Promoting Pneumococcal Immunizations Among Rural Medicare Beneficiaries Using Multiple Strategies

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ABSTRACT: Context: Vaccine-preventable diseases among adults are major contributing causes of morbidity and mortality in the United States. However, adult immunizations continue to be underutilized in both urban and rural areas. Purpose: To evaluate the effectiveness of a community-wide education campaign and mailed reminders promoting pneumococcal immunizations to rural Medicare beneficiaries. Methods: We implemented a community-wide education campaign, and mailed reminders were sent to Medicare beneficiaries in 1 media market in Montana to increase pneumococcal immunizations. In a second distinct media market, mailed reminders only were sent to beneficiaries. Findings: The proportion of respondents aged 65 years and older aware of pneumococcal immunizations increased significantly from baseline to follow-up among respondents both in the education-plus-reminder (63% to 78%, P = 0.04) and the reminder-only (64% to 74%, P = 0.05) markets. Overall from 1998 to 1999, there was a 3.7-percentage-point increase in pneumococcal immunization claims for Medicare beneficiaries in the education-plus-reminder market and a 1.5-percentage-point increase in the reminder-only market. Medicare beneficiaries sent reminders in the education-plus-reminder market compared to those in the reminder-only market were more likely to have a claim for pneumococcal immunization in 1999 (odds ratio 1.18, 95% confidence interval 1.08 to 1.28). The results suggest that these quality improvement strategies (community education plus reminders and reminders alone) modestly increased pneumococcal immunization awareness and pneumococcal immunization among rural adults. Mailed reminder exposure was associated with an increased prevalence of pneumococcal immunizations between 1998 and 1999 and was augmented somewhat by the education campaign.

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506

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increased awareness and demand for immunizations is limited and inconclusive.6,7

In 1999, we implemented a community-wide education campaign and mailed reminders were sent to Medicare beneficiaries in 1 media market in Montana to increase pneumococcal immunization. Mailed reminders alone were sent to Medicare beneficiaries in a second distinct media market for this purpose as well. Mailed reminders and a community-wide education campaign were chosen as interventions in that they are likely to be cost-effective approaches to promote immunizations in a rural population. This report provides an assessment of the effectiveness of these quality management strategies to improve the delivery of this important preventive service in a rural state.

Methods

In 1999, the Mountain-Pacific Quality Health Foundation (MPQHF) implemented a multifaceted community-wide campaign promoting pneumococcal immunization. Both pneumococcal and influenza immunizations are preventive services that MPQHF targeted for improvement through a contract with the Centers for Medicare and Medicaid Services. Media materials included 30-second television advertisements, newspaper advertisements, posters, and brochures. The media campaign was implemented in 1 distinct Montana media market through paid television (6 weeks) and newspaper (4 weeks) advertisement time and space in October and November 1999. There are 15 counties within this media market (1990 census population = 191,626). Thirteen are designated as rural or frontier (2000 population density ranging from 1.5 to 5.8 persons per square mile) and 2 as a small urban area (population density of 29.8 and 46.1 persons per square mile). Fourteen newsprint ads were placed over the 4-week period. MPQHF also recruited members of the health care and business community to display campaign posters, brochures, and other materials. The television advertisements had an estimated reach of 98% of the target audience, and the target audience was exposed to the advertisement an estimated 11.4 times (Banik Creative Group, unpublished data, January 2000). The total estimated cost of the community-wide campaign was $24,870.

Mailed reminder letters were also sent to a random sample of Montana Medicare beneficiaries not known to have had a previous claim for a pneumococcal immunization in both the community-wide education counties and a second comparison area. These beneficiaries were identified through the Center for Medicare and Medicaid Services (CMS) Enrollment Database and the Pneumococcal Beneficiary-level file. The reminder letter, written on MPQHF letterhead and signed by the medical director, also included a brochure on pneumococcal immunization and a reminder regarding influenza immunizations. These reminder letters were mailed to 64% of Medicare beneficiaries (n = 10,374) in the community-wide education campaign market (estimated cost = $2603). A reminder letter was also mailed to 63% of Medicare beneficiaries (n = 10,381) in the comparison area, a separate and geographically distinct media market (estimated cost = 2604). This market includes 13 counties (1990 census population = 200,309), 12 of which are designated rural or frontier (1990 population density ranging from 0.3 to 5.6 persons per square mile) and 1 as small urban area (population density 49.1 persons per square mile). Residents in this media market, however, did not receive the community-wide education campaign. Residents of counties in the community-wide education campaign market and the reminder-only market were similar in the percentage aged 65 years and older (13% in both) and the percentage that reported their race as white (92% versus 90%), respectively.8

We used 2 methods to evaluate these efforts. First, a random digit dial telephone survey of a sample of adults aged 65 years and older was conducted within the education-and-reminder market and within the reminder-only market before and after the interventions. The survey assessed recall of the media campaign by providing verbal descriptions of the television and newsprint advertisements and asking if the respondent had recently seen or heard these ads. We also assessed awareness of pneumococcal immunizations by asking respondents: "There is vaccine for older adults and persons with chronic diseases. This vaccine is called the pneumococcal or pneumonia vaccine. Have you ever heard of the pneumococcal vaccination, sometimes called a pneumonia shot?" Second, Medicare administrative claims were examined to determine all beneficiaries in both markets for whom bills had been submitted for reimbursement of a pneumococcal immunization from October through December 1998 and 1999. Using these unduplicated claims, we compared the receipt of pneumococcal immunization among beneficiaries overall in 1998 and 1999 in these 2 media markets and by reminder status.

