
Improving Measles Vaccination Rates in Previously Vaccinated Adults

Richard W. Demmler, MD; Fred R. Bakht, MD; and Peter DeSilva, MD

Houston, Texas, and Orange County, California

Background. During the 1988 measles epidemic in Houston, Texas, the Harris County Medical Society made each of its members aware of the Centers for Disease Control recommendations concerning revaccination of persons born between 1957 and 1971. A review of records in a family practice residency clinic found a revaccination rate of only 11% among this population. Previous studies of increasing influenza vaccine administration suggest that enlisting the assistance of office personnel can improve the vaccination rate.

Methods. A study was conducted that compared two methods of administering measles vaccine to those born between 1956 and 1967 who had received the killed measles vaccine. Standard ambulatory care (con-

trol group) was compared with a proactive system in which front desk personnel and nursing staff identified and vaccinated appropriate patients (study group).

Results. Sixty-one percent of the study group were vaccinated after identification by office personnel, compared with 5% of the control group ($P < .001$).

Conclusions. Standard ambulatory care protocols, which rely heavily on the patient's chief complaint to determine the patient's medical needs, interfere with the rate of revaccination. The measles vaccination rate can be significantly improved by a simple modification of practice routine, eg, using support personnel.

Key words. Vaccination; health care systems; patient compliance. *J Fam Pract* 1992; 35:180-184.

When a measles epidemic occurred in Houston, Texas, in October 1988, the Harris County Medical Society mailed a copy of the Centers for Disease Control (CDC) recommendations for vaccination and revaccination practices (Table 1) to each of its members (Mark Canfield, MS, epidemiologist, Harris County Health Department, personal communication). The audit committee of the Department of Family Medicine at Baylor College of Medicine (two of the authors are members) evaluated the vaccination and revaccination frequency of Baylor clinic patients. Revaccination of adults was of particular concern because they rarely request immunizations. We reviewed the charts of patients born between 1956 and 1967 (aged 22 to 33 years) who were seen in the clinic over a 2-week period. Only 2 of 17 persons who apparently qualified for revaccination received the vaccine. The two patients vaccinated were medical students who had visited the clinic specifically to receive the measles vaccine.

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From the Department of Family Medicine (Drs Demmler and Bakht), Baylor College of Medicine, Houston, Texas, and Bristol Park Medical Group, Inc (Dr DeSilva), Orange County, California. Requests for reprints should be addressed to Richard W. Demmler, MD, Baylor Department of Family Medicine, 5510 Greenbriar, Houston, TX 77005.

The 11% revaccination rate for adults 22 to 33 years old was not unexpected. Other authors have lamented the poor rates of adult vaccination. Previous investigators have sought to improve vaccination rates in their patient populations for routine influenza vaccination.¹⁻⁴ Gerace and Sangster¹ reviewed their attempt to increase the number of vaccinees by sending a letter reminder to nonvaccinated patients the first year and contacting them by telephone the second year.¹ All members of the staff assisted in the campaign to have all persons in their practice over the age of 65 vaccinated. In the first year, 63% of their eligible patients were vaccinated; half were vaccinated before the letter reminders were mailed. Only one third of those vaccinated before the mailings presented themselves for vaccination. The following year, the clinic vaccinated 68% of its population over 65 years of age. Two thirds were vaccinated before the telephone reminders. Half of the patients vaccinated before the telephone reminders presented to the clinic for vaccination.

