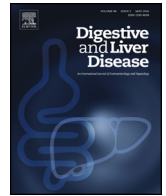




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### Alimentary Tract

# Pneumococcal and influenza vaccine uptake in adults with inflammatory bowel disease in France: Results from a web-based study

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### ARTICLE INFO

#### Article history:

Received 2 August 2017

Received in revised form

16 December 2017

Accepted 22 December 2017

Available online xxx

#### Keywords:

Attitude

Immunization

Inflammatory bowel diseases

Influenza

Knowledge

Pneumococcal

Vaccination

### ABSTRACT

**Background:** Despite specific immunization guidelines for immunocompromised patients, there is a dearth of studies on inflammatory bowel disease (IBD) population in France.

**Aims:** To estimate the prevalence and predictors of influenza and pneumococcal vaccination rates in a sample of French IBD adults.

**Methods:** An anonymous online survey was submitted to members of several French immunocompromised patients' associations during the winter 2016.

**Results:** Overall, there were 199/1625 (12%) participants with an IBD. Among these, 32% were <30 years old, 85% were male, and 62% were treated with immunosuppressive therapy. Self-reported influenza vaccine uptake was 34% (95% CI [28–41]) and 38% (95% CI [31–44]) for pneumococcal vaccines. Healthcare provider's (HCP) recommendation for vaccination (adjusted OR 12.7 95% CI [5.6–28.8]), immunosuppressive therapy (aOR 2.3 [1.1–5.3]), better knowledge of vaccination (aOR 3.2 [1.1–9.2]) and favorable attitudes towards vaccination (aOR 3.4 [1.2–9.5]) were positively associated with influenza vaccine uptake. Vaccine recommendation by HCPs was the only independently associated factor with pneumococcal vaccines uptake (OR 187.7 [24.8–1422.5]).

**Conclusion:** Immunization rates in our sample do not reach recommended levels. Factors associated with vaccination included high knowledge, favorable attitudes towards vaccination and recommendation for vaccination. This underlines the role of health care providers in contact with IBD patients.

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## 1. Introduction

The risk for vaccine-preventable illnesses, such as influenza and pneumococcal pneumonia is high for patients with inflammatory bowel disease (IBD) [1–4], mainly because of the disease itself but also because of treatments that often involve the

use of immunosuppressive medications including corticosteroids, immunomodulators or biological therapies. Several national guidelines recommend a yearly influenza vaccination, and a pneumococcal conjugate vaccine (PCV13) followed by pneumococcal polysaccharide vaccine (PPSV23) at least 8 weeks later [1,5,6] for patients with chronic inflammatory diseases on immunosuppressive medication. Despite these recommendations, vaccination rates for IBD patients remain low [7–10].

Data on barriers to vaccination in IBD populations are scarce. A lack of awareness for the recommendations and concerns for side effects following administration of these vaccines by the patients

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<https://doi.org/10.1016/j.dld.2017.12.027>

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are in part responsible for the observed low immunization rates. This suggests inappropriate patient education by HCPs on the importance of these vaccines [11]. General knowledge and attitude towards vaccination have been shown to be positively associated with vaccine uptake in immunocompromised patients. However it has not been specifically studied in IBD populations [12,13].

The aim of this study was to (i) describe knowledge and attitudes towards vaccination, (ii) assess self-reported immunization rates for influenza and pneumococcus vaccines, and (iii) identify medical and behavioral characteristics associated with the corresponding vaccines uptake in a sample of IBD patients in France.

## 2. Methods

AVNIR (*Associations Vaccin Nation Immunodéprimées Réalité*) is a group of associations of immunocompromised patients created in January 2013. The aim of this group is to promote supportive care among immunocompromised patients, in order to decrease the burden of infections. This group launched a previous online survey in 2013 to gather information on vaccine coverage, knowledge and attitudes towards vaccination among its members [12]. A new survey was implemented in 2016 and included the AFA (*Association François Aupetit*), the French national association of patients with inflammatory bowel diseases. The results from this survey are reported in this paper.

### 2.1. Data collection and management

The survey was promoted through each patients association's websites. The web-link was opened to patients who volunteered from December 2015 to March 2016. Participants were asked to answer 34 multiple choice questions for an overall estimated time of 10–15 min.

