MINDFUL PRACTICE

'Doctor, I Heard the Flu Shot Doesn't Work'

BY JON O. EBBERT, M.D., AND ERIC G. TANGALOS, M.D.

The Problem

A 67-year-old Web-savvy man with a history of hypertension and benign prostatic hypertrophy presents to your clinic during the influenza season for a recheck of his blood pressure. According to guidelines from the Centers for Disease Control and Prevention, this patient should receive the influenza vaccine. When you offer vaccination, the patient tells you that it doesn't work and he won't take it. You respectfully disagree. You and your patient decide to review each other's evidence and get back together.

The Question

In healthy, ambulatory, noninstitutionalized patients, does the influenza vaccine prevent influenza, compared with placebo?

The Search

We used PubMed (www.pubmed.gov) and entered "influenza vaccine" and "effectiveness."

Our Critique

This systematic review appears to be methodologically sound and thorough. However, the presentation of the results is far from transparent to the average reader. The lack of transparency is even more unsettling in light of the authors' conclusion that the "effectiveness of the trivalent inactivated influenza vaccine in elderly individuals is modest." The authors report this conclusion without defining what a reasonable or good vaccine response would be. We are struck by the fact that the vaccine was effective for reducing deaths in long-term care facilities and for preventing hospital admissions for influenza and pneumonia in community-dwelling elderly. We agree with the authors' conclusions that high vaccination coverage is needed in long-term care facilities. Adequate protection of these individuals may only be successful via appropriate vaccination of individuals who come into contact with long-term care patients (i.e., visitors and care providers). Our chances of having a perfect vaccine match during an outbreak may be low due to antigenic drift, but if we have a vaccine that offers some protection in the face of an epidemic like the one in 1918-1919, significant amounts of morbidity and mortality could be averted.

Patient Preferences and Clinical Decision

You discuss your findings with the patient and recommend that he follow the CDC's recommendations. He shows you the news reports he was reading, and together you decide that he should get the vaccination. The time you spent with this individual was quite enjoyable but far more expensive than a flu shot.

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T. Jefferson et al.

Efficacy and effectiveness of influenza vaccines in elderly people: A systematic review. Lancet 2005;366:1165-74.

▶ **Criteria for Study Inclusion:** Randomized trials, cohort studies, and case-control studies assessing vaccination with any influenza vaccine, compared with placebo or no intervention, in people aged 65 years or older were included.

▶ **Study Identification:** Cochrane Library, Medline, Embase, Biological Abstracts, and Science Citation Index were searched.

▶ **Study Selection:** Two reviewers independently applied exclusion criteria, and three reviewers abstracted data from the included studies. Methodologic criteria were assessed.

▶ **Outcomes:** Vaccine efficacy (against influenza) and vaccine effectiveness (against influenzalike illness during the influenza season) were summarized. Vaccine efficacy (VE) was assessed as a proportion—VE equals 1 minus relative risk or VE equals 1 minus odds ratio–and can be interpreted as the percentage of people not experiencing the outcome of interest with the vaccine. Vaccine matching was categorized as good, poor, or unknown, and analyses were grouped by viral circulation and vaccine match.

▶ **Results—Cohort studies in long-term care facilities during outbreaks or high viral circulation periods:** Overall vaccine effectiveness against influenzalike illness was 23% when vaccine matching was good but was not significantly different from no vaccination when matching was poor or unknown. No association was observed between vaccine coverage and attack rate of influenzalike illness. Vaccine efficacy was not significant with good vaccine matching. Well-matched vaccines prevented pneumonia and hospital admission for influenza or pneumonia, while poor or unknown matches did not. Vaccination during low viral circulation prevented influenzalike illness but not influenza. Influenza vaccination significantly reduced the risk of death caused by influenza or pneumonia, irrespective of outbreak or matching status, which was significant.