Data analyses were conducted using SPSS (SPSS Inc., Chicago, Ill) and SAS (SAS Institute Inc., Cary, NC) software. Pearson chi-square tests were used to compare the proportion of respondents who recalled the community-wide education campaign and who were aware of pneumococcal immunization by media market. Odds ratios were calculated to compare the proportion of Medicare beneficiaries that had a claim for a pneumococcal immunization by media market.
Results

The mean age of survey respondents from the education-plus-reminder (n = 114; response rate = 55%) and the reminder only (n = 108; response rate = 55%) markets at baseline were 75.9 (SD 6.7) and 75.3 (SD 7.1) years. The majority of respondents from both markets at baseline were female (71% and 66%) and white (99% and 98%), respectively. There were no significant differences between respondents living in these 2 media markets by age, gender, or race at baseline or follow-up (data not shown).

A significant increase in education campaign message recall was found from baseline to follow-up for respondents in the education-plus-reminder market (18% to 64%, P<0.001) compared to reminder-only market (17% to 21%, P = 0.25) (Figure 1). Given that the campaign started post-baseline, it is likely that responses of campaign recall at baseline in both markets and at follow-up in the reminder-only market reflect respondents giving what they perceived as socially desirable responses. The proportion of respondents aware of pneumococcal immunizations increased significantly from baseline to follow-up among respondents both in the education plus reminder (63% to 78%, P = 0.04) and in the reminder-only (64% to 74%, P = 0.05) markets. Respondents in both the education-plus-reminder market and the reminder-only market were more likely to report message recall at follow-up (P<0.001). However, there were no differences in immunization awareness between these groups at follow-up (P = 0.27).

Overall from 1998 to 1999, there was a 3.7-percentage-point increase in pneumococcal immunization claims for Medicare beneficiaries in the education-plus-reminder market and a 1.5-percentage-point increase in the reminder-only market (Table 1); both increases were statistically significant (P<0.05). In 1999, Medicare beneficiaries sent reminders compared to those not sent reminders were more likely to have a claim for a pneumococcal immunization in both the education-plus-reminder market (odds ratio [OR] 1.25, 95% confidence interval [CI] 1.13 to 1.38) and the reminder-only market (OR 1.49, 95% CI 1.33 to 1.67). Medicare beneficiaries sent reminders in the education-plus-reminder market compared to those in the reminder-only market were more likely to have a claim for a pneumococcal immunization in 1999 (OR 1.18, 95% CI 1.08 to 1.28). Medicare beneficiaries not sent reminders in the education-plus-reminder market compared to those in the reminder-only market were also more likely to have a claim for a pneumococcal immunization in 1999 (OR 1.40, 95% CI 1.24 to 1.59). Overall in 1999, Medicare beneficiaries in the education-plus-reminder market were more likely to have a claim for a pneumococcal immunization than those in the reminder-only market (OR 1.14, 95% CI 1.07 to 1.22).

Discussion

Few published studies have evaluated the effectiveness of community-wide education alone or in combination with other interventions to promote adult immunizations, particularly in rural areas where resource limitations are striking. These limitations include difficulty gaining access to health care, shortages of health care professionals, and long geographic distances.
to health care services as well as severely restricted budgets for prevention services. If community-wide campaigns proved to be cost effective, then applying these campaigns in rural areas would be compelling. Our findings suggest that the education-plus-reminder campaign, as well as use of reminders alone, increased immunization awareness and recent pneumococcal immunization. The small but significant increase in pneumococcal immunization associated with reminders is consistent with the findings from previous studies of mailed reminder interventions for influenza immunizations. Our findings suggest that the community-wide education campaign augmented the effect of the mailed reminders for pneumococcal immunizations, which is consistent with the findings of 1 previous study. Even though a formal cost-benefit analysis was not done, our modest results do not encourage replication of the community-wide campaign for the purpose of increasing adult immunizations.

While our findings suggest that the community-wide education campaign augmented the mailed reminder intervention in terms of pneumococcal immunization, the additive effect was relatively small. Potential explanations for the small additional effect may be related to the strength of exposure to the campaign, the short duration of the campaign, and differences between public health and commercial advertising. This is not surprising in that the translation of commercial media campaigns successfully to varying public health arenas, such as physical activity promotion, has proven to be difficult. This study has a number of limitations related to the use of both a telephone survey and Medicare administrative claims data. First, the survey was conducted by telephone, and it does not reflect the experience of individuals living in homes without telephones. Second, these data were self-reported, and our estimates of media recall and awareness of pneumococcal immunization may be subject to recall bias. Self-reported receipt of a pneumococcal immunization, however, has been found to be a fairly reliable measure. Third, our ability to detect differences in awareness and immunization between the 2 markets was limited by the overall sample size of telephone respondents. Finally, no comparison region was used to assess the effect of having no education campaign or reminder interventions, and the increase in recent pneumococcal immunization may potentially be associated with other factors.

