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Indicators of influenza and pneumococcal vaccination in French nursing home residents in 2011

Philipe de Souto Barreto[a,b,*], Maryse Lapeyre-Mestre[c,d], Bruno Vellas[a,c], Yves Rolland[a,c]

[a] Gérontopôle de Toulouse, Institut du Vieillissement, Centre Hospitalo-Universitaire de Toulouse (CHU Toulouse), Toulouse, France
[b] UMR7268 ADES, Aix-Marseille Univ., Marseille, France
[c] UMR INSERM 1027, University of Toulouse III, Toulouse, France
[d] Service de Pharmacologie Clinique, CHU de Toulouse, Toulouse, France

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ABSTRACT

Introduction: Older adults living in nursing homes (NH) are at high risk of developing influenza and pneumococcal infections. The objectives of this study were to describe vaccination coverage for influenza and pneumococcal among French NH residents and to investigate which NH structure- and organisation-related aspects could impact on vaccination in this population.
Methods: This study is based on cross-sectional data from 175 French NHs ($N = 6275$ residents), collected in May–July 2011. Residents' vaccination status (yes vs. no) against pneumococcal infection and seasonal influenza was recorded by the NH staff (on the basis of the resident's medical chart). Residents' health-related variables (e.g., co-morbidities) and information on NH structure and internal organisation were recorded by the NH staff. Mixed-effects logistic regressions were performed on influenza and pneumococcal vaccination separately.
Results: Influenza vaccination coverage was high ($n = 5071$, i.e., 80.8% of residents) and relatively well-distributed across NHs, whereas pneumococcal vaccination was low ($n = 1758$, i.e., 28%) and highly variable across facilities. Mixed-effects logistic regressions confirmed that structural and organisational aspects related to the NH functioning impacted vaccination coverage. More precisely, living in a private for profit NH, living in NHs located in low-urban areas, and coordinating physician training increased the odds of receiving pneumococcal vaccine, whereas living in NHs located at high-urban areas decreased this odds. Moreover, the time spent by the coordinating physician in the NH increased the odds of receiving influenza vaccine. Prescriptions re-examination since resident's admission at the NH and the presence of an individualised health care project increased the odds of receiving both influenza and pneumococcal vaccines.
Conclusions: Our findings suggest that a more standardised approach is needed to improve vaccination coverage against pneumococcal infection in French NH residents.

1. Introduction

Influenza and pneumococcal infections can be very burdensome in terms of subjects' health status as well as for the health care system. Some populations are particularly at-risk from influenza and pneumococcal infections, such as people 65 years or over. Older adults living in long-term care facilities constitute one of the most at-risk groups. Nursing home (NH) residents are a frail population characterised by multimorbidity [1] and polypharmacy [2]; moreover, they frequently have at least one of the chronic conditions that increase the vulnerability to influenza and pneumococcal infections (e.g., chronic respiratory and cardiovascular diseases (particularly lung and heart diseases), chronic metabolic disorders such as diabetes; chronic renal and hepatic diseases, immune system dysfunctions) [3,4]. In the NH setting, outbreaks of influenza virus [5] and streptococcus pneumoniae [6,7] can be quickly and widely disseminated among residents. Furthermore, preventing influenza and pneumococcal infections can markedly reduce health costs, by preventing, for example, visits to the emergency department (ED) (pneumonia was found to be the third leading cause of potentially preventable ED visits among NH residents) [8]; moreover, adults 65 and older account for 90% of pneumonia-related deaths in developed countries [9].

In the European Union (EU), all 27 member states (year 2009) agree with the World Health Organisation's (WHO) recommendation [10] to provide the influenza vaccine for people aged 65 and

* Corresponding author at: Gérontopôle de Toulouse, Institut du Vieillissement, 37, Allées Jules Guesde, F-31073 Toulouse, France. Tel.: +33 561 145 664; fax: +33 561 145 640.
E-mail address: philipebarreto81@yahoo.com.br (P. de Souto Barreto).

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over [3,11], and most of them, including France (where vaccine provision for seasonal influenza increased in the last decade [12]), further recommend this vaccine for residents of long-term care facilities [11]; the WHO 2010/EU 2014-15 influenza target is 75% vaccination among people ≥65 years [3,10]. In France, however, there is no specific recommendation to provide the pneumococcal vaccine for people ≥65 years (whilst this is recommended by most European countries [13] and by the Advisory Committee on Immunisation Practices – ACIP [4]) and/or those living in NHs [14]. Pneumococcal vaccine is recommended on the patient's admission to French NHs only for people at high risk of pneumococcal infection (i.e., people with asplenia, splenic dysfunction, sickle cell disease, AIDS, kidney, respiratory or heart chronic disease, alcoholism, hepatic disease, and history of lung infection) [14,15]. As a potential consequence, a high variability in the coverage of pneumococcal vaccination may be found across French NHs.

