

Influenza and Pneumococcal Vaccination Rates in Patients With Inflammatory Bowel Disease

Jason S. Reich, MD, Hannah L. Miller, MD, Sharmeel K. Wasan, MD, Ansu Noronha, MD, Eileen Ardagna, RN, BSN, CGRN, Kathleen Sullivan, NP, Brian Jacobson, MD, MPH, and Francis A. Farraye, MD, MSc

Dr Reich is a resident; Dr Miller, Dr Wasan, and Dr Noronha are assistant professors of medicine; Ms Ardagna is a nurse; Ms Sullivan is a nurse practitioner; Dr Jacobson is an associate professor of medicine; and Dr Farraye is a professor of medicine at Boston Medical Center in Boston, Massachusetts.

Address correspondence to:

Dr Francis A. Farraye
Section of Gastroenterology
Boston Medical Center
85 East Concord Street
Boston, MA 02118
Tel: 617-638-8339
Fax: 617-638-6529
E-mail: Francis.Farraye@bmc.org

Abstract: Patients with inflammatory bowel disease (IBD) are at an increased risk for vaccine-preventable illnesses, such as pneumococcal pneumonia and influenza. We hypothesized that a patient-directed educational program would increase vaccination rates of patients with IBD. We developed a written educational form that was given to all patients over a 15-month period. The form included information about the importance of vaccination and asked patients about their vaccination status. If patients indicated that they were not vaccinated, they were offered a vaccination at the time of their visit. For influenza, the vaccination rates during 3 seasons were compared. For pneumococcal pneumonia, the vaccination rates during a 6-month period before the introduction of the educational program and the rates during the 15-month period after implementation of the intervention were compared. Our form increased the percentage of patients who reported having an influenza vaccination (23% vs 47%; $P < .001$) and the percentage of patients who reported having a pneumococcal pneumonia vaccination (21% vs 32%; $P < .001$). We concluded that a simple written educational form designed to assess vaccination status and enable providers to offer same-day influenza and pneumococcal pneumonia vaccinations resulted in a significant increase in influenza and pneumococcal pneumonia vaccination rates among patients in an IBD specialty clinic.

Patients with inflammatory bowel disease (IBD) are at an increased risk for vaccine-preventable illnesses, such as influenza and pneumococcal pneumonia.¹ This risk is exacerbated by the use of corticosteroids, immunomodulators (azathioprine, 6-mercaptopurine, and methotrexate), and biologic therapy (infliximab [Remicade, Janssen], adalimumab [Humira, AbbVie], and certolizumab pegol [Cimzia, UCB]). Despite this increased risk, vaccination rates for patients with IBD remain low. Guidelines recommend that patients on immunosuppressive medications be vaccinated yearly for influenza. New Centers for Disease Control and Prevention guidelines in the United States recommend that adult patients on

Keywords

Inflammatory bowel disease, vaccination, influenza, pneumonia, pneumococcal

immunosuppressive medications be vaccinated once with pneumococcal conjugate vaccine (PCV13, Wyeth Pharmaceuticals), followed by pneumococcal polysaccharide vaccine (PPSV23, Merck & Co) at least 8 weeks later; they should then receive a second dose of the pneumococcal polysaccharide vaccine 5 years after the first dose and then a third dose after the age of 65 years.² The underutilization of vaccines for patients with IBD has frequently been reported in the literature. In a survey of 169 patients with IBD, only 28% reported regularly receiving an influenza vaccination, and only 9% reported having received a pneumococcal pneumonia vaccination.^{3,4}

Numerous barriers exist to increasing the vaccination rates; these include general apathy on the part of the public, fears and concerns about the side effects of vaccination, and costs associated with the storage and administration of vaccines. There are also several logistical barriers, such as the location of clinics and wait times to see a physician. In the 1996 Medicare Current Beneficiary Survey, which included approximately 16,000 Medicare beneficiaries, the most common reason reported by patients for not receiving both influenza and pneumococcal vaccinations was not knowing that the vaccinations were needed.⁵ The report also found that vaccination rates were lower among racial and ethnic minorities than among non-Hispanic whites. Lashuay and colleagues assessed attitudes and beliefs about immunization among African-American parents and found that 62% thought that disease was possible after shots, 27% feared contracting HIV from needles, and 19% thought that pain was a barrier to vaccination.⁶

Many strategies have been implemented to increase vaccination rates. The Minneapolis Health Department flu shot program was able to sustain vaccination rates of 60% or greater for high-risk patients. A major component of this program was allowing nurses to administer vaccinations without a signed order from a physician. This model has been carried out across many vaccination programs.⁷ Other successful strategies include removing financial barriers and providing alternative places where vaccines can be obtained (eg, churches, schools, pharmacies, and vaccine clinics).

