vey was conducted in a 3-week period by three chart abstractors. Once permission is obtained to survey the school district, the actual implementation of the survey is not difficult. The algorithms for measuring vaccination rates are straightforward and can be encoded in either database or statistical package languages.

Because school-based data include children who have no identified provider or who change providers, these surveys are useful for identifying groups of children who may lack connections to the primary care system. Because these children are at the highest risk of adverse outcome, inadequate screening for disease, and inadequate vaccination, this methodology can potentially identify targets for interventions. In contrast, provider-based surveys cannot identify children with inadequate access to the primary care system. A characteristic of school-based immunization surveys, however, is that the surveyed population consists of those children who remain in the city and attend a city school. Migration from the city will reduce the survey scope as a result of omission of those children who were city residents during their preschool years but who moved to the suburbs by school entry. Busing children into or out of the school district will also complicate the survey.

Closing the "toddler gap" in vaccination services will probably require a multifaceted approach. One of the essential early steps is to obtain data that can help to target interventions accurately. Retrospective school-based immunization surveys can provide those data in a short period of time and with minimum effort. □

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ABSTRACT

Public health clients in an Ontario community 65 years of age or older were randomly allocated to receive an intervention by a public health nurse during a home visit promoting either influenza immunization or safety measures. There was no statistically significant difference in influenza immunization rates between these two groups (56.1% vs 56.6%). Men were significantly more likely to receive immunization. (*Am J Public Health.* 1993;83:1751–1753)

The Impact of a Public Health Nurse Intervention on Influenza Vaccine Acceptance

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Introduction

Annual vaccination against influenza is currently recommended for all persons 65 years of age or older.[1–4] Despite this recommendation, vaccination rates among community-living North American seniors remain at approximately 20% to 30%.[5–7] The literature suggests that structured personalized communication[8–14] using components of the health belief model and expectancy-value theory offers considerable promise in altering health behaviors. The current lack of incentives for primary care physicians to promote vaccination and the positive experience in nurse-led interventions[15–17] provide encouragement for the development of a public health nurse intervention.

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TABLE 1—Comparison of Promotion Groups (n = 359)

	Influenza (n = 204)	Safety (n = 155)
Sex, no. (%)		
Men (n = 117)	59 (28.9)	58 (37.4)
Women (n = 242)	145 (71.1)	97 (62.6)
Mean age, y (SD)	77.59 (8.4)	77.78 (6.5)
At least 1 chronic health problem reported, no. (%)	134 (65.7)	104 (67.1)
Alternative and assigned promotion received, no. (%)	15 (8.1)	9 (6.1)
Self-rated health, mean[a] (SD)	2.55 (0.89)	2.70 (0.87)

[a]1 = excellent, 4 = poor.

TABLE 2—Frequency of Responses to Influenza Immunization Items

	Influenza (n = 198), %	Safety (n = 152), %	Difference between Groups, % (95% Confidence Interval)
Reported receipt of immunization	56.1	56.6	−0.5 (−11.0, 10.0)
Reported talking about immunization with public health nurse	42.2	18.2	24.0 (13.9, 31.9)

Methods

Research Design and Setting

Public health clients were randomly assigned to receive a public health nurse intervention during a home visit promoting either influenza immunization (study group) or safety measures (control group). The study took place in an urban–rural region of 450 000 residents, 13.3% of whom were 65 years of age or older.[18]

All 1011 clients aged 65 years or older who were considered active clients as of August 1990 or were referred to public health between September 1, 1990, and January 15, 1992, were randomly assigned to one of two groups. They were visited or contacted by 1 of the 18 seniors program public health nurses to determine, during the course of their usual care, whether they were eligible and willing to participate in the study. If it was determined that the client and/or proxy (family or close friend) were not able to or could or would not participate, the public health nurse did not proceed with the promotion and the client was therefore not part of the study. Some clients required more than one visit for the promotion. The public health nurses were instructed to provide their "usual care" regarding the topic of the alternate promotion.

