

Influenza Immunization: The Impact of Notifying Patients of High-Risk Status

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Background. The influenza immunization rate in the high-risk military and retired military population has not been reported. To determine this rate, and to test whether the rate could be improved by notifying patients of their high-risk status, a clinical trial was conducted using a postcard reminder as an intervention.

Methods. All 1068 high-risk patients enrolled in a large, residency-affiliated, military family practice department were identified. Of these, 519 patients were randomly selected to receive a reminder postcard; the remainder (549) were not sent a card. The immunization rates of each group were compared.

Results. A significantly higher percentage of those to whom postcards were sent received an influenza immunization (25.2% vs 9.1%, $P < .001$). This difference was significant in all demographic groups except in those less than 21 years of age and those 21 to 40

years of age, in which very few patients presented for immunization. In those in the study group aged 65 years and over, 46.7% were immunized vs 20% of controls ($P < .001$). Those aged 65 years and older and those in the higher income group had higher immunization rates, while those aged 40 years and under had very low immunization rates.

Conclusions. The influenza immunization rate among military beneficiaries in high-risk groups is low, but can be significantly improved with a reminder postcard. This intervention may be more effective in the older and higher-income segments of the high-risk population. The low immunization rates of the lower-income group and the younger age groups have significant public health implications and should be studied further.

Key words. Influenza vaccine; preventive health services; risk factors. *J Fam Pract* 1991; 33:495-498.

Influenza continues to be a major killer in our society, primarily among the elderly and those with chronic diseases.¹ Annual mortality due to influenza in the United States ranges from 10,000 in nonepidemic years to 40,000 in epidemic years.² Prevention of influenza by immunization or amantadine hydrochloride prophylaxis has been shown to be effective in reducing influenza-related mortality and morbidity in both the elderly and infirm populations.^{3,4} Both methods of influenza prevention are about 70% effective.⁵ The 1989 US Preventive Services Task Force report recommends annual influenza

immunization for all persons over 65 years of age, residents of chronic care facilities, and persons with chronic cardiopulmonary disorders, metabolic diseases (including diabetes mellitus), hemoglobinopathies, immunosuppression, or renal dysfunction.⁶ Although some disagree regarding the immunization of otherwise healthy individuals aged 65 years and over,⁷ it is clear that a large fraction of our population is at risk for death or severe morbidity due to influenza each year, and that effective preventive measures are available.

Influenza immunization is poorly accepted by patients. Only 20% of high-risk patients receive the influenza vaccine annually.⁸ Baseline immunization rates as low as 3.8% have been reported.⁹ Immunization rates as high as 37%¹⁰ and 59.7%¹¹ have been noted, however, when postcard or telephone reminders were used. If effective interventions to increase patient acceptance of influenza immunization were universally applied to the population at risk, immunization rates would likely improve, with significant reductions in influenza-related mortality and morbidity being the expected result.

One in 25 US citizens are cared for by the Depart-

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ment of Defense medical system.¹² No published studies exist on influenza immunization rates in this population, or on methods to increase the acceptance rate in this population. Although all active duty service members are required annually to receive the influenza vaccine unless medically contraindicated, the same does not hold true for military retirees, or the family members of either group, who together make up three fourths of all military health-care beneficiaries.¹²

Practice-based postcard or telephone notification has shown efficacy,^{9-11,13-15} as have media campaigns and efforts by individual physicians.¹³ In most instances, rates of vaccine acceptance were improved significantly by reminders. Most studies considered only patients over 65 years of age; one included other high-risk patients,¹⁴ and one was stratified for age, sex, household composition, and distance from the clinic.¹⁵ No studies were found that considered high-risk patients in all age ranges or that stratified results by income, age, and sex. No studies were found that specifically studied the rate of influenza immunization among ill patients of any age group.

This study was undertaken to answer the following questions. What is the baseline influenza immunization rate for military beneficiaries with high-risk conditions cared for by family physicians at a military medical center? Would a postcard reminder sent to high-risk patients significantly increase the immunization rate? Does age, sex, or income affect vaccine acceptance?

Methods

Information on all patients of the Department of Family Practice at Madigan Army Medical Center (MAMC), Fort Lewis, Washington, is registered in the computer, including name, military sponsor's social security number, and demographic data. Any diagnoses identified by a physician initially and at any subsequent visit are also entered, in an ongoing fashion.¹⁶ Using the guidelines of the Immunization Practices Advisory Committee,¹ high-risk diagnostic categories were determined (Table 1), and 1068 registered family practice patients with one or more high-risk diagnoses were identified and entered into the study. Patients who were aged 65 years or older but had no other risk factors were not studied. Patients were then assigned a number based on the last two digits of the military sponsor's social security number, to ensure that all members of the same family in the study population would be in the same study group. Individuals were then assigned to the study ("card") group or the control ("no card") group according to a table of random numbers.

In the 2 weeks before availability of the influenza vaccine used during the 1983 to 1984 season, the 519

Table 1. Diagnoses Placing a Patient at High-Risk Status During the 1983 to 1984 Influenza Season

| | |
|-------------------------------------|---------------------------------------|
| Ischemic heart disease | Valvular heart disease |
| Tobacco abuse | Chronic bronchitis |
| Emphysema | Chronic obstructive pulmonary disease |
| Bronchiectasis | Asthma |
| Tuberculosis | Cystic fibrosis |
| Nephrotic syndrome | Pernicious anemia |
| Sickle cell anemia | Diabetes mellitus |
| Chronic renal failure with azotemia | |

patients in the study group were mailed a reminder postcard advising them that their physician had determined that they were at high risk of complications should they catch the "flu," and strongly urging them to come to the Family Practice Clinic for immunization. The control group, 549 patients, were sent no postcard and received routine care.

