

ORIGINAL RESEARCH

# Church-Based Breast Cancer Screening Education: Impact of Two Approaches on Latinas Enrolled in Public and Private Health Insurance Plans

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## Abstract

### Introduction

The Tepeyac Project is a church-based health promotion project that was conducted from 1999 through 2005 to increase breast cancer screening rates among Latinas in Colorado. Previous reports evaluated the project among Medicare and Medicaid enrollees in the state. In this report, we evaluate the program among enrollees in the state's five major insurance plans.

### Methods

We compared the Tepeyac Project's two interventions: the Printed Intervention and the *Promotora* Intervention. In the first, we mailed culturally tailored education packages to 209 Colorado Catholic churches for their use. In the second, *promotoras* (peer counselors) in four Catholic churches delivered breast-health education messages personally. We compared biennial mammogram claims from the five insurance plans in the analysis at baseline (1998–1999) and during follow-up (2000–2001) for Latinas who had received the interventions. We used generalized

estimating equations (GEE) analysis to adjust rates for confounders.

### Results

The mammogram rate for Latinas in the Printed Intervention remained the same from baseline to follow-up (58% [2979/5130] vs 58% [3338/5708]). In the *Promotora* Intervention, the rate was 59% (316/536) at baseline and 61% (359/590) at follow-up. Rates increased modestly over time and varied widely by insurance type. After adjusting for age, income, urban versus rural location, disability, and insurance type, we found that women exposed to the *Promotora* Intervention had a significantly higher increase in biennial mammograms than did women exposed to the Printed Intervention (GEE parameter estimate = .24 [±.11],  $P = .03$ ).

### Conclusion

For insured Latinas, personally delivering church-based education through peer counselors appears to be a better breast-health promotion method than mailing printed educational materials to churches.

## Introduction

Disparities in breast cancer screening rates among Latinas have persisted for the past decade (1-4). Difficulty in accessing preventive care is highly prevalent among Latinas, but studies show that even insured Latinas, who have access, resist screening mammography because of cultural barriers such as fear, embarrassment, and a sense

of fatalism (5-7). Culturally sensitive, church-based health promotion and programs using peer counselors have shown promising results among Latinos (8-14) and may be helpful in increasing breast cancer screening among Latinas.

This report is the third in a series that examines the impact of the Tepeyac Project, a 6-year health quality improvement project that began in 1999 with the aim of increasing breast cancer screening awareness among Latinas in Colorado. The project, which compares the effectiveness of printed breast-health education with personally delivered education, takes its name from Tepeyac, Mexico, the site revered by Latinos as the place where Our Lady of Guadalupe appeared to Saint Juan Diego, and from the community-based clinic that was a close partner in the project, Clínica Tepeyac.

The project's first report focused on Medicare enrollees receiving the interventions; the second addressed Medicaid enrollees (15,16). In both insurance groups, personally delivered education seemed to be more effective than printed educational materials (15,16). Our report expands the evaluation to include enrollees in Colorado's five major private and public insurance plans. This comprehensive analysis allowed us to compare the effectiveness of the two interventions among the majority of insured Colorado Latinas.

## Methods

The Tepeyac Project was conducted from 1999 through 2005 and used a community-participatory approach in which local Latinas identified four main themes that would affect the success of an effort to increase breast cancer screening in the community: the importance of family, Latinos' sense of fatalism, the need for trust, and the need for personal delivery by a trusted messenger (15). These issues guided development of the two interventions compared in the project. In the first, the Printed Intervention, we mailed culturally tailored breast-health promotion packages to Catholic churches across the state. In the second, the *Promotora* Intervention, we trained peer counselors (*promotoras*) to deliver the health promotion message personally, on a one-to-one basis.

We delivered the interventions through churches because they are an integral part of Latinos' social network (17). Local Latinas assisted in choosing the

program message and brochures and in developing messages addressing barriers to breast cancer screening for their church bulletins and for the project newsletter. Periodically, we shared evaluations of mammogram rates with participating churches to keep the community informed, to encourage participation, and to allow people to monitor the intervention in their regions. The study was approved by the Colorado Multiple Institutional Board (Protocol number 02-973).

