

Should Patients With COPD Be Vaccinated?

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BACKGROUND: Exacerbations of COPD are a major component of the socioeconomic burden related to COPD, and frequent exacerbations are associated with greater decline in health status. Tracheobronchial infections are involved in 50–70% of exacerbations, so influenza and pneumococcal vaccines are recommended for prevention. The aim of this study was to determine the level of knowledge among COPD patients about the vaccines, find the rate of patients inoculated with both influenza and pneumococcal vaccines, and assess the effectiveness of vaccination status. **METHODS:** Patients with COPD were recruited from the out-patient clinic of our hospital between September and October 2012. Subject demographic data such as age, gender, level of education, and smoking status were recorded. Vaccination status, number of subjects who were informed by a health-care professional about immunization, and COPD-related emergency or hospital admissions triggered by tracheobronchial infections over 1 y after administration of both influenza and pneumococcal vaccines were noted. **RESULTS:** Eighty-eight subjects were enrolled during the study period. Eighty-two subjects were male (93.2%), 6 subjects were female (6.8%), and the median age was 61.5 y. According to Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2006 classification, 5 subjects were in stage 1 (5.7%), 22 subjects were in stage 2 (25%), 34 subjects were in stage 3 (38.6%), and 27 subjects were in stage 4 (30.7%). Sixty-two subjects had graduated from primary school (70.5%), 21 subjects had graduated from high school (23.9%), one subject had graduated from university (1.1%), and 4 subjects had no education (4.5%). Forty-five subjects (51%) were vaccinated. There was no significant correlation between level of education and vaccination status ($P = .37$). Both COPD-related emergency department and hospital visits were significantly decreased in vaccinated patients with COPD ($P < .001$ and $P = .02$, respectively). Of all the subjects, 39.7% (35 of 88 subjects) mentioned that no health-care professional recommended vaccination. **CONCLUSIONS:** Physicians should be more aware of vaccination and recommend both influenza and pneumococcal vaccines to all patients with COPD to reduce exacerbations. *Key words:* chronic obstructive pulmonary disease; COPD; influenza vaccination; pneumococcal vaccination; immunization. [Respir Care 2015;60(2):239–243. © 2015 Daedalus Enterprises]

Introduction

COPD is a leading cause of morbidity and mortality worldwide and results in an economic and social burden that is both substantial and increasing.¹ A COPD exacerbation is described as “an acute event characterized by a worsening of the patient’s respiratory symptoms that is

beyond normal day to day variations and leads to a change in medication” by different sources.^{2–4} Hospitalization for exacerbation represents a major component of the socioeconomic burden related to COPD.⁵ Frequent exacerbations of $> 2/y$ have been associated with greater decline in

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health status.^{6,7} There are many reasons for COPD exacerbation, but the most common seems to be viral and bacterial respiratory tract infections. Thus, prevention of exacerbations plays an important role in COPD management. Vaccination is accepted as an effective and simple method for this goal. The most common vaccines given to patients with COPD are for the prevention of pneumococcal and influenza infections, which have high exacerbation rates. According to Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2011 COPD guidelines, both influenza and pneumococcal vaccines are suggested for all patients with COPD.¹

The aim of this study was to determine the level of knowledge among COPD patients regarding these vaccines, find the rate of patients who were inoculated with both influenza and pneumococcal vaccines following the GOLD guidelines, and assess the effectiveness of vaccination status.

Methods

In this prospective cohort study, patients with COPD from mild to very severe were recruited from the outpatient clinic of our hospital. Subjects were excluded from the study if they were immunosuppressed or had known neoplasia, renal insufficiency with the need for dialysis, and uncontrolled heart failure. Subject demographic data such as age, gender, level of education, and smoking status were recorded. All subjects were compliant with their medication. The number of unvaccinated subjects and the number of subjects who were inoculated with both influenza and 23-valent pneumococcal capsular polysaccharide vaccines between September and October 2011 (beginning of the 2011–2012 flu season) were noted. All subjects were asked if they had fever, purulent sputum, dyspnea, cough, and other symptoms that might suggest a tracheobronchial infection up to the beginning of the new flu season (September to October 2012), and COPD-related emergency or hospital admissions due to tracheobronchial infections during this 1-y follow-up were recorded. In addition, the number of subjects informed by a health-care professional about immunization was recorded. All analyses were conducted using SPSS Statistics 17.0 (IBM, Armonk, New York). Continuous variables were expressed as medians (25th to 75th percentile) and categoric variables as numbers (%). Intercorrelations of continuous variables were analyzed using the Pearson product moment correlation test, and $P < .05$ was considered to be statistically significant. Categoric variables were compared by the Fisher exact test. The protocol was approved by the local ethics committee, and all participating subjects signed informed consent forms.