Given the low vaccination rates in the high-risk population of patients with IBD, we designed a simple intervention program in our department, with the goal of increasing the rates of influenza and pneumococcal pneumonia vaccination to 60% in patients with IBD.

Methods

Study Subjects

The study population consisted of patients with IBD evaluated at the Center for Digestive Disorders at Boston Medical Center in Boston, Massachusetts. Boston Medical

Center is a safety net hospital where 27% of the patients do not speak English.⁸ Our study was examined by the Internal Review Board and was determined to be exempt research, as there was minimal risk to human subjects.

Study Questionnaire

We developed a 1-page form that assessed vaccination status and provided educational information about pneumococcal pneumonia vaccinations (see supporting online material at www.gastroenterologyandhepatology.net). Educational information was not provided for the influenza vaccination because it is a standard of care for our medical team to inform patients that yearly influenza vaccinations are recommended. Patients were asked whether or not they had been vaccinated against influenza during the current influenza season or against pneumococcal pneumonia in their lifetime. Patients were given the questionnaire upon arrival for their office visit and were asked by the medical assistant to complete the form. If patients indicated that they had not been vaccinated, they were offered a vaccination at the time of their visit. Each patient's responses were verified in the chart by the medical team. If a patient was unsure about his or her vaccination status, and there was no documentation in the chart, the patient was offered a vaccine. Patients were offered an influenza vaccination only during the influenza season (September–February). Pneumococcal pneumonia vaccinations were offered year-round. After administration of the form had been piloted on Wednesdays and Thursdays of December 2012 and January 2013, the form was implemented into our practice in February of 2013. Data were recorded in a Microsoft Excel database and analyzed with an unpaired *t* test. A *P* value of less than .05 was considered statistically significant.

Results

Characteristics of Study Participants

During our intervention from February 2013 to May 2014, a total of 692 unique patients with IBD were seen in the Center for Digestive Disorders at Boston Medical Center. Their mean age was 45.2 years, and 53.2% were female; in addition, 64.4% were white, 17.6% black/African American, 9.8% Hispanic/Latino, 5.9% other, and 2.2% Asian.

Study Outcomes and Statistics

During the pilot period (Wednesdays and Thursdays from December 2012 through January 2013), the mean number of vaccinations given per week increased from 2.6 (vaccines administered Mondays, Tuesdays, and Fridays) to 4.1 (vaccines administered Wednesdays and Thursdays) for influenza (*P* < .05) and from 0.2 (vaccines administered Mondays, Tuesdays, and Fridays) to 5.0 (vaccines administered

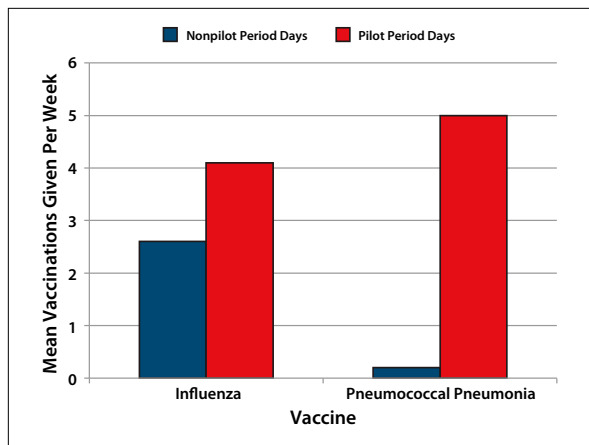


Figure 1. The mean number of influenza and pneumococcal pneumonia vaccinations given per week on pilot period days and nonpilot period days.

Wednesdays and Thursdays) for pneumococcal pneumonia ($P<.05$). No change was noted during the pilot period on days when the form was not used (Figure 1).

