# Health Insurance Knowledge Among Medicare Beneficiaries

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**Objective.** To assess the effect of new consumer information materials about the Medicare program on beneficiary knowledge of their health care coverage under the Medicare system.

**Data Source.** A telephone survey of 2,107 Medicare beneficiaries in the 10-county Kansas City metropolitan statistical area.

**Study Design.** Beneficiaries were randomly assigned to a control group and three treatment groups each receiving a different set of Medicare informational materials. The "handbook-only" group received the Health Care Financing Administration's new *Medicare & You* 1999 handbook. The "bulletin" group received an abbreviated version of the handbook, and the "handbook + CAHPS" group received the *Medicare & You* handbook plus the Consumer Assessment of Health Plans (CAHPS)® survey report comparing the quality of health care provided by Medicare HMOs. Beneficiaries interested in receiving information were oversampled.

**Data Collection Methods.** Data were collected during two separate telephone surveys of Medicare beneficiaries: one survey of new beneficiaries and another survey of experienced beneficiaries. The intervention materials were mailed to sample members in advance of the interviews. Knowledge for the treatment groups was measured shortly after beneficiaries received the intervention materials.

**Principal Findings.** Respondents' knowledge was measured using a psychometrically valid and reliable 15-item measure. Beneficiaries who received the intervention materials answered significantly more questions correctly than control group members. The effect on beneficiary knowledge of providing the information was modest for all intervention groups but varied for experienced beneficiaries only, depending on the intervention they received.

**Conclusions.** The findings suggest that all of the new materials had a positive effect on beneficiary knowledge about Medicare and the Medicare + Choice program. While the absolute gain in knowledge was modest, it was greater than increases in knowledge associated with traditional Medicare information sources.

**Key Words.** Medicare beneficiary, consumer information materials, health insurance knowledge

The Medicare provisions of the Balanced Budget Act (BBA) of 1997 resulted in some of the most sweeping changes to the Medicare program since its inception in 1965. In addition to several payment system changes intended to better control the growth in Medicare expenditures, the legislation created the "Medicare + Choice" program, which increased the number and type of health insurance options for Medicare beneficiaries. Beginning in 1998, several new types of health plans, including provider-sponsored organizations, preferred provider organizations, private fee-for-service plans, and plans attached to medical savings accounts (MSAs), could be sold to beneficiaries, in addition to the array of existing fee-for-service and managed care plans. The legislation represents a dramatic policy shift by Congress, "setting Medicare on a course toward a more competitive and consumer-driven model" (United States General Accounting Office 1998, p. 4). Others have referred to the watershed BBA reforms as being "among the most important social and health policy legislation of the past three decades" (Ethridge 1998, p. 573).

With the rise in the number of health coverage choices and the potential for increased confusion, the need for consumer information has become increasingly apparent. A key component of the BBA mandate is the

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development of a national information campaign to inform beneficiaries about their health insurance choices and about ongoing modifications to the Medicare program. The Health Care Financing Administration (HCFA) initiated the National Medicare Education Program (NMEP) to meet the requirements of the BBA and to support informed decision making by its beneficiaries. HCFA's NMEP is a multifaceted program that employs numerous communication and outreach strategies, including printed materials, toll-free hotlines, health fairs, electronic media (e.g., the Internet), and volunteer counseling programs. A major part of the campaign has been the development of the *Medicare & You* handbook (formerly *The Medicare Handbook*).

This article provides an early assessment of HCFA's new consumer information materials in terms of their effect on beneficiary knowledge. We address the following research questions: Are beneficiaries who received new materials more knowledgeable about the Medicare program and their health insurance options relative to those who do not receive such information? Is more information associated with higher levels of knowledge? Does knowledge depend on sociodemographic and other characteristics of the beneficiary?