Physicians in the Department of Family Practice were aware that a study was in progress and that some of their patients might receive postcards about influenza immunization. The vaccine was offered daily to all eligible patients on a walk-in basis, without appointment, and was free of charge. Patients who presented for immunization read and signed an informed consent document for the vaccine and a research volunteer agreement. To ensure accurate data collection, the physician or a nurse completed the standard department computer form for each patient receiving influenza immunization.

The following data were collected on all identified high-risk patients: age, sex, rank of sponsor (officer vs enlisted), and whether the patient received the influenza vaccine during the 6-month study period. Data were analyzed by chi-square analysis. Multivariate analysis was performed using the Mantel-Haenszel chi-square calculation and the Mantel-Haenszel adjusted risk ratio.

Results

A comparison of the demographic variables in the two patient groups (Table 2) showed that age distribution was similar in both; however, the study group had more female and officer subjects than the control group. Multivariate analysis showed a highly significant statistical association between receiving the postcard and accepting immunization. Therefore, the distribution of rank, age, and sex did not alter the impact of the reminder postcard.

Table 3 shows that overall, 25.2% of the study group were immunized compared with 9.1% of the control group. Stratification analysis reveals that for all age, sex, and rank subcategories, the use of a reminder postcard was clearly associated with higher influenza

Table 2. Demographic Variables of Subjects in Control and Study Groups

| Variable | Study Group (n=519) No. (%) | Control Group (n=549) No. (%) | P Value |
|-------------|-----------------------------------|--|------------|
| Sex | | | |
| Male | 262 (50.5) | 311 (56.6) | .04 |
| Female | 257 (49.5) | 238 (43.4) | |
| Rank | | | |
| Enlisted | 361 (69.6) | 412 (75.0) | .04 |
| Officer | 158 (30.4) | 137 (25.0) | |
| Age (years) | | | |
| 0-20 | 71 (13.7) | 82 (15.0) | .56 |
| 21-40 | 63 (12.1) | 70 (12.7) | .76 |
| 41-64 | 269 (51.8) | 289 (52.6) | .79 |
| >64 | 116 (22.4) | 108 (19.7) | .28 |

immunization rates, with the possible exception of the two youngest age groups. The impact on immunization rates was greatest for those of officer rank and those aged 65 years and over.

Discussion

The low baseline influenza immunization rate in this high-risk military beneficiary population falls far short of both the national average and the Centers for Disease Control (CDC) goal. Enlisted rank and an age of 40 years or less were risk factors for not getting an influenza immunization in the control population. The rate of immunization in the control group patients who were aged 65 years or older was only 20%.

The postcard reminder significantly improved the overall immunization rate. Older age groups and those

with higher rank had the best response rates, reaching a high of 45.7% in the group aged 65 years and older.

Two important findings highlight the probable presence of barriers to immunization. First is the remarkably poor acceptance of influenza immunization among high-risk patients 40 years of age and under. It is possible that some active-duty subjects received influenza immunization at their unit (job site). It is unlikely that this would apply to many of these subjects, however, because with the exception of well-controlled non-insulin-dependent diabetes mellitus, tobacco abuse, and well-controlled asthma, none of the high-risk diagnoses were compatible with active-duty military service at the time of the study.

Another reason for this poor compliance may be related to a lack of perceived risk by both the patient and the physician. Media attention and physician attention to compliance with influenza immunization are usually focused on the elderly population, especially the infirm elderly. High-risk people aged 40 years and under have not been specifically targeted. Also, individuals aged 40 years and under may feel generally healthy despite having one of the high-risk illnesses.

The second important finding is that despite the influenza immunizations being offered at no cost, the higher socioeconomic group (as defined by military rank) had a much higher immunization rate, with or without notification.

These findings indicate that barriers to immunization other than cost may exist, possibly based on educational, cultural, or other socioeconomic or experiential influences on the perceived risks and benefits of getting an influenza immunization. Factors contributing to the low influenza immunization rate in the 40 years and under age group, and in the lower socioeconomic group (enlisted and their families) and ways to improve them, are valid topics for future study, in both military and nonmilitary populations. Further studies elucidating these barriers and ways to overcome them could lead to significant improvement in influenza immunization rates.

Fedson¹⁷ has shown in a study of primary care physicians' practices that only 9% of patients who should receive the vaccine were actually immunized. A high-risk list in each practice, or a search of the computerized patient database each September for those needing influenza shots, and notes placed on charts of high-risk patients by the office staff to remind the physician, are all examples of interventions that may improve immunization rates. Both telephone and postcard reminders have been shown to be effective.^{9-11,14,15} The choice of phone or postcard notification should be based on available staff, budgetary constraints, volunteer help available, and other practice specifics.

Table 3. Impact of Reminder Postcard on Receiving Influenza Immunization

| Category | Study Group Receiving Immunization No. (%) | Control Group Receiving Immunization No. (%) | P Value |
|-------------|---|--|------------|
| Overall | 131 (25.2) | 50 (9.1) | <.001 |
| Sex | | | |
| Male | 73 (27.8) | 31 (9.9) | <.001 |
| Female | 58 (22.6) | 19 (7.9) | <.001 |
| Rank | | | |
| Enlisted | 79 (21.9) | 32 (7.5) | <.001 |
| Officer | 52 (32.9) | 18 (13.9) | <.001 |
| Age (years) | | | |
| <21 | 5 (7.0) | 1 (1.2) | .06 |
| 21-40 | 2 (3.1) | 0 (0.0) | .12 |
| 41-64 | 71 (26.4) | 27 (9.3) | <.001 |
| >64 | 53 (45.7) | 22 (20.0) | <.001 |

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