## Implementation of interventions

### Printed Intervention

The materials used in this intervention included 1) a letter describing the project, 2) bilingual printed materials from the National Cancer Institute that promote breast cancer screening and reflect a sense of family ("Do it for you. Do it for your family."), 3) a display unit, 4) short bilingual messages suitable for delivery from the pulpit and coordinating camera-ready copy for publication in church bulletins, and 5) a fax-back form asking at which level churches would participate (i.e., display materials, publish messages, deliver messages from pulpit).

The three Catholic archdioceses in Colorado approved the project and contacted the churches in their registries, encouraging their participation. We sent the printed intervention package to 209 churches in the registries. The first mailing occurred in March 2000, a second in October 2000, and a third in February 2001. The second and third mailings included issues of the project newsletter containing updates and mammogram rates for the regions. We included all 209 churches that received the Printed Intervention in an intention-to-treat analysis.

Information about the level of church participation, evaluated by personal telephone calls and fax-back forms in 2001, was available for 150 (72%) churches in the Printed Intervention. Of these churches, 61 (41%) displayed the printed materials, 8 (5%) published messages in the bulletin, and 85 (57%) did both; 18 (12%) also made pulpit announcements. The participation level was undetermined in 47 churches, and 12 declined to participate. A second round of telephone contacts in 2004, during the second phase of the project, indicated that participation had increased by approximately 20%, with 177 churches reporting active participation.

### **Promotora Intervention**

In the *Promotora* Intervention, women recruited and trained by project and Clínica Tepeyac staff delivered education about breast cancer screening in person. As the base for this intervention, Clínica Tepeyac staff chose four churches in the Denver area that had large Latino populations and were close to the clinic and to the *promotoras'* residences. The priests of these churches enthusiastically supported the intervention.

The *promotoras* reached their peers through meetings held at least bimonthly immediately after mass and through other church events. During the intervention, a respected leader chosen by the *promotoras*, Sister Lydia Peña, delivered homilies addressing women's breast health at least twice in each of the four churches, in English or Spanish, depending on the language of the mass. *Promotoras* also conducted one to three health groups per church. These groups were for women only and met at the home of one of the participants. The same newsletter used in the Printed Intervention was made available to these churches. The intervention began in 2000 and continued until 2005, when the second phase of the project ended.

### **Study population and insurance plans**

We received data on enrollment and mammogram claims for women aged 50 to 69 years from Medicare Fee-for-Service (FFS), Medicaid FFS, and the following health maintenance organizations (HMOs): Kaiser Permanente of Colorado (a staff-model HMO [i.e., HMO with its own clinic and staff]), Access (the major Medicaid HMO provider in Colorado), and Anthem Blue Cross and Blue Shield (all group-model HMOs [i.e., HMO contracting with a group medical practice]). To merge administrative data from these multiple payers, we used standardized variables and created specific record linkage variables to allow for cross-checking of Medicare FFS and Medicaid FFS datasets to identify dually eligible subjects (18,19). The HMO plans' datasets included their Medicare and Medicaid enrollees. Medicaid FFS subjects enrolled in a primary care case management (PCCM) program, which is reimbursed by Medicaid FFS, were included in the Medicaid FFS database.

We identified Latinas in the enrollment databases of the insurance groups through the race and ethnicity data field of the two insurance groups for which these data were

available (Medicaid FFS, Medicare FFS) combined with the Passel-Word Spanish Surname List (20). In Colorado, this list has a 12%  $\pm$  3% commission rate and a 22%  $\pm$  4% omission rate, both comparable to rates for the United States as a whole. To be included, women had to 1) be aged 50 to 69 years (the group with the strongest evidence of benefit from screening mammograms [21]), 2) be continuously enrolled in the plan for longer than 23 months with a gap in coverage of no longer than 30 days (to obtain completely independent records by excluding individuals who might have appeared in more than one enrollment dataset), and 3) have survived the entire baseline or follow-up period (but not necessarily both).

We used zip codes to determine exposure to the interventions. Study subjects living in the zip codes of the churches visited by the *promotoras* during 2000 and 2001, the time of the first phase of the interventions and the follow-up period for our analysis, were considered exposed to the *Promotora* Intervention; subjects living in the remaining zip codes were considered exposed to the Printed Intervention.

