

SPECIAL ARTICLE

MEDICARE COVERAGE, SUPPLEMENTAL INSURANCE, AND THE USE OF MAMMOGRAPHY BY OLDER WOMEN

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Abstract Background. On January 1, 1991, the Medicare program began offering reimbursement for screening mammography every two years. This study examined the use of mammography in women covered by Medicare during the first two years that the screening benefit was offered.

Methods. Medicare bills for 1991 and 1992 from a nationally representative sample of 4110 women 65 years of age or older were examined to determine the degree of compliance with recognized guidelines for screening mammography and the extent to which the use of mammography was associated with having supplemental insurance, which shields patients from the out-of-pocket costs associated with using Medicare benefits.

Results. A total of 36.9 percent of older U.S. women had mammography during the first two years of the Medicare benefit for screening mammography. Only 14.4 percent of the women lacking supplemental insurance had mammography, as compared with 44.7 percent of those with employer-sponsored supplemental insurance, 40.1

percent of those with self-purchased supplemental insurance, and 23.9 percent of those with Medicaid supplemental insurance. These differences persisted in the stratified and multivariate analyses. As compared with women lacking supplemental insurance, women with employment-based supplemental insurance were more likely to undergo mammography (adjusted odds ratio, 3.03; 95 percent confidence interval, 2.17 to 4.23), as were women with self-purchased supplemental insurance (adjusted odds ratio, 2.97; 95 percent confidence interval, 2.13 to 4.15) and women with Medicaid supplemental insurance (adjusted odds ratio, 1.99; 95 percent confidence interval, 1.30 to 3.07).

Conclusions. The use of mammography was substantially below recommended levels during the first two years of Medicare coverage for screening mammography. Women lacking supplemental health insurance were at particularly high risk of failing to undergo mammography. Requiring copayments for preventive services is an obstacle to the effective mass screening of older women for breast cancer. (N Engl J Med 1995;332:1138-43.)

BREAST cancer is the most common cancer in women, and its incidence increases with age.¹ Since the late 1970s and early 1980s, key organizations — including the National Cancer Institute and the American Cancer Society — have recommended regular screening mammography for women more than 50 years of age.² However, it was not until January 1, 1991, that the Medicare program instituted coverage for biennial screening mammograms.²

Many Medicare beneficiaries have supplemental health insurance — employer-sponsored, individually purchased (so-called Medigap), or Medicaid.³ To varying degrees, these supplemental policies shield patients from the copayments, deductibles, and “balance bills” associated with using Medicare-reimbursed services.³⁻⁶ Out-of-pocket health care costs can be substantial for older people lacking supplemental insurance, many of whom have low incomes, do not qualify for Medicaid insurance, and are unable to purchase private supplemental plans.^{3,6} For these patients, the extra costs associated with the use of Medicare-reimbursed services may keep them from taking advantage of Medicare benefits, particularly for services that are perceived as being discretionary.

This report explores the extent to which supplemental insurance was associated with the use of mammography by older women during the years 1991 and 1992,

on the basis of data from the Medicare Current Beneficiary Survey. The survey provides a detailed picture of the personal, social, and medical circumstances of a large, nationally representative sample of older women.

Several investigators have demonstrated that health insurance is an important determinant of the use of mammography. For example, women with health insurance are more likely to have mammography than are women who are uninsured,⁷ and women enrolled in prepaid health plans are more likely to have mammography than are women receiving their care in the fee-for-service sector.⁸ Preliminary data from the 1992 National Health Interview Survey suggest that supplemental insurance may be an independent predictor of the use of various cancer-screening services by older women.⁹ However, a host of other patient characteristics are associated with the use of mammography, including having a usual source of care, higher income, white race, higher educational attainment, and younger age. Patients’ knowledge and attitudes about preventive care¹⁰⁻¹³ as well as physicians’ behavior^{10,14,15} are also important determinants of whether mammography is used. The analysis reported here incorporates measures reflecting some of these important determinants of mammography use to estimate the effect of supplemental insurance.

METHODS

Study Population

The Medicare Current Beneficiary Survey is a probability survey based on a multistage, stratified cluster sample of Medicare beneficiaries in the 50 states, the District of Columbia, and Puerto Rico.¹⁶ Both community-dwelling people and people living in long-term-

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care facilities are eligible. Beginning in 1991, the survey was administered in a longitudinal-panel fashion (that is, the same people were repeatedly resurveyed). Of the 14,530 persons identified for sampling at the start of the survey, 11,218 (77.2 percent) were still responding at the end of 1992.¹⁷ Detailed analyses of the propensity to respond¹⁷ and a description of the strategy to weight observations for nonresponse¹⁸ appear elsewhere.