Effect of the Intervention on Influenza Vaccination Rates

Patients during the intervention were significantly more likely than those before the intervention to receive influenza vaccinations. For the 2011-2012 influenza season, 23% (43/183) of patients with IBD reported having had the influenza vaccination during the current season. (The numerator reflects the number of patients with IBD who had appointments during the time period and had the influenza vaccine, and the denominator reflects the total number of appointments for patients with IBD.) During the prepilot period of the 2012-2013 influenza season, 12% (8/68) of patients with IBD reported having had the influenza vaccine during the current season. During the pilot period (December 2012-January 2013), 41% (26/63) of patients with IBD reported having had the influenza vaccine during the current season. Individuals during the pilot period were significantly more likely to receive an influenza vaccination when compared with individuals during the 2011-2012 influenza season ($P<.001$) and also when compared with individuals during the first half (prepilot period) of the 2012-2013 influenza season ($P<.001$). During the full implementation of our intervention (2013-2014 influenza season), 47% (302/641) of patients with IBD reported having had the influenza vaccine during the current season. Individuals during the 2013-2014 influenza season were significantly more likely to have received an influenza vaccination when compared with individuals during the 2011-2012 influenza season ($P<.001$) and also when compared with individuals during the prepilot period of the 2012-2013 influenza season ($P<.001$; Figure 2).

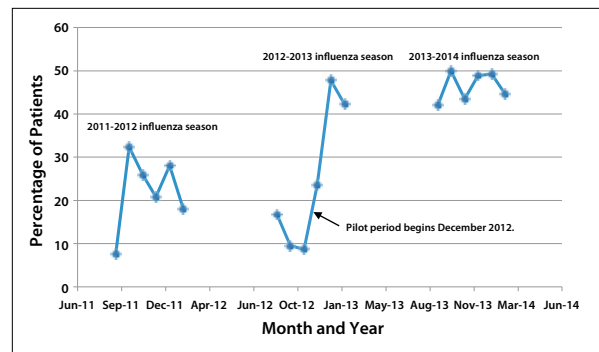


Figure 2. The percentage of patients at the Center for Digestive Disorders with diagnoses related to inflammatory bowel disease and with a current influenza vaccine.

Effect of the Intervention on Pneumococcal Pneumonia Vaccination Rates

Before the intervention (May 2012-November 2012), 21% (39/187) of patients with IBD reported having had the pneumococcal pneumonia vaccination in their lifetime. During the pilot period (December 2012-January 2013), 16% (10/63) of patients with IBD reported having had the pneumococcal pneumonia vaccination in their lifetime. During the period after full implementation of our intervention (February 2013-May 2014), 32% (71/219) of patients with IBD reported having had the pneumococcal pneumonia vaccination in their lifetime. Individuals during the pilot period were not more likely to receive a pneumococcal pneumonia vaccination when compared with individuals in the prepilot period ($P=.391$). Individuals in the intervention period were significantly more likely to receive a pneumococcal pneumonia vaccination when compared with individuals in the prepilot period ($P<.001$) and when compared with individuals during the pilot period ($P<.001$; Figure 3).

Discussion

We found that we could achieve a significant increase in the influenza and pneumococcal pneumonia vaccination rates among patients with IBD with a simple intervention in which the importance of these vaccinations was explained to patients and the vaccinations were then made available at the time of the patients' office visits with their gastroenterology providers. Vaccination rates for pneumococcal pneumonia were not significantly increased during the pilot period compared with the prepilot period; however, a significant increase in vaccination rates occurred during the full implementation of our intervention. The low vaccination rates during the pilot period may be attributed to the small sample size. Although many patients with IBD are familiar with the recommendations regarding influenza vaccination,

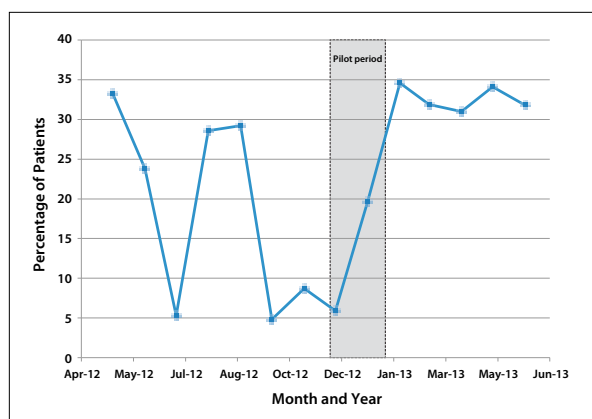


Figure 3. The percentage of patients at the Center for Digestive Disorders with diagnoses related to inflammatory bowel disease and with a current pneumococcal pneumonia vaccine.

fewer of these patients are aware of the recommendations regarding pneumococcal pneumonia vaccination.⁹ Gastroenterologists should be familiar with the current Centers for Disease Control and Prevention guidelines for pneumococcal pneumonia vaccination so that patients can be vaccinated appropriately.