## PREVIOUS RESEARCH

There have only been a few multivariate studies that specifically address factors associated with knowledge of health insurance among Medicare beneficiaries. Most studies (Cafferata 1984; Hibbard et al. 1998; Lambert 1980; Marquis 1983; McCall, Rice, and Sangl 1986) found higher educational levels to be significantly associated with greater health insurance knowledge. Other factors commonly associated with higher levels of knowledge include higher income (Hibbard et al. 1998; Lambert 1980; Marquis 1983; McCall, Rice, and Sangl 1986; Rice, McCall, and Boismier 1991), younger age (Cafferata; Lambert 1980; McCall, Rice, and Sangl 1986), being White (Marquis 1983; McCall, Rice, and Sangl 1986), and being male (Lambert 1980).

Using data from the Health Insurance Experiment, Marquis (1983) found higher knowledge to be significantly associated with being offered a choice of health plans, longer length of enrollment in one's plan, and use of physician services among control group members. She also reported that knowledge was adversely affected by plan complexity. Using the 1977

National Medical Expenditure Survey, Cafferata (1984) found that having supplemental insurance was positively related to knowledge. With the exception of the Cafferata study, neither health status nor use of services was found to be significant explanatory variables in any of the previously mentioned studies.

Several of these studies indicated that health insurance knowledge among Medicare beneficiaries is low. The most recent study by Hibbard et al. (1998) suggests that it is quite inadequate. The authors reported that nearly 30 percent of all respondents know almost nothing about health maintenance organizations (HMOs) and that the large majority of respondents did not understand the differences between the fee for service and managed-care delivery systems.

This study contributes to literature on beneficiary knowledge of their health insurance options by evaluating the effects of HCFA's new consumer information materials using a randomized, controlled study.

## DATA

The data source for the study consisted of two separate beneficiary surveys: one of new beneficiaries who were just aging into the Medicare program at the time of the interview and a second survey of experienced beneficiaries who ranged from 65 to 98 years of age. Residents of the 10-county Kansas City metropolitan statistical area during fall and winter 1998 were included in the sampling frames.

### Experienced Beneficiaries

Experienced beneficiaries were defined as persons who were aged Medicare beneficiaries when the sampling frame ($n = 170{,}062$) was established from HCFA's Enrollment Database in summer 1998. To be included in the sampling frame, beneficiaries must have had both Medicare Part A and Part B. Beneficiaries dually eligible for Medicare and Medicaid, whose original reason for entitlement was a disability, who had end-stage renal disease, who were institutionalized or receiving hospice care, or who were Medicare-qualified government employees were excluded from the sampling frame because of their health or because they were less likely to be interested in examining the experimental materials. No explicit stratification was performed on the sample, but it was sorted by age,

gender, race, and zip code prior to randomization and sample selection to ensure a proportional draw on these characteristics.

We systematically sampled 3,573 experienced beneficiaries for the study and then screened beneficiaries for their level of interest in health insurance information, slightly oversampling those who reported being very (27 percent) or somewhat (36 percent) interested in receiving health insurance information. A methodological decision was made to oversample those interested so we could also obtain feedback on the materials. However, because we did not confine the sample to only those interested in the materials, we can generalize the results to all beneficiaries in the MSA using statistical sampling weights. We interviewed the sample member, not necessarily the most knowledgeable person in the household. Interviewing anyone other than the sample member would have compromised the random nature of the sample.

Persons deemed ineligible to participate in the survey after data collection began included those who were away during the duration of the survey or who had died; those who were physically or mentally incapable of participating or could not read; and those who did not speak English.[1] Interviews were completed with 1,156 experienced beneficiary respondents, distributed approximately equally over the four study groups. After accounting for the screening interviews, the survey response rate was 62 percent (70 percent for the three treatment groups).[2]

*New Beneficiaries*

The HCFA also provided us with a list of persons who were nearing Medicare eligibility age. New beneficiaries were defined as persons between the ages of 64 years and 9 months and 64 years and 11 months (as of July, August, and September 1998). The new beneficiary sample included 1,855 individuals, which was the entire list of new beneficiaries in the Kansas City MSA between July and September 1998. The list only included persons whose age and address were known to HCFA, and was estimated to include approximately 70 percent of persons who would eventually become eligible for Medicare at age 65. As with experienced beneficiaries, we sorted the file prior to randomization. No sampling was performed on the frame—we attempted to interview all 1,855 beneficiaries. Interviews were completed with 951 new beneficiary respondents, distributed approximately equally

over the four groups. The response rate for new beneficiaries was 58 percent (57 percent for the three treatment groups).