Ratner, Fedson, and Kessler have recommended two strategies to achieve better influenza vaccination rates: (1) vaccination at the time of hospital discharge when vaccine is available,⁴ and (2) identification of high-risk individuals by the front desk and nursing staff of the

Table 1. Recommendations* for Measles Vaccination in an Epidemic

1. Immunize any unimmunized child between the ages of 6 and 12 months with monovalent measles vaccine.
2. For unimmunized children, 12 months of age and older, use the combined measles/mumps/rubella vaccine (MMR).
3. Immunize any person who received one of the early measles vaccines (killed, live attenuated with gamma globulin, or live attenuated given before 12 months of age) between 1957 and 1971.
4. Reimmunize any person who received a live attenuated measles vaccine between 1971 and 1980 if in that person's school the City or County Health Department confirms that transmission has occurred.
5. Do immunize those persons with symptomatic or asymptomatic HIV infection who have not been adequately immunized.
6. Do immunize patients with tuberculosis.

*Recommendations are a combination of information from the Centers for Disease Control and the Harris County Health Department 1988.

general medicine clinic who then remind the physician to inquire about and recommend influenza vaccination.²⁻⁴ Using these methods, this program vaccinated four times as many persons as a control site despite having half as many patients.

Unpublished 1981 data from the CDC reveal that 90% to 95% of both internists and family physicians believe that high-risk persons and those over 65 years of age should receive influenza vaccine. Fedson found, however, that only 3% of patients seen in internists' offices that same year received influenza vaccine.⁵ A large discrepancy exists between physician knowledge concerning vaccination and clinical implementation.

After considering this discrepancy, the authors of the present study believed that the office protocols for routine care of the ambulatory patient were a deterrent to revaccination with measles vaccine. In addition, the authors believed a protocol that included identification of patients who needed measles revaccination would lead to a markedly improved revaccination rate. A study was then designed to compare the rate of revaccination with measles vaccine (prompted primarily by patient request) in a standard ambulatory care setting with the rate of revaccination in a setting where the protocol enlists the assistance of other members of the clinic staff to contribute to patient care.

Methods

From a pilot project in the clinic, the authors expected a revaccination rate of 50% in the study group and 10% in

the control group. Based on a value of $P < .01$, a powers analysis indicated that a population size of 25 for each group would be necessary to show significance. Seventy-nine persons were screened for appropriateness of revaccination, and 25 qualified. Ten were in the control group and 15 were in the study group. The Houston epidemic ended before the predetermined number of patients was obtained, and the authors believed that the receptivity of patients to revaccination with the measles vaccine consequently would be lessened. This would have complicated interpretation of the results; therefore, data collection was discontinued.

A concurrent epidemic was identified in southern California. We were able to establish a site to continue the study in the Los Angeles area. The Bristol Park Family Medicine Clinic in Mission Viejo, California, agreed to participate in the study. The study protocol was unchanged. At both the Texas and California sites, persons born between 1956 and 1967 who had probably received the killed vaccine when they were children, were candidates for measles revaccination and were the target population for the study. Exclusions for revaccination were as described in the *Physicians' Desk Reference 1988* edition.⁶ Additionally, employees or students of Baylor College of Medicine were excluded from the Texas study because education and recruitment concerning revaccination in this population was more intense than in the general population.

The study site at the Baylor Family Practice Clinic had a central waiting room where a single receptionist registers all patients. Nursing staff, residents, and faculty physicians are assigned to one of two areas of the clinic for the purpose of seeing patients. Faculty physicians are readily available for consultation by residents anywhere in the clinic. The study group was composed of patients seen in one area of the clinic; the control group comprised those patients seen in another.

In the Bristol Park Medical Group, each physician's practice was self-contained. Each physician had designated front desk personnel, nurses, waiting room, and examining rooms. There was no interchange of staff between the separate physician practices.