A previous study demonstrated similar results through the use of a simple intervention. In 2013, Parker and colleagues reported postintervention vaccination rates of 81% for influenza and 54% for pneumococcal pneumonia.¹⁰ The higher influenza vaccination rate in their study compared with the rate in our intervention may be explained by differences in the patient populations. A potential limitation of their study is the absence of demographic data. Approximately 36% of our patients were nonwhite. Ethnic disparities have been shown to contribute to differences in vaccination rates.⁶

There are some limitations to our intervention. Our vaccination rate for pneumococcal pneumonia during the 15 months of the intervention was 32%. Given the long duration of our intervention, the vaccination rates for pneumococcal pneumonia may have been falsely elevated because these numbers reflect cumulative rates. However, the mean numbers of vaccinations administered for both influenza and pneumococcal pneumonia were significantly greater on pilot period days than on nonpilot period days. Future study designs could include caps on patients to prevent them from being analyzed during return visits, which would allow a more accurate assessment of the long-term sustainability of an intervention. Our intervention was performed prior to the release of the new pneumococcal conjugate vaccine guidelines. More research is needed to understand if additional vaccinations create barriers to implementation of an office vaccination program and the impact on vaccination rates. In addition, our intervention

did not capture information on socioeconomic status. It is well known that a low socioeconomic status is a barrier to vaccination.¹¹⁻¹⁵ Future interventions should be geared toward patients with known barriers to vaccination. Lastly, we did not achieve our goal of increasing vaccination rates for influenza and pneumococcal pneumonia to 60%. This highlights the need to acquire a better understanding of the barriers to vaccination and implement methods that will improve the quality of care in patients with IBD.

Panés and colleagues examined changes that could be made to improve the quality of care of patients with IBD. They noted that the struggles of patients with IBD to adhere to medication regimens and complex treatment plans often result in poor outcomes. They suggested that quality interventions are needed to improve clinical outcomes in patients with IBD.¹⁶

Our intervention shows that the involvement of nurses and other members of the medical team is critical to increasing and maintaining vaccination rates. Empowering patients by providing them with information through a form, as Panés and colleagues¹⁶ have suggested, may have helped to increase the number of patients who received vaccines after our intervention. Guidelines from the Advisory Committee on Immunization Practices state that standing orders for vaccination are the most effective way to increase vaccination rates.¹⁷ Thus, a combined approach of educating patients, involving all members of the medical team, and creating standardized order sets may be the key to improving vaccination rates in patients with IBD. Future studies need to focus on specific barriers to vaccination in this high-risk population of patients.

Conclusion

Gastroenterologists should be aware of the increased risk of vaccine-preventable illnesses in patients with IBD. Practitioners can utilize a simple educational form to increase vaccination rates in patients with IBD.

This study was presented at the American College of Gastroenterology 2014 Annual Scientific Meeting, which was held October 17-22, 2014 in Philadelphia, Pennsylvania.

This work was supported by a gift from Andrew and Robin Davis.

The authors have no relevant conflicts of interest to disclose.

References

1. Wasan SK, Baker SE, Skolnik PR, Farraye FA. A practical guide to vaccinating the inflammatory bowel disease patient. *Am J Gastroenterol.* 2010;105(6):1231-1238.
2. PCV13 (pneumococcal conjugate) vaccine. Centers for Disease Control and Prevention. Accessed December 7, 2014. <http://www.cdc.gov/vaccines/vpd-vac/pneumo/vac-PCV13-adults.htm>.

(continued on page 402)

