



Dutch influenza vaccination rate drops for fifth consecutive year



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ABSTRACT

Aim: To determine the prevalence and trend of the influenza vaccination-rate of the overall target population in the period 2008–2013, with a specific focus on groups at risk such as patients with cardiovascular diseases, lung diseases, diabetes and aged 60 years and older.

Methods: In an observational longitudinal study electronic medical records data from the Dutch representative network of general practices, LINH, were analyzed. For each influenza vaccination season, 2008–2013, the number of vaccinated and unvaccinated patients at risk are compared by chi-square tests (χ^2) for linear trends, linear-by-linear association. The level of significance was set at $p < 0.001$ based on the large number of available records.

Results: The influenza vaccination rate of the overall at risk group decreased significantly from 71.5% in the 2008 season, to 59.6% in the 2013 vaccination season. The difference of 11.9% was gradual over the years, with a mean decrease of 2.4% per year. The decrease was seen in all specified groups at risk, but was mainly among patients aged 60–65 years (mean yearly decrease of 3.3%).

Conclusion: For the fifth subsequent year, we notice a lowering trend of the influenza vaccination rate in the population at risk. Reports in the mass media on questioning the effectiveness of the vaccination program may have been an influence; as well as the relatively light outbreaks of influenza in the past years, which may have affected the sense of urgency. The gradual decrease in vaccination rates over recent years requires further research and a public health debate is needed on the usefulness and necessity of the vaccination program.

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1. Introduction

Annual vaccination can prevent influenza in the at-risk population effectively, and vaccination programs have therefore been provided in a number of countries. Influenza vaccination prevents the disease and its consequences in the most vulnerable populations such as the elderly, those with diabetes, cardiovascular or pulmonary conditions [1–3]. WHO-guidance indicates developed

countries should aim to achieve 75% influenza vaccine coverage in older people, while the European Union Council (EC) advises vaccination in 75% of the at-risk population [4,5].

In several countries monitoring programs have been established to obtain data on the reach of vaccination programs in terms of numbers needed to vaccinate and the vaccination rate of the at-risk population. Box 1 describes the Dutch influenza vaccination and monitoring program. With the results of monitoring programs, it is also possible to estimate the spending of public funds in implementing vaccination programs [6]. Influenza vaccination rates differ widely between countries, figures found in literature vary from about 40% to about 75% of the target population [1,2,7–9]. Uptake rates have been found to be associated with patient level issues (moreover, specific at-risk groups respond differently, and flu shot acceptance is related to multi-morbidity and older age) as well as organizational factors (like reminders or use of information pamphlets) [10–15].

Monitoring vaccination rates is an integral part of vaccination programs. The actual numbers played an important role in the public debate [16–19] that developed following the outbreak of

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Box 1: The Dutch influenza vaccination and monitoring program

In the Netherlands, primary health care is mainly provided by family practices and nearly all Dutch inhabitants are listed. Staff keeps records of all patients, including information on patient demographics and relevant medical information.

According to the 'Health Council of the Netherlands', the at risk groups for influenza vaccination include people ≥ 60 years, those with cardiovascular diseases, lung diseases, diabetes, kidney conditions or with immune-compromising conditions due to other illnesses f.e. HIV or medical treatment such as chemotherapy [31,32]. The Dutch government established an infrastructure for influenza vaccination called the Dutch National Influenza Prevention Program (NPG). There is a standardization of the administrative protocol for execution of the vaccination campaign [31,33], and staff can use supportive computer software for computerized marking and selection of high-risk patients and for administration of the vaccination state [15]. The software package (influenza module) was developed to assist the family practitioners in selecting patients who are indicated as at risk for influenza based on medical conditions in their computerized medical record systems. These medical conditions are based on the official recommendation of Dutch health council and include patients suffering from: cardiovascular diseases, lung disorders, diabetes mellitus, chronic renal insufficiency, immunocompromising conditions due to other illnesses (e.g. HIV) or medical treatment such as chemotherapy, and a respiratory disorder due to a neurologic disorder [15].

The NPG is family practice based and vaccination is free of charge for the at risk population [31]. There is a fee-for-service for the family practitioner who select, invite, remind and vaccinate the population at risk, and document the vaccinations. The NPG also initiates the mass Media information campaign, including distribution of posters and pamphlets.