Reasons for enrollment in Medicaid were 1) receipt of a pension (for people aged 60 to 64 years); 2) disability or blindness (a small number of refugees were included in this group because of similar mammogram screening rates); and 3) receipt of benefits from Aid to Families with Dependent Children. Reasons for enrollment in Medicare were being aged 65 years or older, having end-stage renal disease (ESRD), and having a disability. In Colorado in 2000, approximately 70% of Medicare enrollees were enrolled in FFS plans; the remaining 30% were in Medicare HMO plans (22,23). Eighty-eight percent of Medicaid enrollees were enrolled in managed care, with the remainder enrolled in Medicaid's FFS plans (24,25).

### **Mammogram rates**

We considered claims with any of the following codes to represent mammogram use: *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) ([www.cdc.gov/nchs/icd9.htm](http://www.cdc.gov/nchs/icd9.htm)) procedure codes 87.36, 87.37, or diagnostic code V76.1x; Healthcare Common Procedure Coding System codes GO202, GO203, GO204, GO205, GO206, or GO207; *Current Procedural Terminology* ([www.ama-assn.org](http://www.ama-assn.org)) codes 76085, 76090, 76091, or 76092; and revenue center codes 0401, 0403, 0320, or 0400 in conjunction with breast-related *ICD-9-CM* diagnostic codes 174.

x, 198.81, 217, 233.0, 238.3, 239.3, 610.0, 610.1, 611.72, 793.8, V10.3, V76.1x.

### Statistical analysis

We compared the rates of mammogram screening obtained for the baseline period before the intervention (January 1998 through December 1999) with those for the follow-up period used in our analysis (January 2000 through December 2001) for Latinas living in each of the intervention areas.

The outcome variable was the biennial mammography screening status in each study period, as determined by the codes cited above. The main effect variable was the intervention, and the covariates were age, insurance type, two measures of income (median family income from *United States Census 2000* [www.census.gov] and Medicare-Medicaid dual eligibility status), urban versus rural residence, and disability. We included disability as a variable because the Medicare FFS dataset contained a large proportion (49%) of Latinas aged 50 to 64 years with disability and ESRD as reasons for coverage. To determine rural or urban residence, we linked the patient's zip code to the Rural Urban Commuting Area (RUCA) codes using the *RUCA Zip Code Approximation*, and the suggested binary categorization (categorization C) (26).

We used the chi-square test and the Fisher exact test (for cells with expected values <5) to compare categorical variables and analysis of variance (ANOVA) for continuous variables (with the Welch modification when the assumption of similar variances did not hold) (27). For multivariate modeling, we used generalized estimating equations (GEE) analysis, a statistical technique appropriate for binary variables that allows for testing several covariance structures. GEE analysis accounts for correlations between baseline and follow-up samples (as a consequence of having some subjects present in both time periods), while accommodating unequal group sizes, as was the case in this project (28,29).

The hypothesis for the GEE model was that among Latinas, the *Promotora* Intervention was associated with a larger increase in mammogram rates over time than was the Printed Intervention, irrespective of insurance group. We used the following GEE statistical model to test this hypothesis:

$$\text{Logit } P = \alpha + \beta_1 \text{time (follow-up vs baseline)} + \beta_2 \text{intervention (PI vs PSI)} + \beta_3 \text{(time*intervention)} + \beta_4 \dots n \text{(covariates)},$$

where  $P$  is the probability of having a mammogram,  $\alpha$  is the intercept,  $\beta_1$  is the parameter estimate for time (baseline vs follow-up),  $\beta_2$  is the parameter estimate for the intervention (*Promotora* Intervention vs Printed Intervention),  $\beta_3$  is the parameter estimate for the interaction between time and intervention, and  $\beta_4$  is the parameter estimate(s) for the covariates.

We also analyzed the subgroup of 4739 Latinas (56% of the total of 8439 individuals, with 11,964 observations included in the GEE analysis) who were present during both baseline and follow-up.

## Results

### Study subjects

Latinas represented approximately 11% of the total population of eligible women (Latinas can be of any race; 90% were white). The distribution of insurance type was significantly different between Latinas in the *Promotora* Intervention and in the Printed Intervention during baseline and follow-up (Table 1). The staff-model HMO had the largest population, serving half of the Latinas receiving the *Promotora* Intervention and about one-third of those receiving the Printed Intervention. Over time, the distribution of insurance type remained stable among women receiving the *Promotora* Intervention. Among women receiving the Printed Intervention, however, the proportion of enrollees in HMO plans increased and the proportion in public FFS plans decreased. Latinas receiving the *Promotora* Intervention were younger and poorer than those receiving the Printed Intervention, and these differences were stable over time.