Among the 11,218 respondents described above, those who were female, 65 years of age or older, and community dwelling were included as subjects in the present study. Of the 4746 respondents who met these criteria, 335 (7.1 percent) had a history of breast cancer and so were excluded from analyses because they would be expected to undergo routine diagnostic mammography. Women who were members of Medicare-qualified health maintenance organizations (326, or 6.9 percent) were also excluded, since their bills for mammography would be unlikely to appear in Medicare's files. Several women met both exclusion criteria. The final analytic sample included 4110 community-dwelling women who were 65 or older.

Ascertainment of Use of Mammography

Whether a woman had undergone mammography during the calendar years 1991 and 1992 was ascertained with the use of *Current Procedural Terminology* (CPT) codes in Medicare's billing files for outpatient hospitals and physician suppliers. Subjects were considered to have had mammography during the relevant year if the pertinent code appeared in bills found in either of those files for that year. The analysis was begun with the expectation that screening mammograms would be coded by CPT code 76092 ("screening mammography, bilateral; two film study of each breast"). However, a preliminary examination of the 1991 bills revealed an unexpected pattern. A substantial majority of mammograms were recorded with the two other CPT codes for mammography — numbers 76090 ("mammography, unilateral") and 76091 ("mammography, bilateral") — which apply to diagnostic rather than screening mammography. For example, in 1991, among women 65 to 69 years of age, 8.5 percent had mammography coded as 76092, whereas 26.5 percent had mammography coded as 76090 or 76091. Similar coding patterns were noted for other age groups in both years. From a clinical perspective, it was clear that such a high percentage of women could not have undergone diagnostic mammography and that CPT codes did not reliably discriminate between diagnostic and screening mammograms. Subjects were consequently classified as having had mammography if any of the three codes was present.

Supplemental Insurance Status and Other Covariates

Whereas the use of mammography was ascertained by examination of Medicare bills, supplemental-insurance status and most other covariates were determined on the basis of subjects' survey responses during the final four months of 1991. Each subject was assigned to one of four insurance categories according to the supplemental insurance policies that she held during any part of that year. In ascending order, the four categories were Medicare only, Medicare plus Medicaid, Medicare plus employer-sponsored insurance, and Medicare plus self-purchased insurance. The categories were assigned in a mutually exclusive, hierarchical fashion, with patients assigned to the "highest" possible category. For example, subjects who reported having both employer-sponsored and self-purchased policies were assigned to the category Medicare plus self-purchased insurance.

Data on income were extracted from interviews conducted from May through August of 1992 and reflect the total incomes of the beneficiaries and spouses for 1991, including the cash value of any food stamps received. Those data were missing for 142 (3.5 percent) of the subjects, who were excluded from multivariate analyses. The county code of residence was used to assign subjects to "metropolitan" or "nonmetropolitan" status, according to whether they lived in a Metropolitan Statistical Area during 1992. A final measure, total reimbursement for 1991 under Medicare Part B, was included to reflect the subjects' overall use of outpatient services.

Statistical Analysis

Statistics were developed to describe the distribution of supplemental insurance in the sample. Observations were weighted appropriately to estimate the proportion and the number of commu-

nity-dwelling female Medicare beneficiaries nationwide in each supplemental-insurance group. Then the proportion of women who had mammography in 1991, 1992, or either year was tabulated according to supplemental-insurance group and the other covariates. To explore potential interactions between those individual characteristics and supplemental-insurance status in determining the use of mammography, the proportion of women in each supplemental-insurance group who had mammography in either of the two years was tabulated in an analysis that was stratified according to each of the covariates. Finally, the effect of supplemental insurance on the use of mammography in either year was estimated with the use of logistic regression,¹⁹ with simultaneous control for age, race, income, education, self-rated health status, total Medicare Part B reimbursement in 1991, smoking status, and living arrangement. Standard diagnostic techniques were used to test for multicollinearity,¹⁹ and the model performed favorably.