*Sample Characteristics*

Nearly two thirds of experienced beneficiaries in the sample were between the ages of 65 and 74, with the remaining 35 percent being age 75 and over (Table 1). Nearly all new beneficiaries had just aged into Medicare by the time they were interviewed. Both samples were disproportionally female and White, and more were married than were not. The education level was well distributed across the samples with most having a high school degree, but a full 14 percent of experienced beneficiaries had less than 12 years of schooling. New beneficiaries had higher incomes, on average, most likely because a greater share were still working. Most study participants reported being in good or very good health, but 22 percent of experienced beneficiaries and 12 percent of new beneficiaries indicated they were in fair or poor health.

# STUDY DESIGN

*Intervention Materials*

Beneficiaries were randomly assigned to a control group or one of three treatment groups that received different information interventions. The three treatment groups differ in the amount, type, and specificity of the information provided as part of the study. Group 1, the "handbook-only" group, received the *Medicare & You* 1999 handbook. *Medicare & You* 1999 is a 52-page handbook that provides an overview of the new Medicare + Choice health insurance options available to beneficiaries, as well as a discussion of Medicare eligibility, covered benefits, and patient rights. The handbook also includes a section tailored to specific market areas that allows consumers to compare plan-level benefits and costs.

Group 2, the "bulletin" group, received the *Medicare & You* 1999 bulletin, which is an eight-page trifold and a condensed version of the handbook. It has much of the same information as the handbook, but it does not include market-specific cost and benefit information.

Group 3, the "handbook + CAHPS" group, received both the *Medicare & You* 1999 handbook and a Consumer Assessments of Health Plans (CAHPS) consumer survey report. The CAHPS report provided Medicare

Table 1: Sociodemographic Characteristics of the Study Samples

| Variable | Experienced Beneficiaries | New Beneficiaries |
|---|---|---|
| **Age** | | |
| 64 | 0.0 Percent | 10.5 Percent |
| 65–69 | 34.0 | 89.5 |
| 70–74 | 30.3 | 0.0 |
| 75–79 | 20.1 | 0.0 |
| 80+ | 15.6 | 0.0 |
| **Gender** | | |
| Male | 39.5 | 44.3 |
| Female | 60.5 | 55.7 |
| **Race** | | |
| White | 90.8 | 90.3 |
| Non-White | 9.1 | 9.2 |
| Other | 0.1 | 0.5 |
| **Marital status** | | |
| Married | 61.2 | 75.3 |
| Not married | 38.2 | 24.3 |
| Unknown | 0.6 | 0.4 |
| **Education** | | |
| Less than 12 years | 14.3 | 8.8 |
| High school graduate | 38.4 | 40.6 |
| Trade school/some college | 24.9 | 25.8 |
| College graduate | 21.6 | 24.8 |
| Unknown | 0.8 | 0.0 |
| **Income** | | |
| <$15,000 | 18.5 | 11.1 |
| $15,000–30,000 | 28.5 | 22.3 |
| >$30,000 | 27.0 | 45.9 |
| Unknown | 26.0 | 20.7 |
| **Self-reported health status** | | |
| Excellent | 13.4 | 21.7 |
| Very good | 32.2 | 35.9 |
| Good | 32.0 | 30.8 |
| Fair/poor | 22.3 | 11.5 |
| Unknown | 0.1 | 0.1 |

*Data Source:* Survey of new and experienced Medicare beneficiaries in the Kansas City MSA conducted by Research Triangle Institute between September 1998 and January 1999.

beneficiaries in the Kansas City MSA information comparing the quality of care provided by the five local Medicare HMOs based on a survey of enrolled beneficiaries. Fifteen CAHPS ratings were included in the booklet for each of the HMO plans in the Kansas City MSA market. CAHPS ratings

included aspects of care, such as getting the care without long waits, having doctors who communicate well with their patients, and overall rating of their health plan. The CAHPS report provided some information about beneficiaries' health plan options, but the majority of basic Medicare information and overview of plan choices was contained in the *Medicare & You* materials. Thus, treatment group 3 was sent the most information.