As far as we know, the last surveys examining influenza and pneumococcal vaccine coverage in geriatric institutions in France were performed in 2008 [16] and 2003 [17], respectively; both surveys obtained very high rates of influenza vaccination (>87%), whereas Gavazzi et al. [17] showed extremely low coverage (21.9%) of pneumococcal vaccine in French institutionalised older adults. However, these studies did not explore the associations of several NH organisational aspects and vaccine coverage; Vaux et al. [16] only showed that the presence of a NH coordinating physician was not associated with influenza vaccination. NH structure and internal organisation are important determinants of the care of NH residents: for example, staffing characteristics (e.g., staffing levels and turn-over) strongly determine the quality of care provided in this setting [18], with more favourable staffing being generally associated with better quality. Moreover, any study has not investigated the vaccine coverage in French NH residents with selected clinical conditions (e.g., chronic pulmonary disease and heart failure). The objectives of this study were to examine the vaccination coverage among NH residents characterised by selected medical conditions (at-risk groups) and to investigate if facilities' structure and internal organisation impact residents' vaccination in French NHs.

2. Materials and methods

This work used the baseline data (cross-sectional design), collected in May–July 2011, from the IQUARE study. IQUARE's research protocol was fully described elsewhere [1]; it will be briefly reported hereafter. IQUARE is a multicentric individually tailored controlled trial developed in NHs from Midi-Pyrénées, South-Western, France (trial registration number: NCT01703689). This is a 6-month intervention, with a 18-month follow-up, designed to improve quality of care indicators in NHs. IQUARE followed the principles of the Declaration of Helsinki and complied with ethical standards in France; the study protocol was approved by the ethic committee of the Toulouse University Hospital and the Consultative Committee for the Treatment of Research Information on Health (CNIL: 07-438).

Since the functioning and integration of NHs in the health system vary among countries, we will briefly describe how it is operationalised in France. In the French health system, each registered NH is required to have a coordinating physician among its staff members; this coordinating physician, commonly a geriatrician or a general practitioner who followed a specific training in geriatrics or a specific training to become a NH coordinating physician, is responsible for comprehensive health evaluation of each NH resident and for health care coordination. Drug prescription remains under the responsibility of the resident's primary care physician.

2.1. Participants

A total of 6275 residents, aged in average 86 years-old (±8.2) and mostly women (73.7%), from 175 NHs participate in IQUARE. People were randomly selected on the basis of alphabetical order within each NH. Data collection was made through two questionnaires, completed on-line by the NH staff: a questionnaire on NHs' structure and organisation was completed by the NH administrative staff, mainly the NH director; another questionnaire, asking for information on resident' general health status, including vaccination against pneumococcal and seasonal influenza infections and medical conditions, was completed by the NH medical staff, mainly the coordinating physician, after consulting residents' medical charts.

2.2. Outcomes

This study has two binary dependent variables: vaccination against influenza and pneumococcal infections. For each participant, the NH coordinating physician responded (yes vs. no) to the following questions: "*Has the patient received the seasonal influenza vaccine for the 2010/2011 influenza season?*" and "*Has the patient ever received the pneumococcal vaccine?*".

2.3. Independent variables of interest

Based on our clinical and research experience in the NH setting, we identified a set of NH structural and organisational aspects that could be associated with vaccine coverage in NH residents. The variables selected were: (1) *NH level*. NH ownership (public, private non-profit or private for profit), geographical location (rural (<2000 inhabitants), low-urban (2000 ≤ inhabitants < 10,000), intermediate-urban (10,000 ≤ inhabitants < 100,000), or high-urban (inhabitants ≥ 100,000)), full-time equivalents (FTE) for the NH coordinating physician per 100 beds (continuous), training of the NH coordinating physician (advanced training: post-graduate advanced diploma in geriatrics; intermediate training: other training on geriatrics or specific training on NH coordinating physician; and low training: none of the specific training described before), and the presence of an informatics system to handle information on resident health care (including vaccinations and drug prescriptions); (2) *resident-level*. coordination among ≥2 physicians (e.g., primary care physician and NH coordinating physician) for the re-examination of patients' prescriptions since their admission in the NH, living in a special care unit (SCU), and the presence of an individualised health care project (i.e., care project specifically designed for one subject as the result of a multidisciplinary work developed to establish feasible strategies to delay the onset/progression of the resident's negative health outcomes).

2.4. Confounders

Based on the French policy regarding influenza and pneumococcal vaccination [14] and on the literature about the factors associated with vaccination coverage in NH residents, we selected the following subject-related confounders: age (years), sex, length of stay in the NH (continuous), disability in activities of daily living (ADL. 6-item scale, with scores varying from 6 to 18 (higher scores indicating higher disability)), number of medications, body mass index (low weight: BMI < 18.5 kg/m^2, normal weight: 18.5 ≤ BMI ≤ 24.9; overweight: 25 ≤ BMI ≤ 29.9; obesity: BMI ≥ 30; and missing data for BMI), number of diseases (calculated by summing depression, hypertension, stroke, hemiplegia, epilepsy, connective tissue disease, ulcer disease, any tumour, leukaemia, lymphoma, metastatic solid tumour, liver disease, and