Annual influenza surveillance monitoring is carried out by the National Information Network of Family Practices (LINH) since 1996 (www.linh.nl) [30]. The monitoring follows the Dutch guidelines and is based on the standardized computer software in each electronic patient record system, for computerized marking and selection of high-risk patients and the administration of at risk patients vaccination state. The LINH project has its own quality check of the data: only practices with valid and reliable data are included in the analyses.

Influenza A(H1N1)pdm09 virus (colloquially referred to as "Swine flu") and its vaccination campaign in 2009 [20,21]. As in other countries, in The Netherlands seasonal immunization programs were supplemented with extra vaccinations to mitigate the transmission of the A(H1N1)pdm09 virus [21–23]. Initially, the influenza A(H1N1)pdm09 virus was expected to lead to increased morbidity and mortality, but it turned out that this flu strain was mild [24]. However, public debates were seen in relation to the definition of a pandemic, the effectiveness of any vaccination program, the costs involved, and the way the pandemic was reported in the media [16–19].

The aim of our study is to describe the trend in influenza vaccination rate over the years 2008 to 2013 overall and in specific target groups of patients with cardiovascular diseases, lung diseases, diabetes and the elderly. Because the number of patients at risk is also varying over the years, in this trend analyses the size of the at risk population is taken into account. This descriptive study retrospectively assesses and compares the characteristics of patients at-risk for influenza and their vaccination state in a large family practice (FP) database representative for the general adult population of The Netherlands.

2. Methods*2.1. Design and study population*

In an observational longitudinal study, anonymous data from computerized medical record systems (CMRS) in family practices were used to calculate the influenza vaccination rate in the years 2008–2013 overall and for the different main at-risk groups. The family practices participated in a nationally representative network, the Netherlands Information Network of FPs (LINH) and the staff in the family practices routinely record encoded patient information of all patients, using a CMRS [11,25,26]. The LINH database holds longitudinal anonymous data at the patient level, including information on patient demographics and relevant information on morbidity, prescriptions and referrals. Clinical diagnoses are coded using the ICPC (International Classification of Primary Care) coding system [27]. Drugs are coded according to the Anatomical Therapeutic Chemical (ATC) classification [28] LINH Practices are spread throughout the Netherlands [11,25,26]. Quality checks on completeness and irregularities (fe pregnant men) support the validity of the data [29,30]. In the vaccination years 2008–2013, the family physicians at these practices invited all their high-risk patients for annual immunization in accordance with the immunization guidelines of the Dutch College of General Practitioners [31–33]. We specifically considered data provided on the registration of the at-risk population and the vaccines distributed (see Box 1).

2.2. Measures and statistic analyses

Based on age, relevant diagnosis codes (ICPC) and prescription codes (ATC) people at risk and their vaccination state could be identified in the medical records (see Box 2). To analyze the trend in vaccination rates in the years 2008–2013 descriptive statistics per vaccination season of vaccinated and unvaccinated patients at risk were compared by chi-square tests (χ^2) for linear trends, linear-by-linear association. The level of significance was set at $p < 0.001$ based on the large number of available records. Data were analyzed using the statistical package IBM SPSS statistics 20.0. This analysis was performed for the overall target group, and separately for patients with diabetes, cardiovascular diseases, pulmonary diseases as well as for people aged 60 years or more. As international guidelines mostly recommend vaccination for people aged over 65 years old, an extra analysis was completed for this group.

3. Ethical considerations

Data collection within the LINH network was conducted in accordance with the Dutch legislation on privacy [34] and the Declaration of Helsinki [35]. Each patient record in the database is coded with an anonymous administrative number. The key to this coding number is only in the family practice. According to the Dutch Central Committee on Research Involving Human Subjects, obtaining informed consent is not obligatory for observational studies, so no medical ethical committee approval was required for this study.

4. Results

Between 2008 and 2013 respectively 56, 72, 69, 68, 61 and 45 family practices could be included in our study, with over 175,000 listed patients *per year* (Table 1). The total study population (all listed patients) was representative for the Dutch population on patients' ages and gender.

In the 2008 vaccination season, 30.5% of all patients were identified as being at risk because of having at least one of the chronic conditions or because of their age. This percentage significantly

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