QUICK LOOK

Current knowledge

Exacerbations of COPD contribute significantly to the socioeconomic burden related to COPD, and frequent exacerbations are associated with declines in health status. Infections are involved in 50–70% of exacerbations; influenza and pneumococcal vaccines are recommended as a preventive strategy.

What this paper contributes to our knowledge

In a small population of subjects with COPD, vaccination status was not associated with level of education, but was associated with a decrease in emergency department and hospital visits. Doctors recommended vaccinations only to 60% of subjects. Caregivers should recommend administration of both influenza and pneumococcal vaccines to patients with COPD to reduce exacerbations and the socioeconomic burden related to COPD.

Results

A total of 114 subjects signed an informed consent form, but 26 subjects were excluded from the study according to the exclusion criteria. Eighty-eight subjects were enrolled during the study period. Eighty-two subjects were male (93.2%), 6 subjects were female (6.8%), and the median age was 61.5 y. According to GOLD 2006 classification, 5 subjects were in stage 1 (5.7%), 22 subjects were in stage 2 (25%), 34 subjects were in stage 3 (38.6%), and 27 subjects were in stage 4 (30.7%). Sixty-two subjects had graduated from primary school (70.5%), 21 subjects had graduated from high school (23.9%), one subject had graduated from university (1.1%), and 4 subjects had no education (4.5%). Four of 5 subjects in stage 1 (80%), 15 of 22 subjects in stage 2 (68.1%), 18 of 34 subjects in stage 3 (52.9%), and 8 of 27 subjects in stage 4 (29.6%) were vaccinated. Forty-five subjects (51.1%) were vaccinated with both influenza and pneumococcal vaccines, and 43 subjects (48.9%) had no history of vaccination (Table 1). Seven of the vaccinated subjects had no history of smoking, 35 subjects were ex-smokers, and 3 subjects were active smokers. Fourteen of the unvaccinated subjects had no history of smoking, 28 subjects were ex-smokers, and one subject was an active smoker.

There was no significant correlation between level of education and vaccination status ($P = .37$). A total of 52 subjects (59.1%) were informed by doctors regarding vaccination, and 44 of these subjects were vaccinated (84.6% of the informed subjects).

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Table 1. Subject Characteristics

Variable	Values
Male/female, <i>n</i>	82/6
Age (median), <i>y</i>	61.5 (54–67)
GOLD, <i>n</i> (%)	
Stage 1	5 (5.7)
Stage 2	22 (25)
Stage 3	34 (38.6)
Stage 4	27 (30.7)
Education, <i>n</i> (%)	
Primary school	62 (70.5)
High school	21 (23.9)
University	1 (1.1)
No education	4 (4.5)
Vaccinated subjects, <i>n</i> (%)	45 (51.1)

GOLD = Global Initiative for Chronic Obstructive Lung Disease

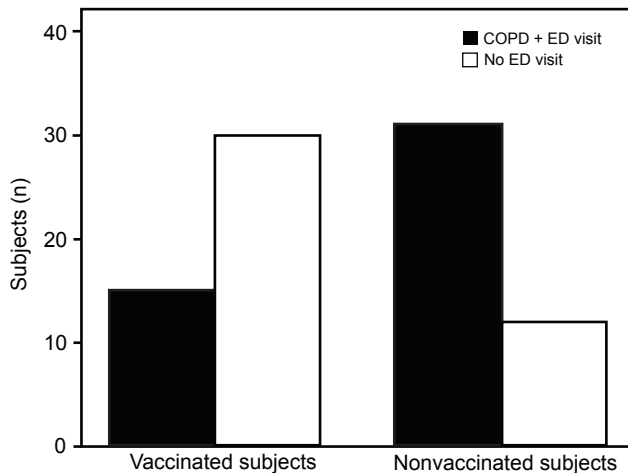


Fig. 1. Relationship between vaccination status and COPD-related emergency department visits. $P < .001$.

Both COPD-related emergency department and hospital visits were significantly decreased in vaccinated patients with COPD ($P < .001$ and $P = .02$, respectively) (Figs. 1 and 2).

Discussion

This study showed that additive inoculation of influenza and pneumococcal vaccines may decrease both COPD-related emergency department and hospital admission rates triggered by tracheobronchial infections. However, subjects did not have sufficient knowledge regarding the importance of immunization, and half of subjects with COPD remain unvaccinated. Another finding is that getting vaccinated is not related to level of education, but the advice of a health-care professional (particularly a doctor) leads