In all analyses, SUDAAN software was used to incorporate weights reflecting the sampling strategy and adjustment for nonresponse and to take into account the potential design effect of cluster sampling.²⁰

RESULTS

Of the 4110 subjects, 500 had Medicare insurance only, 476 were classified as having Medicare plus Medicaid, 1142 as having Medicare plus employer-based insurance, and 1992 as having Medicare plus self-purchased insurance. The corresponding nationally weighted percentages and numbers of patients were as follows: 11.3 percent, Medicare only (1,305,632 women); 10.5 percent, Medicare plus Medicaid (1,221,092 women); 30.0 percent, Medicare plus employer-sponsored insurance (3,470,192 women); and 48.2 percent, Medicare plus self-purchased insurance (5,585,704 women). As compared with women with private insurance, women lacking supplemental insurance and women with Medicaid insurance were disproportionately of minority race, low income, and relatively limited education (Table 1).

In 1991, 25.7 percent of the women had mammography; a similar percentage (24.3 percent) did so in 1992. Taking both years together, during the first two years of the biennial benefit, only 36.9 percent of the female Medicare beneficiaries had mammography. In bivariate analyses, the use of mammography was strongly associated with having supplemental insurance (Table 2). Only 14.4 percent of the women lacking supplemental insurance had mammography in either of the two years, as compared with 44.7 percent of the women with employer-sponsored supplemental insurance, 40.1 percent of the women with self-purchased supplemental insurance, and 23.9 percent of the women with supplemental Medicaid insurance.

Having supplemental insurance was also strongly associated with the use of mammography in subgroups defined by age, race, income, and education (Table 3). Because these variables are likely to be strongly correlated with knowledge, attitudes, and beliefs about preventive care,^{11-13,21} this relatively invariant relation evidences the importance of supplemental insurance in increasing access to mammography for women spanning a range of levels of knowledge about and attitudes toward mammography.

Finally, supplemental insurance was strongly associated with the probability of having mammography in a multivariate analysis adjusted for age, race, income,

education, self-reported health status, usual source of care, smoking status, living arrangement, place of residence, and total Medicare Part B reimbursement (Table 4). During the first two years of the biennial benefit, women with either type of private insurance coverage were approximately three times as likely as women lacking supplemental insurance to receive a mammogram (adjusted odds ratio for Medicare plus self-purchased insurance as compared with Medicare only, 2.97; 95 percent confidence interval, 2.13 to 4.15; adjusted odds ratio for Medicare plus employer-sponsored insurance as compared with Medicare only, 3.03; 95 percent confidence interval, 2.17 to 4.23). Women with supplemental Medicaid insurance were nearly twice as likely as their counterparts lacking supplement-

Table 1. Characteristics of 4110 Female Medicare Beneficiaries According to Type of Supplemental Insurance.*

| CHARACTERISTIC | SUPPLEMENTAL-INSURANCE GROUP | | | |
|---------------------------------------|------------------------------------|--------------------|-------------------------------|---------------------------|
| | MEDICARE ONLY (N = 500) | MEDICAID (N = 476) | EMPLOYER-SPONSORED (N = 1142) | SELF-PURCHASED (N = 1992) |
| | <i>percentage of beneficiaries</i> | | | |
| Age (yr) | | | | |
| 65-69 | 24.4 | 24.0 | 33.6 | 24.4† |
| 70-74 | 22.6 | 23.9 | 30.2 | 27.7 |
| 75-79 | 22.7 | 21.7 | 20.1 | 22.0 |
| 80-84 | 15.4 | 14.7 | 10.0 | 15.3 |
| ≥85 | 15.0 | 15.7 | 6.1 | 10.6 |
| Race | | | | |
| Black | 24.7 | 27.9 | 6.0 | 3.7† |
| White | 69.1 | 61.0 | 93.1 | 95.1 |
| Other | 6.2 | 11.0 | 0.9 | 1.2 |
| Income (quartiles)‡ | | | | |
| <\$7,461 | 46.6 | 72.0 | 9.0 | 20.0† |
| \$7,461-\$12,000 | 29.5 | 22.2 | 21.2 | 27.1 |
| \$12,001-\$20,166 | 16.8 | 4.5 | 32.3 | 26.3 |
| >\$20,166 | 7.1 | 1.3 | 37.5 | 26.6 |
| Education | | | | |
| Grade school | 47.4 | 62.4 | 14.6 | 22.5† |
| High school | 42.4 | 30.9 | 54.2 | 54.1 |
| College or higher | 10.2 | 6.7 | 31.2 | 23.5 |
| Self-rated health status | | | | |
| Excellent | 16.7 | 6.3 | 20.8 | 17.2† |
| Very good | 20.0 | 13.6 | 27.2 | 28.2 |
| Good | 26.8 | 25.7 | 31.3 | 29.5 |
| Fair | 24.3 | 36.3 | 16.0 | 19.1 |
| Poor | 12.2 | 18.1 | 4.7 | 6.0 |
| Usual source of care | | | | |
| No usual source | 19.2 | 7.1 | 7.9 | 6.9† |
| Doctor's office | 58.9 | 67.9 | 76.2 | 76.1 |
| Clinic, ER, OPD, or other§ | 22.0 | 25.1 | 15.9 | 17.0 |
| 1991 Part B reimbursement (quartiles) | | | | |
| <\$72 | 38.0 | 15.4 | 25.6 | 23.5† |
| \$72-\$340 | 24.7 | 22.9 | 26.5 | 24.7 |
| \$341-\$1,128 | 20.1 | 26.7 | 25.2 | 25.6 |
| >\$1,128 | 17.2 | 35.0 | 22.6 | 26.1 |
| Smoking status | | | | |
| Not current smoker | 83.3 | 85.2 | 87.3 | 87.7 |
| Current smoker | 16.7 | 14.8 | 12.7 | 12.3 |
| Living arrangement | | | | |
| Not living alone | 63.0 | 53.1 | 65.7 | 55.7† |
| Living alone | 37.1 | 46.9 | 34.3 | 44.3 |
| Place of residence | | | | |
| Nonmetropolitan | 33.3 | 30.0 | 21.2 | 29.3† |
| Metropolitan | 66.7 | 70.0 | 78.8 | 70.7 |