3. Harper SA, Fukuda K, Uyeki TM, Cox NJ, Bridges CB; Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP). Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 2004;53(RR-6):1-40.
4. Melmed GY, Ippoliti AF, Papadakis KA, et al. Patients with inflammatory bowel disease are at risk for vaccine-preventable illnesses. *Am J Gastroenterol*. 2006;101(8):1834-1840.
5. Centers for Disease Control and Prevention (CDC). Reasons reported by Medicare beneficiaries for not receiving influenza and pneumococcal vaccinations—United States 1996. *MMWR Morb Mortal Wkly Rep*. 1999;48(39):886-890.
6. Lashuay N, Tjoa T, Zuniga de Nuncio ML, Franklin M, Elder J, Jones M. Exposure to immunization media messages among African American parents. *Prev Med*. 2000;31(5):522-528.
7. Nichol KL. Long-term success with the national health objective for influenza vaccination: an institution-wide model. *J Gen Intern Med*. 1992;7(6):595-600.
8. Population and patient profile tables, charts and statistics: calendar year 2011. Boston University Medical Campus Clinical Research Resources Office. <http://www.bumc.bu.edu/crro/files/2012/06/BMC-stats-2011.pdf>. Accessed May 12, 2015.
9. Melmed GY. Vaccinations and the utilization of immunosuppressive IBD therapy. *Gastroenterol Hepatol (N Y)*. 2008;4(12):859-861.
10. Parker S, Chambers White L, Spangler C, et al. A quality improvement project significantly increased the vaccination rate for immunosuppressed patients with IBD. *Inflamm Bowel Dis*. 2013;19(9):1809-1814.
11. Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. *Am J Prev Med*. 2000;18(1 suppl):92-96.
12. Klein RS, Adachi N. An effective hospital-based pneumococcal immunization program. *Arch Intern Med*. 1986;146(2):327-329.
13. Rhew DC, Glassman PA, Goetz MB. Improving pneumococcal vaccine rates. Nurse protocols versus clinical reminders. *J Gen Intern Med*. 1999;14(6):351-356.
14. Postema AS, Breiman RF; National Vaccine Advisory Committee. Adult immunization programs in nontraditional settings: quality standards and guidance for program evaluation. *MMWR Recomm Rep*. 2000;49(RR-1):1-13.
15. Nowalk MP, Zimmerman RK, Tabbarah M, Raymund M, Jewell IK. Determinants of adult vaccination at inner-city health centers: a descriptive study. *BMC Fam Pract*. 2006;7:2.
16. Panés J, O'Connor M, Peyrin-Biroulet L, Irving P, Petersson J, Colombel JF. Improving quality of care in inflammatory bowel disease: what changes can be made today? *J Crohns Colitis*. 2014;8(9):919-926.
17. Centers for Disease Control and Prevention. Prevention of pneumococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Recomm Rep*. 1997;46(RR-8):1-24.

Supporting Online Material

Vaccination Form

1. Have you had a flu shot (influenza vaccine) this year? (Circle one.)

YES NO I DON'T KNOW

If "yes," approximate date of shot: _____

Note: You should not get a flu shot if you have had a severe allergic reaction to a prior flu shot or to eggs, or if you ever had Guillain-Barré Syndrome (a severe paralytic illness, also called GBS) that occurred after receiving a flu shot.

2. Have you ever had a Pneumovax ("pneumonia vaccine")? (Circle one; for information about who should receive the Pneumovax, please see the reverse side.)

YES NO I DON'T KNOW

If "yes," approximate date of shot: _____

3. Have you ever had a vaccine for hepatitis A? (Circle one.)

YES NO I DON'T KNOW

If "yes," approximate date of shot: _____

4. Have you ever had a vaccine for hepatitis B? (Circle one.)

YES NO I DON'T KNOW

If "yes," approximate date of shot: _____

Who should get the Pneumovax vaccine?

- All adults 65 years of age and older.
- Anyone 2 through 64 years of age who has a long-term health problem such as: heart disease, lung disease, sickle cell disease, diabetes, alcoholism, cirrhosis, leaks of cerebrospinal fluid, or cochlear implant.
- Anyone 2 through 64 years of age who has a disease or condition that lowers the body's resistance to infection, such as: Hodgkin's disease; lymphoma or leukemia; kidney failure; multiple myeloma; nephrotic syndrome; HIV infection or AIDS; damaged spleen or no spleen; or organ transplant.
- Anyone 2 through 64 years of age who is taking a drug or treatment that lowers the body's resistance to infection, such as: long-term steroids, certain cancer drugs, or radiation therapy.
- Any adult 19 through 64 years of age who is a smoker or has asthma.
- Residents of nursing homes or long-term care facilities.
- Some people should not get the Pneumovax vaccine or should wait:
 - Anyone who has had a life-threatening allergic reaction to vaccinations should not get another dose.
 - Anyone who has a severe allergy to any component of a vaccine should not get that vaccine. Tell your provider if you have any severe allergies.
 - Anyone who is moderately or severely ill when the shot is scheduled may be asked to wait until he or she recovers before getting the vaccine. Someone with a mild illness can usually be vaccinated.
- Although there is no evidence that Pneumovax is harmful to either a pregnant woman or to her fetus, as a precaution, women with conditions that put them at risk for pneumococcal disease should be vaccinated before becoming pregnant, if possible.