### Mammogram rates

Overall, unadjusted mammogram rates did not change significantly in either intervention group (*Promotora* Intervention, unadjusted GEE,  $P = .15$ ; Printed Intervention, unadjusted GEE,  $P = .68$ ) (Figure). We used the GEE model to adjust the effect of the intervention on mammogram rates among Latinas by insurance group, age, income, rural versus urban location, and disability.

The significant positive interaction term between time and intervention suggests that the *Promotora* Intervention was more effective than the Printed Intervention in increasing mammogram screening among Latinas from baseline to follow-up and that this effect was independent of age, income, urban location, and insurance group (Table 2).

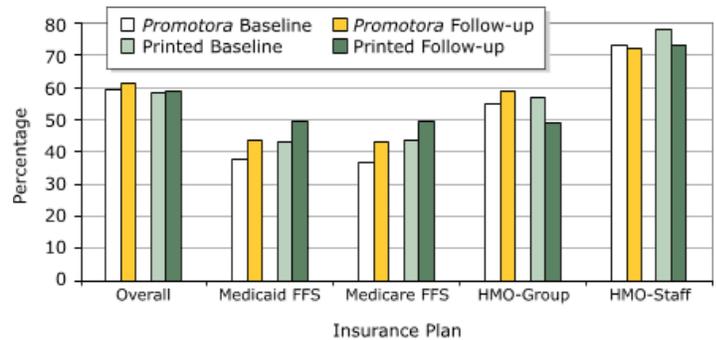
Other factors associated with not obtaining mammograms were being age 65 years or older (marginally significant), having lower income, and having disability (Table 2). After adjustment for other variables, insurance type was a significant factor, with Latinas enrolled in Medicare FFS being less likely to obtain mammograms than were their HMO counterparts and more likely than were Latinas with Medicaid FFS. The adjusted differences in mammogram rates between HMOs and Medicare FFS decreased significantly over time, as indicated by the significant negative interaction between time and insurance type.

The GEE model including only enrollees who were present in both periods of time produced very similar results (data not shown in table), with a significant positive interaction term between time and intervention (GEE parameter estimate = .2911 [ $\pm$  .1218],  $P = .02$ ), suggesting that in this subset of women, the *Promotora* Intervention was also associated with a larger increase over time in mammogram rates than was the Printed Intervention, independent of age, income, rural location, disability, and insurance group.

## Discussion

Culturally appropriate health promotion specific to the needs and barriers affecting Latinas is necessary if health disparities are to be eliminated. The Tepeyac Project was based in churches because studies show that they represent a safe and convenient place for Latinas to gather for health education (9,13-17,30-33). Our question was whether receiving culturally tailored information through this trusted environment was sufficient or whether a personal connection was necessary to move Latinas into action. The *promotoras*, well-trusted women in their communities, provided this personal component by engaging women on a one-on-one basis, tailoring the education to the individual needs and learning styles of each woman.

The previous evaluations on Medicare FFS and Medicaid



**Figure 1.** Biennial mammogram rates of Latinas exposed to the Printed Intervention or the *Promotora* Intervention during baseline (1998–1999) and follow-up (2000–2001), by insurance plan, Tepeyac Project, Colorado, 1999–2005. (FFS indicates fee-for-service; HMO-Group, health maintenance organization contracting with a group medical practice; HMO-Staff, health maintenance organization with its own clinic and staff.)

FFS suggested that the personally delivered education was more effective than the mailed intervention package (Printed Intervention) (15,16). The present analysis expanded the evaluation to the most important insurance types in Colorado (public and private). The *Promotora* Intervention seemed to be more effective than the Printed Intervention, independent of insurance type, age, location (urban vs rural), and income.

Overall, the changes in mammogram rates were quite modest. One explanation might be that our interventions did not fully address the cultural factors involved in lower screening rates among Latinas or that the process requires more time to determine a behavioral change. Alternatively, the cultural components that our interventions try to address may represent only a small fraction of the causes of lower screening rates. Our experience working closely with the communities we were serving indicated that factors such as financial constraints that limit the ability to afford time off work, transportation, child care, copayments, and other issues involved in obtaining mammograms may play a more important role than education.