*Subjects were 65 years of age or older and living in the community.

†P<0.001 by chi-square analysis for the association between the supplemental-insurance group and the characteristic in question.

‡Analysis of this variable was based on 3968 women, since income data were missing for 142 of the 4110 subjects.

§ER denotes emergency room, and OPD outpatient department.

Table 2. Percentages of Female Medicare Beneficiaries Having Mammography in 1991 and 1992.

| CHARACTERISTIC | PERCENTAGE HAVING MAMMOGRAPHY | | |
|---------------------------------------|-------------------------------|---------|-----------------|
| | IN 1991 | IN 1992 | IN 1991 OR 1992 |
| Age (yr) | | | |
| 65-69 | 32.5* | 31.4* | 46.4* |
| 70-74 | 32.3 | 29.8 | 44.2 |
| 75-79 | 22.5 | 22.6 | 34.4 |
| 80-84 | 17.3 | 15.8 | 26.4 |
| ≥85 | 8.2 | 5.7 | 11.8 |
| Race | | | |
| Black | 16.3* | 14.7* | 25.2* |
| White | 26.9 | 25.8 | 38.6 |
| Other | 16.4 | 8.7 | 21.2 |
| Income (quartiles) | | | |
| <\$7,461 | 14.5* | 14.8* | 24.0* |
| \$7,461-\$12,000 | 20.1 | 17.8 | 29.5 |
| \$12,001-\$20,166 | 29.5 | 27.5 | 41.5 |
| >\$20,166 | 37.5 | 36.6 | 51.9 |
| Supplemental insurance | | | |
| Medicare only | 9.0* | 8.8* | 14.4* |
| Medicaid | 16.1 | 13.7 | 23.9 |
| Employer-sponsored | 32.4 | 29.3 | 44.8 |
| Self-purchased | 27.5 | 27.1 | 40.1 |
| Education | | | |
| Grade school | 15.6* | 14.9* | 24.4* |
| High school | 27.0 | 25.5 | 38.6 |
| College or higher | 35.3 | 33.3 | 48.8 |
| Self-rated health status | | | |
| Excellent | 27.6* | 27.4* | 40.7* |
| Very good | 30.6 | 28.5 | 43.4 |
| Good | 24.5 | 24.5 | 35.8 |
| Fair | 23.5 | 20.6 | 32.2 |
| Poor | 15.6 | 13.4 | 24.3 |
| Usual source of care | | | |
| No usual source | 8.7* | 11.3* | 16.8* |
| Doctor's office | 26.7 | 25.8 | 38.5 |
| Clinic, ER, OPD, or other† | 29.7 | 24.3 | 40.4 |
| 1991 Part B reimbursement (quartiles) | | | |
| <\$72 | 6.2* | 12.7* | 16.0* |
| \$72-\$340 | 31.2 | 28.9 | 43.5 |
| \$341-\$1,128 | 32.9 | 28.9 | 44.7 |
| >\$1,128 | 32.4 | 26.5 | 43.4 |
| Smoking status | | | |
| Not current smoker | 26.6* | 25.0‡ | 38.0* |
| Current smoker | 19.8 | 19.1 | 29.3 |
| Living arrangement | | | |
| Not living alone | 27.8* | 26.1* | 38.7* |
| Living alone | 22.7 | 21.7 | 34.2 |
| Place of residence | | | |
| Nonmetropolitan | 22.7 | 22.9 | 33.8‡ |
| Metropolitan | 26.8 | 24.8 | 38.1 |