All data were collected entirely in a web-based format, which allowed for real-time implementation of range and consistency checks, thus minimizing missing data. The Web forms were accessible from any computer running a modern Internet browser with an active connection to the Internet; no special software was required. Participants had to read and understand French.

This anonymous questionnaire (see full questionnaire in Supplementary data) included the following information: sociodemographic (age, sex, level of education, area of residence), type of disease, length of follow-up, referring physician (General Practitioner or Specialist), number of visits per year, and treatments. Participants were asked whether they were receiving immunosuppressive therapy and if so, which type of treatment: chemotherapy, systemic corticosteroids, immunomodulators (Azathioprine, Mycophenolatemofetil, Cyclophosphamide, 6-mercaptopurine, Methotrexate) or biological therapies (TNF- $\alpha$  inhibitors: infliximab, adalimumab, certolizumabpegol). Patient's awareness regarding vaccination was ascertained by both self-evaluation of general knowledge for vaccination (defined as: restricted, low, average, or high), and declarative statements regarding the recommended or contraindicated vaccines in the specific case of their disease. Patients were asked if they were favorable to vaccination (5-point Likert scale including a "don't know" answer). They were also asked what they consider the most reliable information source on vaccination (patients associations, physicians, other health care workers, media, health authorities), and items on which they wished more information (different types of vaccines, information on their production; role of adjuvants; safety; recommended and contraindicated vaccines). Finally, they were asked about the use of vaccine according to their knowledge and general beliefs. Respondents were asked whether they had been vaccinated during the previous season (2014/2015) by seasonal

influenza vaccines, and by a pneumococcal vaccine in the past five years. According to their vaccination status, they were asked about motivating factors and concerns about influenza and pneumococcal vaccines.

### 2.2. Statistical analysis

Descriptive statistics were used to characterize the population, including proportions, means and standard deviations (SD) for normally distributed variables, as well as medians and interquartile ranges (IQR) for nonparametric data. Fisher's exact test and Wilcoxon rank sum were used to compare characteristics, knowledge, and attitudes. Self-reported vaccine uptake is given with 95% confidence intervals (95% CI). Factors associated with vaccine uptake were studied with a univariate then a multivariate logistic regression. We first tested socio-demographic variables, care modalities, knowledge and attitudes towards vaccination in a univariate analyses. All variables with a  $p$ -value  $<0.2$  in the univariate analysis were tested in the multivariate model. We used a backward stepwise selection procedure (removal criteria:  $p > 0.05$ ). A  $p \leq 0.05$  was considered statistically significant. All analyses were performed using Stata (V12, © Copyright 1996–2014 StataCorpLPt).

### 2.3. Ethics

Participants submitted an online consent form before accessing the questionnaire. Data were collected anonymously and participants had the right to access their answers. The National Data Protection Authority (*Commission Nationale Informatique et Libertés*), responsible for ethical issues and protection of individual data in France, approved the panel and its procedures. (Declaration reference number: 1893197)

## 3. Results

### 3.1. Patients and disease characteristics (Table 1)

Among the 1625 study participants, 199 (12%) had IBD. Among them, 64 (32%) were  $<30$  years old, 169 (85%) were male, 103 (52%) were highly educated (post graduate), and 129 (65%) had their residence in an urban area.

One hundred and twenty-three patients (62%) were receiving immunosuppressive therapy including systemic corticosteroids (27/123, 22%), immunomodulators (71/123, 58%), and biological therapies (38/123, 31%). Some of the participants may have received multiple immunosuppressive therapies. Among those treated, 46 (37%) had started treatment more than five years earlier, 177 (89%) reported follow-up by a medical specialist for their underlying disease and 89 (45%) were member of a patients association.

About one-third of the participants ( $n = 61$ ) reported at least one other chronic underlying disease such as ankylosing spondylitis (46/199, 23%) mainly, and rheumatoid arthritis (11/199, 5.5%).

Most of the participants reported vaccination by their specialist ( $n = 169$ , 85%) and 151 (76%) possessed an immunization record.

### 3.2. Knowledge and attitudes towards vaccination in general

#### 3.2.1. Knowledge

Self-reported general knowledge on vaccination was low in 89 (45%), average in 71 (36%), and high in 37 (19%) patients. There was no difference in vaccine knowledge according to age or gender. One hundred and fourteen (58%) patients were estimated to have insufficient information on vaccination. Moreover, 119 (60%) participants were unable to list recommended or contraindicated vaccines that applied to their medical condition, and only

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