The influenza promotion was designed to be individualized to address each client's unique concerns. The public health nurse reviewed influenza and its vaccine with clients and identified strategies to overcome barriers to immunization by family physicians (e.g., transportation services available in the community).

Data Collection

Outcome data were obtained through telephone interview (or home visit) by two research assistants who were unaware of group membership. Assignment of clients to research assistants was randomized. All clients were asked identical questions regarding the receipt of influenza immunization, self-rated health, and the presence of high-risk conditions[19,20] (heart disease, respiratory disease, or diabetes). Clients who did not receive the immunization were asked to explain their reasons. Both client groups were asked safety questions.

Results

Of the 1011 potential study clients, 589 (58.0%) were excluded for reasons such as cognitive impairment and "inactive" client status. An additional 57 clients (5.6%) refused the promotion, and 6 (0.6%) were lost to follow-up. Of those who were recruited, 157 received the influenza promotion and 148 received the safety promotion. Another 45 clients had been assigned to the influenza group but did not receive the promotion because the public health nurse found that they had already been administered influenza vaccine. These 45 subjects and those who were missed (n = 9) were included in the analysis in their originally allocated group (an "intention to treat"[21] analysis); thus, a total sample of 359 was analyzed.

Among these 359 clients, 117 were men and 242 were women; the mean age was 77.2 years. The sex and age distributions were very similar in the two groups (see Table 1). No between-group differences were found in the proportion of subjects reporting at least one chronic health condition or receiving the alternate promotion together with the assigned promotion. The mean ratings of self-rated health were similar.

At follow-up, there were no differences between groups in the number of subjects interviewed through a proxy, the number assigned to the two interviewers, and the number deceased. Also, there were no statistically significant differences in the rates of self-reported influenza immunization in the influenza and safety groups (56.1% and 56.6%, respectively) (see Table 2).

A post hoc power analysis confirmed that the sample size was sufficient to have detected a 50% relative increase in the vaccination rate (80% power, 5% alpha, two-sided). After the effects of the presence of chronic health conditions, self-rated health, and sex were controlled, there was still no statistically significant difference between the group immunization rates. In a pooled analysis of both study groups, we found that men were more likely than women to receive influenza immunization (70.5% and 49.6%, respectively).

Multiple logistic regression was used to examine the relative contribution of sex, promotion group, age, chronic health conditions, self-rated health, public health nurse, and public health nurse experience on the likelihood of receiving the influenza immunization. Even when group membership was forced into the model, only the effect of sex was significantly associated with the likelihood of receiving immunization when all of the variables were considered simultaneously (β = .89 [SE] .25), $P < .003$, 95% CI = 1.51, 4.01).

Forty-nine clients (33.7% and 45.7% of the nonvaccinated clients in the influenza and safety groups, respectively) gave reasons for not receiving immunization. The three most frequent reasons in the influenza promotion group were forgetting/confusion, prior experience with vaccine side effects, and beliefs regarding immuni-

zation. In the safety group, the most frequent reasons were beliefs regarding immunization and previous experience with vaccine side effects.

Discussion

The immunization rates reported here were considerably higher than the expected community rates of 20% to 30% for older persons.[5–7] Because of the nature of public health referrals, our subjects may be more likely to see a physician regularly and may be perceived as at greater risk; therefore, they may be more likely to be offered immunization. However, because there are no recent surveys on immunization rates among older adults in our community, we cannot be certain of the extent to which this subgroup is representative of the older community in general.

The reasons clients reported for failing to receive immunization were consistent with those previously reported[14,22] and appear to be an important barrier to preventive behavior. In contrast to findings reported by Conn,[23] the presence of chronic health conditions and self-rated health were not related to immunization behavior in this study.

Our finding that men were more likely than women to receive immunization was puzzling. Future studies could investigate population- and sex-specific influenza immunization rates. Researchers could also examine the effect of peer support in overcoming the reluctance of those whose beliefs constitute barriers to vaccine acceptance. Finally, qualitative research methods may contribute to our understanding of older clients' perceptions and their willingness to participate in preventive self-care. □

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