Cohort studies in elderly individuals in the community: Among all elderly in the community, vaccination was not effective against influenza, influenzalike illness, or pneumonia. Well-matched vaccines prevented hospital admissions for these diseases, however. Among individuals at risk for influenza complications, vaccination was effective for death from all causes, but among healthy individuals, vaccines were only effective for preventing hospital admissions for influenza or pneumonia. After adjustment, vaccination significantly decreased all-cause mortality and hospital admission for influenza or pneumonia, respiratory disease, and cardiac disease. Combining results across all matching categories, vaccination reduced hospital admission for influenza and pneumonia.

Market Concepts Used To Predict Flu Activity

BY SHERRY BOSCHERT
San Francisco Bureau

SAN FRANCISCO — The same principles that keep commodities traders in business were used for the first time to predict disease, accurately forecasting influenza activity up to 6 weeks in advance, Philip M. Polgreen, M.D., said.

Instead of buying corn or soybean futures, a group of 61 health care providers in Iowa used an Internet site to trade information about influenza activity during last year's flu season. In this innovative pilot study, the investigators aggregated and analyzed the trades and compared them with later surveillance data on actual flu activity from the Centers for Disease Control and Prevention.

Results showed that the influenza "prediction market" provided useful forecasts of disease activity up to 6 weeks in advance, with accuracy increasing as the target week grew nearer, Dr. Polgreen said at the annual meeting of the Infectious Diseases Society of America.

Market forecasts made 2-3 weeks in advance matched the level of influenza activity later reported by the CDC 80% of the time, reported Dr. Polgreen of the University of Iowa, Iowa City, and his associates.

"Our data suggest that prediction markets can forecast influenza activity quickly, accurately, and inexpensively by aggregating the expert opinion of health care providers," he said.

Even a 2-week warning of increased influenza activity would be helpful because it would allow time to vaccinate high-risk patients and health care providers and also would allow planning for increased hospital admissions, Dr. Polgreen said.

Historically, no accurate predictor of flu activity has been available. Although yearly influenza outbreaks are certain, the timing, severity, and strains are not known.

Outbreaks typically peak over 2-3 weeks and last for about 2-3 months. Vaccines must be administered early enough to provide protection (at least 2 weeks before exposure) but not too early, because their effectiveness wanes over time.

Prediction markets were used first in 1988 to forecast the winner of Iowa's presidential caucus, and have proved more accurate than Gallup polls. The method since has been used by Hewlett-Packard to forecast sales of its printers and by Eli Lilly & Co. to predict which drugs are most likely to advance through clinical trials.

About 30-60 active traders are needed for a prediction market to function. More are better, but the most important goal is to use traders who have solid information, such as primary care physicians, infectious disease specialists, pediatricians, emergency department physicians and nurses, epidemiologists, clinical microbiologists, public health officials, and pharmacists.

This year, the investigators will run an influenza prediction market for the full state of Iowa with about 100 traders. ■

How the Flu Market Worked

Each trader was given 100 "flu dollars" for trading on an interactive Web site that was accessible around the clock. Every even-numbered week during the flu season, the system introduced a new set of contracts, and traders bought or sold predictions of the level of flu activity that would occur 8 weeks after the contracts opened.

They chose from six levels of flu activity, which ranged from "no activity" through "widespread activity." Trading could continue until the last day of the target week.

A clinical microbiologist who suddenly began seeing more respiratory cultures that tested positive for influenza might log on to the Web site and purchase shares for "widespread influenza activity" while also trying to sell shares for "little or no influenza activity," Dr. Polgreen said.

The electronic interaction of all the traders led to a set of market prices that reflected the consensus probability for the future level of influenza activity.

When the CDC released its influenza surveillance report after the target week, traders who bought contracts correctly predicting the level of flu activity received 1 flu dollar per contract. All other contracts converted to a zero value.

At the end of the flu season, traders received $1 in educational grant money for every flu dollar they owned. The most successful trader amassed $213.