### The Outcome Variable

The new and experienced beneficiary surveys included more than 100 questions with a series of 15 questions used to gauge beneficiary knowledge. The questions quizzed beneficiaries about the information provided in the interventions (see Table 2 for survey question wording). A few questions were designed to assess whether beneficiaries had heard of different plan options (e.g., Medigap plans, Medicare HMOs, and MSAs) to measure the NMEP goal of awareness of such options. Other questions measured whether beneficiaries were aware of key messages being promoted at the time by HCFA about beneficiary rights (e.g., if beneficiaries are satisfied with their existing plan, they do not need to change health plans).

A knowledge score was constructed for each survey respondent from the percentage of the 15 questions answered correctly about the basic Medicare program and Medicare + Choice options, that is, a value ranging from 1 to 100. A "don't know" response was considered incorrect, which is the approach taken in most previous studies (Hibbard et al. 1998; Lambert 1980; McCall, Rice, and Sangl 1986). Each question was given an equal weight in the index.[3]

All of the knowledge questions could be answered by consulting the *Medicare & You* handbook (treatment groups 1 and 3). The *Medicare & You* bulletin provided the information necessary to answer 13 of the 15 questions. The CAHPS booklet reinforced some of the same information, but did not cover all of the issues (received by treatment group 3). All treatment groups received the bulletin as part of HCFA's national mailing in fall 1998 (separate from this study), therefore any differences among the treatment groups represent the effect of the intervention, not that of the bulletin.

### Data Collection Process and Timeline

We mailed the intervention materials to treatment group members at home in advance of a computer-assisted telephone interview. We had to remail

Table 2: Percentage of Beneficiaries Who Correctly Answered the Knowledge Questions

| | | Experienced Beneficiaries | | New Beneficiaries | |
|---|---|---|---|---|---|
| *Survey Questions* | | C | T | C | T |
| Q1 | As far as you know, can people on Medicare still get Original Medicare today? (*Yes*/No) | 69 | 83*** | 56 | 78*** |
| Q2 | As far as you know, does Original Medicare pay for all health care costs for people on Medicare? (Yes/*No*) | 76 | 85*** | 78 | 87*** |
| Q3 | As far as you know, are there different types of private health insurance plans that people on Medicare can get to pay for things that Medicare doesn't pay for? (*Yes*/No) | 85 | 91*** | 91 | 96** |
| Q4 | Have you ever heard of a Medicare supplemental health insurance plan, sometimes called a "Medigap" plan? (*Yes*/No) | 72 | 81*** | 67 | 81*** |
| Q5 | Have you ever heard of a Medicare HMO? (*Yes*/No) | 82 | 88** | 87 | 89 |
| Q6 | Have you ever heard of a Medicare managed care plan? (*Yes*/No) | 53 | 62*** | 59 | 70** |
| Q7 | Are there Medicare (HMO/managed care plans) in the Kansas City area? (*Yes*/No) | 51 | 61*** | 53 | 57 |
| Q8 | Have you ever heard of an MSA or medical savings account for people on Medicare? (*Yes*/No) | 23 | 33*** | 24 | 41*** |
| Q9 | If a person signs up for any of these Medicare health insurance plans, is he or she still in the Medicare program? (*Yes*/No) | 57 | 68*** | 68 | 80*** |
| Q10 | If a person signs up for any of these Medicare health insurance plans, does he or she still get at least the same health care benefits as someone in the Original Medicare plan? (*Yes*/No) | 46 | 55*** | 55 | 68*** |
| Q11 | Do people who are happy with the health insurance plan they have now have to change plans this year? (Yes/*No*) | 69 | 80*** | 64 | 79*** |
| Q12 | In this type of Medicare health insurance plan, a person needs to go to doctors and hospitals from a list given by the plan. Does this statement best describe (Original Medicare/*A Medicare* [*HMO/ managed care plan*]/Both/Neither)? | 51 | 57* | 51 | 58 |
| Q13 | Which type of Medicare health insurance plan is more likely to pay for most prescription drugs (Original Medicare/*A Medicare* [*HMO/managed care plan*]/Both/Neither)? | 36 | 41* | 40 | 45 |