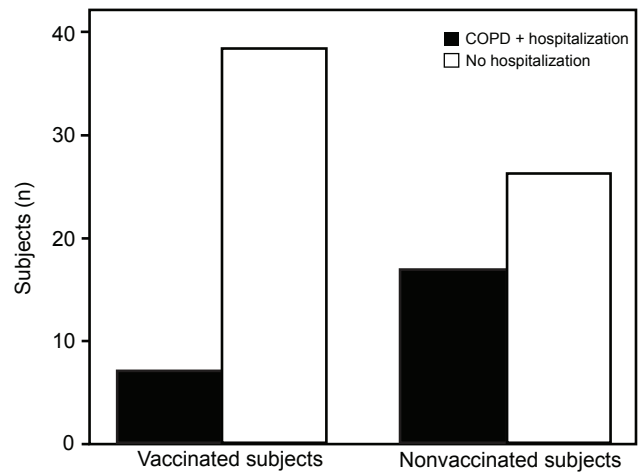


Fig. 2. Relationship between vaccination status and COPD-related hospitalizations. $P = .02$.

to high vaccination compliance. In this study, 39.7% of all subjects (35 of 88 subjects) said that they did not receive any information about vaccination from health-care professionals. In contrast, 84.6% of those subjects (44 of 52 subjects) who were informed by doctors (pulmonologists and family doctors) took this advice into consideration and were more compliant with vaccination.

Tracheobronchial infections are involved in 50–70% of COPD exacerbations.⁸ Studies show that 8–35% of these exacerbations are due to influenza virus^{9–12} and 8–25% are due to pneumococcal infection.¹³ The mortality rate of COPD exacerbation after hospitalization is 8%, and patients with frequent exacerbations have a mortality rate of 23%/y.⁸ Both influenza and pneumococcal vaccination of patients with COPD seems to be an effective way to prevent some of the bad outcomes of COPD.

Despite the fact that GOLD guidelines recommend administration of both influenza and pneumococcal vaccines for all patients with COPD, the majority of previous studies aimed to determine the effectiveness of these vaccines separately. These studies demonstrated different results for reduction in COPD-related hospital admissions, hospitalizations, emergency department visits, and mortality.

Nichol et al^{14,15} reported that influenza vaccination reduced mortality and hospitalization rates due to COPD exacerbations. As a result of a review including 2,469 subjects, Poole et al¹⁶ demonstrated that influenza vaccination reduced COPD exacerbations effectively by 60%, but they also mentioned that vaccination had no effect on mortality or hospitalization rates.

Results of studies that aimed to demonstrate the effectiveness of pneumococcal vaccine in COPD have conflicting results as well. In a retrospective cohort control study of elderly subjects with COPD, Nichol et al¹⁵ demonstrated that pneumococcal vaccination reduced hospitalization (43%) and mortality (29%), whereas Leech et al¹⁷

failed to demonstrate reduction of these parameters in subjects with COPD who were vaccinated with the 14-valent pneumococcal vaccine. Alfageme et al¹⁸ had the same results showing no mortality benefit with the 23-valent pneumococcal capsular polysaccharide vaccine.

Despite these different results from separate administration of influenza and pneumococcal vaccines in subjects with COPD, there is some evidence that influenza and pneumococcal vaccines have an additive role in preventing exacerbations of the disease, as this study revealed. Consistent with our data, Furumoto et al¹³ demonstrated fewer exacerbations in subjects with COPD who were vaccinated with both vaccines instead of only the influenza vaccine. Sumitani et al¹⁹ assessed respiratory infection and hospitalization reduction in subjects with chronic respiratory disease who received both vaccines compared with those subjects who received only the influenza vaccine. The Centers for Disease Control and Prevention recommends administration of both influenza and pneumococcal vaccines at the same time if possible and vaccination of patients whose history of pneumococcal vaccination is unclear.²⁰

Although both influenza and pneumococcal vaccines are suggested for all patients with COPD, this advice seems not to be taken into consideration by physicians and patients. The vaccination rates for patients with COPD are not high enough. Similar to the results of this study, < 50% of subjects were previously found to be vaccinated (33% and 34%, respectively).^{21,22} The Centers for Disease Control and Prevention announced that the influenza immunization rate was below 70% and less than that for some subgroups, although the targeted rate was 90% in 2006.²³ In a previous study of subjects with COPD, 44% of subjects had no knowledge regarding the importance of vaccination.²⁴ Zimmerman et al²⁵ reported that more than one third of unvaccinated subjects stated that their physician did not recommend vaccination. Some studies discussed the subjects themselves as a reason for low vaccination rates. Fear of adverse effects of vaccination²⁶ and doubting the effectiveness of vaccinations were found to be the main reasons for remaining unvaccinated.²⁷

There are some limitations of this study. The majority of subjects were male, so the results for male and female subjects could not be compared. Moreover, the sample size was small due to the limited period of the study. Finally, these data reflect the attitudes and outcomes of subjects from a single center, which limits the generalizability of the results.

In conclusion, health-care professionals, particularly doctors, should be more aware of vaccination and recommend administration of both influenza and pneumococcal vaccines to patients with COPD to reduce exacerbations and the socioeconomic burden related to COPD.

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