "very probable", and from "not severe at all" to "very severe", respectively. Attitude and behavior towards seasonal influenza vaccination was assessed by asking for influenza vaccination during the previous season 2014/15 ("Have you received a flu shot during the last influenza season?") and on any previous influenza vaccination of the respective child ("Has your child ever been vaccinated against the flu?"). We assessed the intention of participants to immunize their child against seasonal influenza by describing to all participants three hypothetical scenarios: we asked first if participants would immunize their child against seasonal influenza if they were informed through the media that the vaccination was recommended for all children as part of the immunization schedule (scenario 1), then if a physician would recommend them to vaccinate their child against influenza (scenario 2), and finally if they were informed about the fact, that the vaccination could also be applied as a nasal spray instead of an injection (scenario 3). After each scenario, optional answers were "Yes, of course", "Probably yes", "Probably no", "No, not at all" or "I don't know". To assess reasons why participants would or would not vaccinate their child against seasonal influenza, we listed possible reasons for and against the vaccination and asked participants to select those that applied.

To assess participants' attitude towards vaccinations in general, we asked them to select one of the following statements in respect to their own vaccination status: (a) "I usually complete all recommended vaccinations"; (b) "There are a few vaccinations that I haven't completed, but I do not generally refuse to receive them"; (c) "There are a few vaccinations that I refuse to receive"; (d) "I am opposed to vaccinations in general".

Regarding sociodemographic characteristics, we collected data on age, sex, place of residence, education level, migration background, underlying chronic diseases, current pregnancies, about the number of children and of persons living in the same household and asked if the participant had a medical profession. Migration background was defined as not having been born in Germany or as having at least one parent that has not been born in Germany [24]. Underlying chronic diseases were defined as lasting for at least six months and being diagnosed by a physician and a list of

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