Table 2:    *Continued*

| Survey Questions | Experienced Beneficiaries | | New Beneficiaries | |
|---|---|---|---|---|
| | *C* | *T* | *C* | *T* |
| Q14  Which type of Medicare health insurance plan only allows a person to leave the plan and change to another plan once a year (A Medicare [HMO/ managed care plan]/*A MSA*/Both/Neiher)? | 2 | 5** | 3 | 4 |
| Q15  Is there a local service in the Kansas City area that offers free and unbiased counseling to people on Medicare about choosing a health insurance plan? (*Yes*/No) | 25 | 32** | 25 | 38*** |

*Notes*: C, control group; T, treatment groups.
The correct response is shown in italics. A "don't know" response was considered incorrect.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$. *Data Source:* Survey of new and experienced Medicare beneficiaries in Kansas City MSA conducted by Research Triangle Institute between September 1998 and January 1999.

materials to 39 percent of the treatment group members who said they did not receive the first mailing because we were asking beneficiaries to look at the materials before their interview. This is a surprisingly high proportion of respondents but is consistent with HCFA's experiences with other large-scale mailings. Beneficiaries were permitted to have the materials in front of them at the time of the interview; 13 percent reported doing so.

All control group interviews were completed before HCFA's fall 1998 national mailing of the *Medicare & You* bulletin (to avoid contamination), and all treatment group interviews were completed after the nation-wide mailing. This sequencing of events poses a small threat to internal validity but was viewed as the preferred alternative relative to potential contamination.

## HYPOTHESES AND METHODS

### Hypotheses

*Treatment group.* The key independent policy variable was an individual's study group (treatment versus control). We hypothesized that beneficiaries who received the informational interventions would be more knowledgeable relative to the control group who, as part of the study, received no information.

*Sociodemographic variables.* Sociodemographic and economic variables included beneficiary age, gender, race, ethnicity, education, marital status, family income, and whether the beneficiary lived alone or with others. The potential effect of age on beneficiary knowledge is debatable. One could argue that older beneficiaries have more experience with the Medicare program and thus should be more knowledgeable. On the other hand, new beneficiaries have recently made their supplemental insurance decision and might be more knowledgeable as a result of researching their options during the decision-making process. In addition, research on the relationship between age and cognitive functioning (Craik and Jennings 1992) suggests a negative relationship between age and knowledge. With regard to gender, husbands are traditionally more likely to make the financial decisions in the family, and thus, men in general were expected to be more knowledgeable than women. Finally, those with more education and higher income were expected to be more knowledgeable.

*Health status and utilization variables.* Beneficiary utilization was measured based on self-reported experience with the health care system. Variables representing (1) the number of physician visits in the last three months and (2) whether the beneficiary was hospitalized in the last 12 months were both included in the models. A bivariate indicator of whether an individual had a usual source of health care was also included. Beneficiaries' health status was measured using the SF-12, which produced a physical and a mental health score. We expected that those with higher utilization, a usual source of medical care, and/or lower health status would have higher levels of knowledge as a result of their increased exposure to the health insurance system.

*Insurance-related variables.* We also included variables reflecting the type of supplemental health insurance the beneficiary had beyond Medicare (if any)—employer-sponsored or individually purchased supplemental insurance, that is, Medigap. A significant proportion of beneficiaries who had supplemental insurance were unsure whether it was employer sponsored or individually purchased; therefore, we included a dummy variable reflecting an unknown type of coverage. We anticipated those with any type of supplemental coverage might be more knowledgeable because of their experience dealing with insurance issues. Beneficiaries were asked how much their spouse's choice of a health plan affected their plan choice. We included this variable as we thought there could be a positive association between the type of plan spouses choose, which might affect the propensity to use information and thus knowledge level.