*P<0.001 by chi-square analysis for the association between having mammography during the indicated period and this characteristic.

†ER denotes emergency room, and OPD outpatient department.

‡P<0.01 by chi-square analysis.

tal insurance to have mammography (adjusted odds ratio for Medicare plus Medicaid as compared with Medicare only, 1.99; 95 percent confidence interval, 1.30 to 3.07). The rate of use for women with self-purchased private insurance was essentially identical to that for women with employer-sponsored plans. However, women with either type of private supplemental insurance were substantially more likely to have mammography than were women with Medicaid insurance (for example, the adjusted odds ratio for Medicare plus self-purchased insurance as compared with Medicare plus Medicaid was 1.49; 95 percent confidence interval, 1.09 to 2.04).

DISCUSSION

During the first two years of the screening-mammography benefit offered by Medicare, only 36.9 per-

Table 3. Percentages of Women in Each Supplemental-Insurance Group Who Had Mammography in 1991 or 1992, According to Various Characteristics.

| CHARACTERISTIC | SUPPLEMENTAL-INSURANCE GROUP | | | |
|---------------------------------------|--------------------------------------|----------|--------------------|----------------|
| | MEDICARE ONLY | MEDICAID | EMPLOYER-SPONSORED | SELF-PURCHASED |
| | <i>percentage having mammography</i> | | | |
| Age (yr) | | | | |
| 65–69 | 17.2 | 30.7 | 54.0 | 50.0* |
| 70–74 | 16.0 | 33.3 | 48.8 | 48.6* |
| 75–79 | 20.0 | 23.8 | 38.3 | 37.9* |
| ≥80 | 6.7 | 11.1 | 26.6 | 23.6* |
| Race | | | | |
| Black | 15.6 | 21.7 | 43.0 | 27.6* |
| White | 13.3 | 25.5 | 45.0 | 40.9* |
| Other | 20.7 | 20.4 | 36.3 | 16.3 |
| Income (quartiles) | | | | |
| <\$7,461 | 13.7 | 22.4 | 28.8 | 29.2† |
| \$7,461–\$12,000 | 11.4 | 25.6 | 34.7 | 32.2* |
| \$12,001–\$20,166 | 14.9 | 30.8 | 43.2 | 44.3* |
| >\$20,166 | 16.6 | 35.9 | 54.8 | 52.0† |
| Education | | | | |
| Grade school | 11.5 | 22.4 | 32.1 | 28.5* |
| High school | 15.0 | 24.8 | 44.0 | 41.5* |
| College or higher | 25.8 | 37.6 | 52.7 | 48.6‡ |
| Self-rated health status | | | | |
| Excellent | 14.8 | 26.2 | 49.9 | 40.5* |
| Very good | 13.0 | 25.8 | 48.1 | 47.6* |
| Good | 13.6 | 18.2 | 43.8 | 38.7* |
| Fair or poor | 15.6 | 25.8 | 37.2 | 33.2* |
| Usual source of care | | | | |
| No usual source | 6.7 | 12.3 | 21.8 | 20.9† |
| Doctor's office | 13.8 | 22.4 | 45.9 | 41.4* |
| Clinic, ER, OPD, or other§ | 22.6 | 31.1 | 51.3 | 42.3* |
| 1991 Part B reimbursement (quartiles) | | | | |
| <\$72 | 3.2 | 5.7 | 17.3 | 21.3* |
| \$72–\$340 | 21.2 | 23.7 | 55.4 | 44.8* |
| \$341–\$1,128 | 17.2 | 23.5 | 55.1 | 48.4* |
| >\$1,128 | 26.1 | 32.2 | 52.4 | 44.6* |
| Smoking status | | | | |
| Not current smoker | 16.2 | 23.2 | 46.5 | 40.9* |
| Current smoker | 5.4 | 27.7 | 33.6 | 34.6* |
| Living arrangement | | | | |
| Not living alone | 14.7 | 21.0 | 48.0 | 42.0* |
| Living alone | 13.8 | 27.1 | 38.9 | 37.8* |
| Place of residence | | | | |
| Nonmetropolitan | 12.8 | 19.4 | 41.9 | 38.8* |
| Metropolitan | 15.2 | 25.7 | 45.7 | 40.7* |