Merging administrative data from different insurance plans to provide objective outcomes for evaluation gave a comprehensive portrait of mammography rates among insured Latinas in the state and was a strength of this study. The National Institutes of Health and the Agency for Healthcare Research and Quality recognize the need for datasets from multiple payers in cancer research (34). This approach presents challenges, however. Competing

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payers must collaborate in providing their claims and enrollment data. Combining their individual datasets into one dataset without including duplicate patient records requires verification of data integrity, standardization of variables across plans, and the creation of record linkage variables to cross-check datasets for duplicates and to identify individuals who were dually eligible for Medicare and Medicaid.

Working with nontraditional partners, such as churches and community-based clinics, and using a community-participatory approach were somewhat new to the state's Health Care Quality Improvement Program and represented another challenge. The *Promotora* Intervention requires that project staff stay in close personal contact with the community, partners, and the *promotoras* to forge a trusting relationship. These partners, for whom health promotion is not the primary mission, however, have their own timing and priorities, all of which must be respected.

Another issue is that mammogram rates calculated from claims data seem to be consistently lower than those calculated from self-reported data. Widely cited self-reported data from the Behavioral Risk Factor Surveillance System and the National Health Interview Study suggest that 70% to 80% of women aged 65 to 69 years receive at least biennial screening (1,3,4). Several groups, however, suggest that studies based on self-reported data may overstate screening rates (35). The Colorado Mammography Project reports that the sensitivity of Medicare FFS billing data for screening mammography in Colorado was 85% and varied substantially by age, race, and socioeconomic status (36). A further complicating factor that particularly affects Latinas and Asian-American women in studies using billing data is the low sensitivity of these data in identifying ethnicity (35,37). Using linked data from the Medicare Current Beneficiary Survey, Arday et al (37) assessed the accuracy of racial and ethnic classifications in the Centers for Medicare and Medicaid Services enrollment database before and after the 1997 effort to update the database. After the update, sensitivity was 97% for whites and 95% for blacks but less than 60% for all other categories. The positive predictive value was higher than 96% for whites, blacks, and Latinas but lower than 80% for all others.

A limitation of our study is that although the interventions were based in churches, outcomes were measured in neighborhoods, with the assumption that a church intervention will diffuse into the community. Using zip

codes to determine exposure to the interventions admittedly makes the study vulnerable to ecological fallacy; however, most churches do not release parishioners' individual data because of trust issues. In fact, the *promotoras* were adamantly against even asking for zip codes because any information request could result in distrust of the intervention. Furthermore, data from parish registries are unreliable because Latinos are less likely than whites to register (38). According to the Archdiocese of Denver's Hispanic Ministry, however, a large proportion of Latinos now attend their neighborhood churches (i.e., in the zip codes where they live) because of a recent increase in the number of churches offering masses in Spanish.

Because this was a pilot project, financial and feasibility constraints limited to four the number of churches in the *Promotora* Intervention. The fact that the churches were not randomly chosen, but were selected by our community-based partner and the *promotoras*, presents a potential selection bias. We do not, however, anticipate that the women exposed to the personal education were inherently more likely to obtain mammograms than were parishioners of the other churches. Unfortunately, we had to exclude uninsured women because of the lack of a denominator for computation. Even so, the data clearly indicate that insured Latinas represent a large group still requiring much effort in breast-health promotion.

Our results suggest, rather than provide firm evidence, that the *Promotora* Intervention is more effective than the Printed Intervention in increasing breast cancer screening rates among Latinas. The scientific rigor needed to prove causation, however, may be difficult to achieve in this type of project. Using pure control groups poses an ethical dilemma for community-participatory projects such as ours, in which the community's will, although not necessarily in line with academic standards, is paramount. Methods to obtain more detailed data, such as surveys, require large samples of ethnic minorities and special resources (e.g., trained bilingual surveyors) and, thus, sizeable funding (39). Furthermore, surveys are subject to limitations and biases among Latinos, whose addresses and telephone numbers often change and who may feel uncomfortable providing personal information, including race and ethnicity, to unfamiliar people (39). Although randomized clinical trials are the paradigm of scientific evidence, community-participatory research projects may require a scientific model of their own.

