

Characteristics of patients and physicians correlated with regular influenza vaccination in patients treated for type 2 diabetes: a follow-up study from 2008 to 2011 in southeastern France

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Abstract

We studied a cohort of 110 823 patients treated with oral hypoglycaemic agents for type 2 diabetes in southeastern France from 1 January 2008 to 31 December 2011, to identify influenza vaccination coverage trends and the patient and physician correlates of influenza vaccine (IFV) uptake. We used French national health insurance fund (NHIF) databases to identify these patients and collect data on their IFV reimbursement claims (IFVC) and patient and physician characteristics. We used multilevel multivariate polytomous logistic regressions to test the correlates of IFVC. Between 2008 and 2011 the annual IFVC rate varied from 33.7% to 32.3% in the 18–64 age group and from 69.5% to 61.1% in the 65+ age group, among whom we saw a clear trend towards reduced vaccination after 2008. In the younger group, the probability of regular vaccination each year from 2008 to 2011 increased with diabetes severity and duration, comorbidities, and the number of general practitioner and nurse visits; it was higher among patients seeing endocrinologists and lower among low-income patients than in other patients. In the older group, there was no association with either diabetes severity or physician specialty. These results suggest different patterns of correlates of influenza vaccination according to age. Endocrinologists might help to improve IFV uptake in the younger group of patients with type 2 diabetes. Communication strategies regarding influenza vaccination should be adapted to age, and collaboration between healthcare professionals should be reinforced to achieve vaccination objectives for these patients. *Clinical Microbiology and Infection* © 2015 European Society of Clinical Microbiology and Infectious Diseases. Published by Elsevier Ltd. All rights reserved.

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Introduction

Worldwide, seasonal influenza causes 3–5 million serious illnesses annually and 250 000–500 000 deaths, depending on the

virulence of the virus and the duration of the epidemic [1]. The World Health Assembly and the guidelines of most countries, including France [2–4], recommend influenza vaccination every year for groups at high risk of influenza-related complications (persons 65 years of age or older or with specific chronic diseases including diabetes). Although the target coverage rate in Europe, including France, is 75% in all at-risk groups [5,6] (80% in Canada [7], and in the USA [8], 90% among all persons aged 65+ years and 60% among persons aged 18–64 years who have risk factors), actual coverage for high-risk groups remains below national targets in most countries [9]. It is

therefore essential to improve our understanding of the predictors of influenza vaccine (IFV) uptake in these groups, especially patients with chronic diseases such as diabetes, among whom these predictors have been studied somewhat less than among older people.

Studies of adults with diabetes show that increasing age [9], previous influenza vaccination [10], other comorbidities [11] and having a regular health provider [12] are important positive predictors of IFV uptake and that low income and/or residing in a deprived area are negative predictors [13]. The few studies that have considered the characteristics of the diabetes itself show that its severity [14] and duration [15] are positively associated with IFV uptake. Although influenza vaccination must be repeated annually, we are not aware of any studies that have examined factors associated with it for several consecutive years. Because physician advice is one of the most important influences on the decision about this vaccination [16,17], their characteristics may also help to predict it. Few studies have considered both patients' and physicians' characteristics.

In view of the marked decrease of IFV uptake in the general French population since the 2009 A/H1N1 pandemic in France [18] and of the dramatic rise in unfavourable attitudes towards vaccination in France during this pandemic [19], we set up a cohort of patients treated with oral hypoglycaemic agents (OHAs) for type 2 diabetes—referred to hereafter as patients with diabetes—in southeastern France. We followed up this cohort from 1 January 2008 through 31 December 2011. Our aims were: to estimate influenza vaccination coverage from 2008 to 2011; and to study patient (socio-demographic, diabetes severity, comorbidities and care-seeking behaviour) and physician (demographic, specialty and practice of alternative medicine) characteristics correlated with IFV uptake.

Methods

Database

We used the databases of the French national health insurance fund (NHIF) in southeastern France to identify the patients with diabetes and collect data on IFV purchases and patient and physician characteristics. This fund covers all but 13% of the population (i.e. it does not cover students, farmers and farm workers, and self-employed workers). Its databases record all drugs prescribed by a physician and dispensed in community pharmacies. For each prescription, the databases contain the prescription and purchase dates and prescriber and patient identifiers. The French national data protection authority (CNIL) approved this study.

Patient inclusion and exclusion criteria

We included patients aged 18 years or more in 2008 who purchased an OHA (A10B under the Anatomical, Therapeutic, Chemical Classification System) at least once in 2008 and at least twice during the following 12-month period. We used this previously published method [20] because the NHIF databases do not routinely contain diagnosis information. The diabetes was classified as incident if the patient had not been reimbursed for an OHA or insulin in 2007 and prevalent otherwise. The inclusion date was defined as the date of the first reimbursement for OHA for incident cases and 1 January 2008, for prevalent cases.

Patients whose type 1 diabetes was officially recognized as a chronic disease were excluded, but they accounted for only 4.3% of the initial subjects. Chronic disease status is attributed to people with specific and expensive chronic diseases defined by NHIF and makes them eligible for 100% reimbursement for treatment. In addition, every 1 January for the years 2009–11, we censored the patients who had died or left the southeastern France NHIF during the previous year.

Influenza vaccination

We used influenza vaccine reimbursement claims (IFVCs) recorded in the NHIF database (Anatomical, Therapeutic, Chemical Classification System codes J07BB01, J07BB02) between 30 September and 31 December of each year as a proxy to estimate IFV uptake for each vaccination campaign. During the study period, the seasonal influenza vaccination campaigns in France did not start earlier than 30 September, lasted for 3 months, and extended for a tiny percentage of the population ($\leq 0.8\%$) into January of the following year. As data for January 2012 were not available at the time of the study, we calculated the IFVC at year n over the study period and excluded data for January at year $n + 1$ from annual rate numerators. We constructed an individual IFVC score (range: 0–4) equal to the individual's total number of IFV claims in 2008–11.

Patients' characteristics

From the NHIF database, we collected the following patient data: age on 1 January 2008; gender; CMUC (Complementary Universal Health Insurance, a programme that exempts individuals who have annual incomes below € 9000 from any out-of-pocket costs and is therefore a proxy for very low income [21]); and number of consultations or visits with general practitioners (GPs) and nurses during the follow-up period. Based on chronic disease status and International Classification of Diseases, 10th edition codes, we constructed a proxy variable for comorbidity in four classes: no chronic disease status, chronic disease status for type 2 diabetes, or for other diseases at high risk of complicating influenza (Appendix 1), or finally for

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