*P<0.001 by chi-square analysis for the association between supplemental-insurance group and having mammography, for women in this category.

†P<0.01 by chi-square analysis.

‡P<0.05 by chi-square analysis.

§ER denotes emergency room, and OPD outpatient department.

cent of the women over 65 years of age had mammography. Even among relatively younger women between the ages of 65 and 75 — for whom screening mammography is clearly effective^{2,10} — only 45 percent had mammography during the two-year period. Therefore, despite coverage for screening mammography as part of the basic benefit package, a minority of older women complied with the U.S. Consensus Statement (which recommends annual screening mammograms for women over the age of 50)²² or the U.S. Preventive Services Task Force guidelines (which suggest mammography every one to two years for women 50 to 75 years of age).²³ Moreover, women without supplemental insurance were at particularly high risk of failing to undergo mammography.

Although the Medicare program has played a key part in reducing barriers to care for older Americans,

substantial financial obstacles remain.^{24,25} In order to take advantage of the screening-mammography benefit, women must meet the annual Medicare deductible (\$100 for Part B in 1994), provide the copayment for screening mammography (20 percent of \$59.63, or \$11.93, in 1994), and pay a “balance bill” for that service (up to 15 percent of \$59.63, or \$8.94, in 1994). Women who can locate providers who accept the Medicare benefit as payment in full are exempt from the “balance bill” charge. Previous research has shown that even small out-of-pocket costs reduce the use of preventive care services.²⁶ In our sample, the median income of women (and their spouses, if living) was \$12,000. For many older women, screening mammography may have been an unaffordable luxury, particularly with competing out-of-pocket medical expenses, including prescription drugs, eyeglasses, and dental care.

It bears emphasis that some — but not all — supplemental policies cover preventive care services. In 1991, 39 state Medicaid programs provided some coverage for screening mammography²⁷; increasingly, private policies have covered screening mammography as states have passed legislation mandating reimbursement for that service.²⁸ Reforms that took effect in July 1992 required that all Medigap policies include coverage for Medicare's Part B deductible as well as reimbursement of the 20 percent coinsurance charge.²⁹ Those reforms permitted the sale of more costly policies covering “balance bills”; under one option, policies could be written with specific funds set aside for preventive care services. Therefore, some — but not all — subjects with supplemental insurance could avoid out-of-pocket costs when they sought mammography. To the extent that some subjects with supplemental insurance in 1991 and 1992 faced copayments for mammography, the estimate reported here of the effect of having supplemental insurance on obtaining mammography is likely to be conservative relative to the effect that would have been observed had all supplemental insurance covered screening mammograms.

Although there is good reason to believe that having supplemental coverage made it more likely that women would seek mammography, it is also possible that women who were somehow more inclined to use screening mammography were also more likely to obtain supplemental coverage. In the evaluation of the likely extent of selection bias, it is notable that the three kinds of supplemental insurance included in the study differed

Table 4. Adjusted Odds Ratios for the Use of Mammography during 1991 or 1992 Comparing Women Who Had Various Types of Supplemental Insurance with Women Who Had Medicare Insurance Only.

| SUPPLEMENTAL INSURANCE | ADJUSTED ODDS RATIO* | 95% CONFIDENCE INTERVAL | P VALUE |
|------------------------|----------------------|-------------------------|---------|
| Self-purchased | 2.97 | 2.13–4.15 | <0.001 |
| Employer-sponsored | 3.03 | 2.17–4.23 | <0.001 |
| Medicaid | 1.99 | 1.30–3.07 | <0.001 |

*Adjusted odds ratios comparing women who had different types of supplemental insurance with women who had Medicare only were derived from a simultaneous logistic-regression equation including age, race, income, education, self-reported health status, usual source of care, smoking status, living arrangement, place of residence, and total Medicare Part B reimbursement for 1991.

