Published in final edited form as:

Vaccine. 2014 October 21; 32(46): 6025–6028. doi:10.1016/j.vaccine.2014.08.081.

Provider Knowledge of Trivalent Inactivated and High-Dose Influenza Vaccines

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Abstract

The objective of this study was to assess provider knowledge about trivalent inactivated and high dose influenza vaccines. Hence, a 20 item survey was distributed to providers within the Internal Medicine department at an urban academic medical center.

Results—281(24.5%) providers responded. The correct response rate was 63.2%. The highest performing subspecialties were infectious diseases (80.5%), endocrinology (69.2%), and pulmonary (68%). Those who received an influenza vaccine during the most recent season scored significantly higher than those who did not (63.6% vs. 43.6%, $p=.001$). Areas where respondents did poorly included questions pertaining to contraindications to immunizations (27.4%), common adverse events after immunization (29.2%), target antigen (73.5%), number of strains in the trivalent inactivated vaccine (62.9%), and time to immunity (61.4%). High dose vaccine knowledge was poor, with 37% of providers unaware of its existence.

Conclusion—Significant gaps in provider knowledge exist regarding both trivalent inactivated and high dose influenza vaccines.

Keywords

Influenza vaccine knowledge; high dose influenza vaccine

Introduction

Influenza vaccination is safe and effective,¹ but immunization rates are low, estimated at 35.1% for adults and 54.9% for children during the 2012–2013 season.² It has been previously demonstrated that a strong recommendation from a physician increases the likelihood of vaccination.^{3,4} An integral part of making a case for vaccination is having the knowledge to address patient questions. It has been shown that healthcare workers with

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Conflicts of interest:

H.K.T. has received research funding from Wyeth/Aztrazeneca, sanofi-Pasteur, and Medimmune and serves on an advisory board for Teva.

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greater knowledge are more likely to receive the vaccine.^{5,6,7} It would follow that they would also be more likely to recommend it to their patients, and indeed it has been shown that H1N1 vaccination rates among pregnant women increase as their obstetrician's knowledge of the vaccine improves.⁸ The expectations placed on provider's understanding will only increase due to the development of new vaccine formulations. These include a high dose vaccine which is indicated in people older than age 65 and has been shown to have improved immunogenicity,⁹ vaccines produced without the use of eggs, an intradermal vaccine, and quadrivalent vaccines. Previous studies have assessed general knowledge and attitudes among health care workers regarding influenza vaccination, but these did not include specific clinical and basic science questions directed at the provider level. In this study, we sought to assess knowledge among academic providers in general internal medicine and medicine subspecialties.

Methods

A 20 item multiple choice survey was created using the REDCap (Research Electronic Data Capture) electronic data capture tool.¹⁰ The survey can be found in the appendix. Questions assessed demographic data as well as clinical and basic science knowledge of the inactivated trivalent influenza vaccine (IIV3), the live attenuated influenza vaccine, and the high dose influenza vaccine for the 2012-2013 season. The survey was administered to 10 physicians prior to full scale distribution to ensure that questions and answers were readable and understandable. The survey was distributed in June 2013 by email to all subspecialty and general medicine housestaff, faculty, and mid-level providers within the Department of Medicine at Vanderbilt University. A follow-up email was sent to increase response rate. Data were analyzed using Stata 12.1 (StataCorp LP, College Station, TX). Descriptive statistics and bivariate analyses were performed using Chi-squared test where appropriate.

Results

Response rate

The survey was sent to 1146 subjects. There were 281 responses (24.5%). There were more male respondents than female (52.7% vs. 47.3%). The majority of respondents were attending physicians (50.5%), followed by those still in residency training (23.8%), subspecialty fellows (18.2%), and mid-level providers (7.5%). By specialty, the largest groups were general internal medicine (39.2%), followed by cardiology (12.1%), hematology-oncology (11%), infectious diseases (9.6%), pulmonary (9.6%), gastroenterology (5.3%), and nephrology (5%) (Figure 1). Mid level providers made up a large share of respondents within hematology-oncology (16.1%) and cardiology (11.8%).

Vaccination Rate

The overall reported self-vaccination rate was 97.9%. Mid-level providers had lower vaccination rates than physicians (90.5% vs. 98.5%; $p=.01$).

Influenza Vaccine knowledge

The correct response rates to selected question are shown in Figure 2 and Table 1. The mean correct response rate was 63.2%. The scores were normally distributed with a standard deviation of 15.2%. Infectious diseases was the highest scoring (80.5%), followed by endocrinology (69.2%) and pulmonary (68%). Specialties with low relative scores included cardiology (60.4%), nephrology (60.4%), hematology/oncology (55.3%), and gastroenterology (54.4%). General internal medicine had an average score of 61.1%. There were large numbers of housestaff in this group, but when examining only attendings the score was 65.8%. The results examined by level of training showed that attending physicians scored the highest (64.6%), followed by fellows (63.8%), residents (57.8%), mid-level providers (56.2%), and interns (56.1%). Those who reported receipt of influenza vaccine during the last season scored higher than those who did not (63.6% vs 43.6%, $p=.001$). Content areas where respondents did poorly included contraindications to IIV3 (27.4%), common adverse events after IIV3 (29.2%), target antigen (73.5%), number of strains in the IIV3 (62.9%), and time to immunity (61.4%). Common misconceptions regarding contraindications to IIV3 included that mild to moderate egg allergy (53%), age less than 2 years (18.5%), and pregnancy (11.7%) were reasons to avoid vaccination. Respondents also frequently misidentified common adverse reactions, with 70.5% stating that the rate of fever after administration of IIV3 is $>5\%$. Respondents had high rates of correct responses to questions about efficacy of influenza vaccination (70.5%), route of administration of the live attenuated vaccine (86.8%), absolute risk of serious complications (98.2%), and whether the IIV3 was live or killed (94.0%).