In both the Texas and California sites, charts of study group patients were identified by the reception secretary when the patients registered in the clinic. A questionnaire was attached to the chart and charge ticket. The questionnaire was administered by a nurse when the patient was taken to an examination room. The questionnaire covered all exceptions to revaccination. If the patient was considered a candidate for revaccination, the nurse was authorized to vaccinate those patients who agreed by signed consent. Study group patients were then categorized as vaccinated or not vaccinated. If a

Table 2. All Stated Exclusions for Receiving Measles Revaccination in Texas and California Sites

Reasons for Exclusion	Texas		California	
	Study	Control	Study	Control
Fever	2	4	0	0
Pregnancy	2	0	0	1
Immune deficiency	0	1	0	0
Currently receiving chemotherapy	0	0	0	1
Egg/neomycin allergy	0	1	1	0
Employment	7	14	NA	NA
Recent gamma globulin	1	0	0	0
Serologic evidence of immunity	6	13	0	0
Previous revaccination	8	8	0	0
Natural illness	17	16	25	8
No identification*	0	0	0	5

*The subject could not be verified to confirm vaccination status.
NA denotes not available.

person refused revaccination, the nurse was to make a brief statement concerning the reason or reasons revaccination was refused.

The control group completed a questionnaire at the cashier's desk to establish whether there were exclusions for revaccination in this group. Chart review determined revaccination status. Patients in the control group were then categorized as vaccinated or not vaccinated.

A simple 2×2 chi-square was used to determine the significance of the vaccination rate in the study group compared with the control group.

Results

At the Texas site, 38 persons were screened in the control group; 10 were candidates for revaccination. Forty-one persons were screened in the study group; 15 were candidates for revaccination. The reasons for exclusion were similar between the two groups except that there was a larger percentage of Baylor employees, students, and residents in the control group excluded because of their exceptional exposure to revaccination education and recruitment.

The California study group included 44 patients; 18 were candidates for revaccination. The control group included 23 patients; 9 were candidates for revaccination. There was no difference in the reason for exclusion between the control and study groups except for the 5 subjects in the control group whose names were not on the questionnaire to evaluate vaccination status (Table 2). All five of the unidentifiable subjects had no contraindication to vaccination.

Both sites demonstrated that the rates of revaccination in the study groups were greater than those in the

Table 3. Ratio of Vaccinees to Total Number in the Study Group and Control Group, by Site

	California, n = 27	Texas, n = 25	Combined, N = 52
Study, No. (%)	14/18(78)	6/15(40)	20/33(61)
Control, No. (%)	0/9(0)	1/10(10)	1/19(5)
Significance	$P < .001$	NS	$P < .001$

NS denotes not significant.

control groups (Table 3). Forty percent of the study group in Texas and 78% in California were immunized. The control groups were able to revaccinate only 10% in Texas and none in California. Taken together, there was a 61% vaccination rate among patients in the study groups as compared with a 5% vaccination rate in the control groups.

The reasons expressed by patients who deferred vaccination reflected the differences of the two sites. In Texas, four patients reported that they would get the vaccine later or at another facility, one did not consider himself at risk for contracting the disease, one felt the vaccine was too expensive, one felt the injection was painful, one hated shots, one felt ill, and no explanations were given by three other patients. In California, three patients were unsure whether they had previously had natural measles, and one believed that having the injection would be uncomfortable.

Discussion

The present study examined one method to improve the measles vaccination rate in a population that did not make frequent visits to a physician. This study demonstrated that physicians can expand health care delivery simply by involving their front desk and nursing personnel. The validity of this finding was strengthened because results of the study group in a family practice residency clinic were easily reproduced and improved in a private family practice. The twelvefold increase in the revaccination rates of the study groups compared with the control groups suggest that this intervention is a substantial improvement over standard ambulatory care. Before this study, numerous public health notices were broadcast on television and radio, printed in newspapers, and posted on the entry doors of the Houston clinic. These notices described the groups that should be vaccinated or revaccinated. The vaccination rates at the control sites indicated that the effectiveness of these types of measures is limited without an active recommendation for vaccination being made to the patient at the time of the encounter.