in the extent to which obtaining coverage under one of them could plausibly be attributed to a desire to obtain preventive care. For example, employment-based insurance for retirees typically does not require premium payments by people who are eligible,⁴ so they often have little to lose by enrolling; it seems unlikely that enrollment would be strongly associated with the desire to obtain mammography. In the case of Medicaid supplemental insurance, qualification is based on pure income-and-assets criteria or on the individual beneficiaries' being "medically needy"; there is no evidence that qualification for the plan is highly associated with a desire to obtain preventive care services. The purchase of Medigap insurance is plausibly related to the desire (or the need) to consume more medical services of all types, yet this study found that women with plans they purchased themselves used mammography at a rate no higher than that of women with employer-sponsored supplemental plans. Moreover, the purchase of Medigap policies may reflect people's financial resources as much as it does their attitudes toward seeking medical care. In a 1982 survey of Medicare beneficiaries lacking supplemental policies, the most common reason given for not having Medigap insurance was that the respondent could not afford to buy such a policy.⁵

However, having supplemental insurance is clearly associated with factors that have previously been shown to influence the use of preventive care services, including age, income, race, and education. These factors were controlled for (as were, implicitly, other aspects of knowledge, attitudes, and beliefs that are correlated with these factors and that may be associated with the tendency to seek mammography)^{10-13,21} in stratified and multivariate analyses. Although there may be residual unmeasured confounding factors, it seems unlikely that the resulting biases would be of a magnitude comparable to the effects observed.

Some women in the sample may have had mammography that was not billed to Medicare. For example, some women may have been screened through programs sponsored by voluntary organizations such as the American Cancer Society, which may provide services without billing Medicare. Because the 1991 survey included a question about mammography use during the year, it was possible to compare billing data with survey responses. In 1991, some women who reported having mammography had no corresponding bills. Although this group includes women who had mammography but did not bill Medicare, it also includes women who incorrectly recalled having had mammography during the period in question. Previous research suggests that such "telescoping" errors occur relatively frequently.^{30,31} With respect to the "true" mammography rate, then, it can be noted that the fundamental findings reported here — that mammography rates in elderly women fell well below recommended levels, and that supplemental insurance was a strong predictor of the use of mammography — were unchanged when women who simply reported having had mammography were included among those classified as having had it. Self-reported rates of use for 1991 were somewhat

higher than rates based solely on bills for that year, although they were lower than those cited in preliminary results emanating from the 1992 National Health Interview Survey, which are based solely on self-report.⁹ Finally, all these estimates are prone to overstating the population-screening rate, since they incorporate both diagnostic and screening procedures.

What are the implications of this report for policy makers and clinicians? A 1988 paper described the "reverse targeting" of preventive care, in which uninsured women 45 to 64 years of age, who by virtue of their demographic characteristics are at high risk for preventable disease, were also the least likely to receive preventive care by virtue of their lack of insurance.³² The results reported here show that the distribution of supplemental health insurance in Medicare beneficiaries also leads to "reverse targeting" of mammography, since women lacking supplemental policies — who are at high risk for nonscreening and for late-stage breast cancer diagnosis^{33,34} because they are among the poorest, the least well educated, and the most likely to be of minority race — are also the most likely to experience financial barriers to care because of their lack of supplemental coverage.

Although this report has emphasized out-of-pocket expenditures as barriers to breast cancer screening, it is important to stress that seeking preventive care is not solely a financial issue. Among the women with private supplemental insurance in this sample, for example, fewer than one half had mammography during the two-year period. The knowledge, attitudes, and beliefs of patients,^{10-13,21} along with the behavior of physicians,^{10,14,15} are undoubtedly important contributors to the decision to have mammography. Studies have repeatedly shown that a prime reason for not seeking screening mammography is the patient's perception that her physician did not recommend it. For clinicians, the results reported here underscore the opportunity to encourage and educate older women about mammography and to acquaint them with the new Medicare benefit.³⁵ For policy makers, these findings reinforce previous studies showing that cost-sharing decreases the use of preventive services,^{8,26} even for populations with "basic benefit packages." But more important, this report joins a small number of studies^{32,36} demonstrating that within present U.S. health care-financing arrangements, the burden of cost-sharing for preventive services often falls on those least able to share costs and on those most vulnerable to preventable disease and preventable premature death.

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