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Tables

**Table 1. Characteristics of Latinas Exposed to the Printed and Promotora Interventions During Baseline (1998–1999) and Follow-up (2000–2001), Tepeyac Project, Colorado, 1999–2005**

Characteristic	Baseline			Follow-up		
	Printed N <sup>a</sup> (%)	Promotora N <sup>a</sup> (%)	P value	Printed N <sup>a</sup> (%)	Promotora N <sup>a</sup> (%)	P value
<b>Insurance</b>						
HMO-Group <sup>b</sup>	593 (10)	97 (17)	<.001	836 (14)	114 (19)	<.001
HMO-Staff <sup>c</sup>	1940 (32)	278 (48)		2201 (37)	301 (50)	
Medicaid FFS <sup>d</sup>	1798 (30)	136 (23)		1588 (27)	126 (21)	
Medicare FFS <sup>d</sup>	1739 (29)	74 (13)		1296 (22)	61 (10)	
DE <sup>e</sup>	1564 (26)	127 (22)	.03	1321 (22)	110 (18)	.02
<b>Annual income, \$</b>						
≤38,317	2406 (40)	119 (20)	<.001	2286 (39)	124 (21)	<.001
38,317-45,581	1347 (22)	428 (73)		1298 (22)	432 (72)	
45,582-58,937	1379 (23)	38 (7)		1354 (23)	46 (8)	
>58,937	938 (15)	0 (0)		983 (17)	0 (0)	
<b>Age (y)</b>						
50-54	1268 (21)	136 (23)	.06	1397 (54)	141 (23)	.12
55-59	1449 (24)	154 (26)		1514 (26)	171 (28)	
60-64	1705 (28)	164 (28)		1436 (24)	155 (26)	
65-69	1648 (27)	131 (22)		1574 (27)	135 (22)	
<b>Rural vs urban</b>	944 (16)	0 (0)	<.001	787 (14)	0 (0)	<.001
<b>Disability</b>	957 (16)	40 (7)	.28	699 (12)	31 (5)	.35

<sup>a</sup> Number of women without missing values.

<sup>b</sup> Health maintenance organization contracted with a group medical practice.

<sup>c</sup> Health maintenance organization with its own clinic and staff.

<sup>d</sup> Fee-for-service.

<sup>e</sup> Dually eligible for Medicare FFS and Medicaid FFS; DE individuals are also included in the Medicaid FFS group.

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**Table 2. Generalized Estimating Equation Model Evaluating the Effect of the Interventions on Changing Mammogram Rates Among Latinas From Baseline (1998–1999) to Follow-up (2000–2001), Adjusted for Insurance Group, Age, Income, and Rural vs Urban Location, Tepeyac Project, Colorado, 1999–2005**

Parameter	Estimate (SE)	95% CI	P Value
<b>Promotora Intervention vs Printed Intervention</b>	–.1847 (.0962)	–.3732 to .0038	.05
<b>Time (follow-up vs baseline)</b>	.2106 (.0725)	.0684 to .3528	.004
<b>Interaction time X<sup>a</sup> Promotora Intervention</b>	.2357 (.1069)	.0262 to .4451	.03
<b>Age ≥65</b>	–.1077 (.0575)	–.2203 to .0049	.06
<b>Median family income by zip code area<sup>b</sup></b>	.0092 (.0018)	.0056 to .0128	<.001
<b>Rural vs urban location</b>	.0920 (.0680)	–.0412 to .2253	.18
<b>Dual eligibility for Medicare and Medicaid</b>	.4153 (.1143)	.1912 to .6393	<.001
<b>Disability</b>	–.3737 (.1093)	–.5879 to –.1594	.001
<b>Insurance type<sup>c</sup></b>			
HMO-Group <sup>d</sup>	.3465 (.1173)	.1166 to .5764	.003
HMO-Staff <sup>e</sup>	1.1812 (.1049)	.9757 to 1.3868	<.001
Medicaid FFS <sup>f</sup>	–.5592 (.1434)	–.8402 to –.2781	<.001
<b>Interaction time and insurance type<sup>c</sup></b>			
Time X HMO-group	–.4698 (.1133)	–.6920 to –.2477	<.001
Time X HMO-staff	–.4206 (.0890)	–.5950 to –.2462	<.001
Time X Medicaid FFS	–.0070 (.0954)	–.1941 to .1800	.94

CI indicates confidence interval.

<sup>a</sup> Baseline vs follow-up.

<sup>b</sup> In increments of \$1000.

<sup>c</sup> Medicare fee-for-service as the reference group.

<sup>d</sup> Health maintenance organization contracted with a group medical practice.

<sup>e</sup> Health maintenance organization with its own clinic and staff.

<sup>f</sup> Fee-for-service.

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