A clear problem with the present study was the

inability to obtain all of the prestudy determined number of patients at one site. When a second site was established, it was the intent that the full data set would be collected at one site. The second site believed they had obtained the appropriate numbers and sent the data collecting sheets to the primary site. When the data were reviewed, it was found that there were more exclusions, which resulted in fewer than the number that had been predetermined. We analyzed the data that are presented here, and felt that the results demonstrated strong support for the establishment of protocols that would lead to better revaccination rates; we chose to discontinue the study and report the results. Because of the differences in the two sites, one a private practice with two practitioners involved and the other a residency training site, the applicability of our findings may be in question. However, the magnitude of the difference (61% as compared with 5%) is so great that there is little reason to believe that the intervention was not responsible for the observed difference.

We did not review all of the charts of patients in the targeted age group who had been seen in the clinic during the time of the study. The nursing staff and front desk personnel at both sites were reminded weekly to continue identifying eligible patients and to revaccinate appropriate candidates, so we assumed an equal rate of noncapture in the study and control groups.

The doubling of the revaccination rate in California compared with the rate achieved by the intervention in Texas was surprising. There are three possible explanations for this difference. First, the private practice site was simpler in its constructs. Front desk personnel and a nurse were assigned to a single physician. In contrast, nurses at the Texas site, which is a residency training program, were responsible to a different set of physicians each half day. Second, the investigator in the private practice site was better able to monitor the intervention efforts, as he was on site at all times. In contrast, investigators in the training program were on site approximately one half the time. Third, the reasons for refusing vaccination were different in the two sites, which probably reflects differences in patient populations of a private practice and a residency training program. In the California site, one patient refused to be vaccinated because of discomfort; three stated they wanted to check whether they had any natural illnesses before consenting to vaccination. In Texas, three patients did not give any reason other than they just did not want to receive the vaccine, and four expressed an interest in receiving the vaccination later. This could reflect the difference in relationships between patients and physicians in a private practice and those in a residency training program.

In this study, we did not quantitate the extra effort

necessary for the intervention used, but we estimated that an additional 2 or 3 minutes of the nurse's time was needed for each patient identified as a candidate for measles immunization. The extra time of the receptionist would be almost negligible since the patient's date of birth appears on the charge ticket printed at the time of the visit. The minimal time required to achieve the results reported here, as well as the successful implementation of the intervention into a private practitioner's office, should encourage physicians to implement similar protocols in their practices.

This study is consistent with previous research concerning improved adult immunization rates. In one project, an intensive program of reminders resulted in a 66% vaccination rate. No comment was made about those who were vaccinated before the reminders, but at least 50% of the vaccinees had not visited the clinic for the purpose of receiving the influenza vaccine. This suggests that there was a reminder system in the clinic to identify these persons, though it was not described. Other researchers have also shown that utilizing other members of the health care team, whether in a hospital or in a clinic situation, has led to markedly improved vaccination rates.²⁻⁴ A more recent study from a Veterans Administration Hospital in Minnesota reported results similar to those of Fedson and Ratner.² Nichol et al⁷ used a labor-intensive model to improve their vaccination rate. They not only used staff members to identify eligible patients but also were available in high-traffic areas of the hospital, and reminder letters were mailed to their high-risk patients. The above-mentioned authors established "protocols" to identify prospective vaccinees in a health care facility to increase the vaccination rate over more conventional ambulatory care models. As demonstrated in this study, the method is highly effective in a clinical practice.

Morris and Morris⁸ reviewed the patient charts of residents in their family practice clinic to determine how well the residents followed established guidelines for various preventive measures. They concluded that the residents had not sufficiently met the expectations for current preventive measures. For instance, only 23% of the patients whose charts were reviewed had been vaccinated against influenza. This finding is consistent with most reports on influenza vaccination rates in high-risk groups. The present study suggests that provider knowledge of the recommendations does not in itself promote better utilization. Residency programs should not only teach residents preventive medicine recommendations but also demonstrate methods for using available staff to improve patient compliance with the recommendations.

The present study shows that by restructuring pa-

tient care protocols, medical services can be expanded with minimal increases in time and effort.

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