*Other variables.* All beneficiaries—treatment and control group members—could have been exposed to other information such as health plan marketing materials, media reports on television or radio, or information provided by a family member or friend. Therefore, we included a continuous variable ranging from 0 to 11 reflecting the number of Medicare information sources beneficiaries had seen, heard, or received in the last 6 months. The treatment groups were asked to not count in their answer to this question the materials that were sent to them as part of the study. We assumed exposure to information other than that provided in the intervention would be positively correlated with knowledge. It was important to control for this to determine the effect of the intervention materials. In the experienced beneficiary survey, we also asked respondents if they had seen information on quality of care differences across plans.

*Statistical Methodology*

We first conducted bivariate analyses of the relationship between knowledge and treatment group assignment using chi-square tests and a 0.05 alpha level criterion. Then, using a weighted least squares regression with the knowledge index as the dependent variable, we determined which factors were uniquely and significantly associated with higher knowledge. All estimates using the survey data were weighted to the Kansas City MSA new and experienced beneficiary population using sampling weights computed as the inverse of the probability of selection adjusted for nonresponse. To account for the complex sample design of the surveys, all variance estimates were corrected for unequal weighting using SudAAN software (Shah, Barnell, and Bieler 1997).

## RESULTS

*Bivariate Results*

Overall rates of knowledge varied substantially, as measured by the percent of beneficiaries correctly answering each knowledge question (Table 2). Among the 2,107 new and experienced survey respondents, the median number of correct answers to the 15 knowledge questions was nine (Table 3). On a scale of 100, beneficiaries' mean score was 60 percent. The majority of scores were within one standard deviation of the mean (between 7 and 12, or 46 and 80 percent). For five of the questions (four for new beneficiaries), less than 50 percent of the respondents knew the correct

Table 3:  Descriptive Statistics for the Knowledge Index

| | Mean Percent of Correctly Answered Questions | Mean Number of Questions Correctly Answered (SD) | Median Number of Questions Correctly Answered | Range |
|---|---|---|---|---|
| Experienced beneficiaries | 58.6% | 8.9 (2.9) | 9 | 0–15 |
| New beneficiaries | 62.0% | 9.4 (2.9) | 10 | 1–15 |
| All beneficiaries | 60.0% | 9.1 (2.9) | 10 | 0–15 |

*Data Source:* Survey of new and experienced Medicare beneficiaries in Kansas City MSA conducted by Research Triangle Institute between September 1998 and January 1999.

answer to the question. Questions that had dichotomous response options were more likely to be answered correctly than those that had more than two response options.

Treatment group members were more likely than control group members to answer all 15 knowledge questions correctly. The greatest differences in knowledge between treatment and control group members arose with respect to beneficiaries' awareness about still being able to obtain Original Medicare; whether they still had Medicare if they had some other type of supplemental plan; whether they had to change health plans; and familiarity with MSAs.

Although the differences in knowledge between the control group and the three treatment groups combined were statistically significant for many questions, there were few differences among the experienced beneficiary treatment groups. Overall, these descriptive results show that Medicare beneficiaries are informed about some elements of the Medicare program but that a sizable proportion of beneficiaries are unaware about some basic and critical aspects dealing with cost, coverage, and supplemental insurance options. The findings also suggest that the materials have a positive effect on beneficiary knowledge.

*Multivariate Results*

Overall, the multiple regression results support conclusions based on the bivariate analyses. Models were used to explain between 23 percent (new beneficiaries) and 34 percent (experienced beneficiaries) of the variation in the dependent variable (Table 4). For both the new and experienced beneficiaries, all three treatment groups had higher knowledge scores relative to the control group. Among experienced beneficiaries, the effect of the information on beneficiary knowledge varied

depending on the type of information received. Compared with controls, beneficiaries in the bulletin treatment group scored seven percentage points higher on the knowledge measure, and those who received both the handbook and CAHPS report scored nine percentage points higher.