There are also limitations to the use of Medicare administrative claims data for an evaluation of this type. The limitations concern the timeliness and completeness of the billing data. With regard to timeliness, the Medicare program usually waits until at least 18 months have passed from the date of service before considering the billing available for use for analyses of billed health care events. Since we conducted the present analysis in September 2001, more than 18 months after the last

Table 1. Montana Medicare Beneficiaries Having a Claim for Pneumococcal Immunization Within the Community-Wide Education-Plus-Mailed-Reminder Market and the Mailed-Reminder Only Market, 1998 and 1999

<table>
<thead>
<tr>
<th></th>
<th>Community-Wide Education Plus Mailed Reminder</th>
<th>Mailed Reminder Only</th>
<th>Likelihood of immunization in Mailed Reminder Only Market Versus Reminder-Only Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number With Pneumococcal Immunization Claim/Total (%)</td>
<td>Number With Pneumococcal Immunization Claim/Total (%)</td>
<td>OR (95% CI)*</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>1536/17,949 (8.6)</td>
<td>1514/17,855 (8.5)</td>
<td>1.01 (0.94–1.09)</td>
</tr>
<tr>
<td>1999</td>
<td>1555/10,374 (13.1)</td>
<td>1175/10,381 (11.3)</td>
<td>1.18 (1.08–1.28)</td>
</tr>
<tr>
<td>Letter</td>
<td>1555/10,374 (13.1)</td>
<td>1175/10,381 (11.3)</td>
<td>1.18 (1.08–1.28)</td>
</tr>
<tr>
<td>No letter</td>
<td>617/5,741 (10.8)</td>
<td>481/6,091 (7.9)</td>
<td>1.40 (1.24–1.59)</td>
</tr>
<tr>
<td>Total</td>
<td>1617/16,173 (12.3)*</td>
<td>1616/16,173 (10.0)*</td>
<td>1.14 (1.07–1.22)</td>
</tr>
</tbody>
</table>

* OR indicates odds ratio (95% confidence interval).
+ The number of "letter" and "no letter" Medicare beneficiaries in each column does not sum to the total. The status regarding the reminder letter for a small percentage of Medicare beneficiaries in the campaign market (0.4%, n = 58) and the other market (0.3%, n = 55) could not be determined. The denominator for 1999 is the 1998 denominator minus the number of Medicare beneficiaries that received pneumococcal immunization in 1998 plus the number of Medicare beneficiaries newly enrolled in 1999 not known to have had this immunization. The 1999 denominator is smaller than the 1998 denominator because the number subtracted was larger than the number added. Source: Centers for Medicare and Medicaid Services enrollment database and pneumococcal Beneficiary-level file.
potential date of service for this study, we felt that this limitation had little if any effect on the results reported. Regarding completeness, there are several reasons to be cautious about the completeness of ascertainment of the billing data. First, as described previously, bills may be submitted many months after a service is provided. However, most bills submitted are received by the Medicare program within 6 months of the date of service.\textsuperscript{14} Second, sometimes a service is provided without submission of a bill. This is often the case for influenza vaccination but is not known to be a frequent occurrence for pneumococcal immunization.\textsuperscript{10} In addition, we have no reason to think that bills would be submitted at a differential rate for beneficiaries to whom letters were sent or who lived in the education-and-reminder market than for beneficiaries not sent letters or living in the reminder market. Another limitation to our evaluation is nondifferential misclassification.\textsuperscript{15}

In conclusion, our findings support the use of mailed reminders to increase pneumococcal immunization awareness and immunization among rural Medicare beneficiaries. The ongoing use and enhancement of these reminders among at-risk Medicare beneficiaries will likely increase pneumococcal immunization awareness and immunization over time. Strategies that identify and target Medicare beneficiaries who are persistent "non-vaccinees" (those not receiving a pneumococcal or annual influenza immunization) will also be needed to reach this challenging subgroup. An additional quality management strategy would include using reminders and promoting the availability and delivery of pneumococcal immunization during non-influenza season among clinicians in primary care practices. The addition of a community-wide education modestly augmented this effect of mailed reminders. Ongoing use of community-wide education campaigns in combination with mailed reminders will also likely increase immunization awareness and immunization over time. However, consideration should be given to the additional cost and relative gain of conducting adequate (eg, exposure intensity) community-wide education campaigns. Further study of community-wide education alone and in combination with other strategies is necessary to confirm our findings and to evaluate the cost effectiveness of these interventions to the rates of immunization against pneumococcal disease.

\textbf{References}