High dose vaccine

There were four questions in the survey addressing the high dose influenza vaccine. Two were knowledge-based questions and two were related to usage by providers. The knowledge questions addressed the difference between high dose vaccine and IIV3 and whether providers knew the indication for the high dose vaccine. The correct response rates were 61.3% and 42.0%, respectively. The highest scoring specialty was infectious diseases (82.7%) followed by endocrinology (72.7%), nephrology (60.7%), pulmonary (55.6%), general internal medicine (50.9%), hematology/oncology (35.5%), cardiology (33.3%), and gastroenterology (30.0%). Common misconceptions about the high dose vaccine included that it contains adjuvant (30.5%) and that chronic medical conditions or immunosuppression are indications (19% and 24.4%). Only 15.8% of providers reported that they had administered the vaccine. The most common reasons for not using the high dose vaccine were that providers were not familiar with the indications (43.1%), they were unaware it existed (37.0%), and it was not available in their clinic (17.4%).

Discussion

In this study, provider knowledge about influenza vaccines was found to be sub-optimal. The highest performing specialties were infectious diseases, pulmonary, and endocrinology. Conversely, the specialties with the lowest overall scores were gastroenterology and hematology/oncology. General internal medicine as a field scored in the middle of all specialties. It is somewhat unexpected that they did not obtain higher scores given that they

likely administer vaccines more than any other group. Factors associated with improved knowledge were attending or fellow level of training and reported receipt of influenza vaccine within the last year. There were several content areas where knowledge was poor, including knowing the target antigen, number of strains in the IIV3, time to immunity, contraindications to IIV3, and common adverse events after IIV3. The most common misconceptions about influenza vaccination were primarily associated with misidentifying contraindications to vaccination or common adverse reactions.

This study also assessed provider knowledge of the relatively new high dose influenza vaccine, which was found to be poor. Only 15.8% of providers indicated that they had prescribed the high dose vaccine. The reasons most commonly given for lack of administration were that providers did not know it existed or did not know enough about its indications. Providers seemed to know very little about the high dose vaccine despite the improved immunogenicity in individuals ≥ 65 years of age compared to IIV3.⁹

Few previous studies have assessed provider knowledge of influenza vaccination, and none have assessed knowledge of the high dose vaccine. People who decline vaccination often have misinformation about the vaccine.^{4,11} Providers must have the knowledge to counter these often deeply held misconceptions. Data also indicates that familiarity with vaccine guidelines makes a provider more likely to discuss vaccination with patients¹², and it is well established that a strong physician recommendation for vaccination increases usage.^{3,4} Patient uptake of the H1N1 influenza vaccine has been shown to be impacted by provider knowledge.⁸ This evidence makes it clear that an important part of increasing influenza vaccination rates is to ensure that providers thoroughly understand the vaccine. Our study shows that more effort is needed to educate providers in many areas. Clearly, knowledge about the high dose vaccine is lacking and providers have largely not accepted it into their routine practice. Although no study has shown that vaccine uptake can be increased by education interventions aimed at providers, it would seem to be a reasonable assumption that they would improve knowledge and may increase vaccination rates. The most effective intervention to accomplish this has not been identified.

A major strength of our study was the ability to assess knowledge among a wide range of internal medicine specialties and training levels. Limitations of the study included the low response rate (24.5%), limiting generalizability due to possible ascertainment bias. Demographic data comparing responders to non-responders is not available. Perhaps the true knowledge scores would have been lower had the response rate been higher. However, scores overall were lower than expected, and we were still able to identify many areas where knowledge was deficient. The study was conducted at an academic medical center, so the results may not accurately reflect US medical providers as a whole. It is also possible given the electronic distribution of the survey that respondents could have used external resources to inflate the scores, but again the scores overall were relatively low.

Conclusion

This study assessed provider knowledge via specific questions regarding traditional and high dose influenza vaccination. We have demonstrated that there are significant misconceptions

regarding these vaccines. It will be important to determine what forms of provider education are effective at improving knowledge and what effect these interventions have on vaccination rates.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- A knowledge survey about standard and high dose influenza vaccines was distributed.
- Many common areas of clinically important knowledge deficiencies were identified.
- High dose influenza vaccine knowledge and utilization was low.

Figure 1.

Figure 2.

Correct response rate for selected questions by specialty.

GIM (General Internal Medicine), ID (Infectious Diseases), GI (Gastroenterology), Heme-Onc (Hematology-Oncology), Other (Rheumatology, Endocrinology, Geriatrics, Allergy)

Table 1

Correct response rate for selected questions.

Does the inactivated vaccine contain live or killed virus?	94.0%
What is the preferred route of administration of the inactivated vaccine?	84.3%
What part of the influenza virus is used as the target antigen in the inactivated vaccine?	73.5%
How many strains of virus were included in the 2012-2013 influenza season's inactivated vaccine?	62.9%
How long after influenza vaccine administration does it take for immunity to occur?	61.4%
What is the risk of serious complications from influenza vaccination?	98.2%
Which of the following are contraindications to influenza vaccination?(choose all that apply)	27.4%
Which of the following are common(>5%) adverse reactions to the inactivated influenza vaccination?(choose all that apply)	29.2%
Which of the following is the route of administration of the live attenuated influenza vaccine?	86.8%