Interpretation of the handbook-only group's coefficient must take into account its involvement in interactions with two age spline variables. Age splines—like those used in the experienced beneficiary model for those age 65 to 74 and another for those age 75 and over—are continuous variables that permit nonlinear effects to occur over the age span. For beneficiaries in the age 65 to 74 cohort who received the handbook, age had a positive effect on knowledge (a 16 percentage point increase in the knowledge score for those age 65), but the effect declined to about a three percentage point gain as age progressed to 74 despite receipt of the handbook (data not shown). The combined effect of age and receipt of the handbook on knowledge for those over age 75 peaked at eight percentage points for the oldest persons in the sample (age 98). This nonlinear effect suggests that the handbook is the most useful for those at the beginning and end of the age spectrum. Interactions between the age splines and the bulletin group were not significant nor were any other interactions between the treatment groups and sociodemographic or health status characteristics or utilization. We did not interact the age splines with the handbook + CAHPS group because the *Medicare & You* materials provided the most detail about knowledge items in the knowledge index.

There were statistically significant differences in knowledge among some of the experienced beneficiary treatment groups based on *F* tests. The difference between the handbook-only group (0.1605) and the bulletin group (0.0729) coefficients was statistically significant ($F = 13.4$), and the difference between the handbook-only group (0.1605) and handbook + CAHPS group (0.0888) coefficients was also significant ($F = 9.5$). It is important to note that results for the handbook-only and handbook + CAHPS groups technically include the effect of bulletin as a result of the national mailing. Among new beneficiaries, members of all three treatment groups scored approximately nine percentage points higher on the knowledge index than the controls. Although treatment groups were universally more knowledgeable than the controls, there were no significant differences in knowledge among the new beneficiary experimental groups using the 0.05 significance criterion.

The level of beneficiary education and income was significantly associated with beneficiary knowledge in both models. There was a positive

Table 4:   Weighted Least Squares Regression Predicting Beneficiary
Knowledge Levels

| Variables | Experienced Beneficiaries | | New Beneficiaries | |
|---|---|---|---|---|
|  | Beta | (SE) | Beta | (SE) |
| Intercept | 0.2197*** | (0.0564) | 0.4019*** | (0.759) |
| Study group |  |  |  |  |
| Bulletin | 0.0729*** | (0.0139) | 0.0924*** | (0.0160) |
| Handbook† | 0.1605*** | (0.0239) | 0.0856*** | (0.0158) |
| Handbook CAHPS | 0.0888*** | (0.0139) | 0.0982*** | (0.0165) |
| Control | — |  | — |  |
| Age spline |  |  |  |  |
| 65–74 | 0.0014 | (0.0021) |  |  |
| 75+ | −0.0096*** | (0.0018) |  |  |
| Age spline * study group |  |  |  |  |
| Age 65–74* handbook | −0.0162*** | (0.0038) |  |  |
| Age 75+* handbook | 0.0114*** | (0.0036) |  |  |
| Gender |  |  |  |  |
| Male | 0.0367** | (0.0111) | 0.0107 | (0.0120) |
| Female | — |  | — |  |
| Race |  |  |  |  |
| Non-white | −0.0299* | (0.0196) | −0.0576** | (0.0224) |
| White | — |  | — |  |
| Ethnicity |  |  |  |  |
| Hispanic | −0.0636** | (0.0410) | −0.0611 | (0.0392) |
| Not Hispanic | — |  | — |  |
| Education |  |  |  |  |
| Less than 12 years | — |  | — |  |
| High school graduate | 0.0367* | (0.0167) | 0.0711** | (0.0224) |
| Some college/tech school | 0.0701*** | (0.0173) | 0.1263*** | (0.0238) |
| College graduate | 0.1105*** | (0.0192) | 0.1633*** | (0.0241) |
| Marital status |  |  |  |  |
| Married | 0.0039 | (0.0194) | −0.0091 | (0.0223) |
| Not married | — |  | — |  |
| Annual income |  |  |  |  |
| Less than $15 K | — |  | — |  |
| $15–$30 K | 0.0290* | (0.0166) | 0.0454** | (0.0225) |
| More than $30 K | 0.0675*** | (0.0187) | 0.0615*** | (0.0222) |
| Unknown | 0.0103 | (0.0170) | −0.0108 | (0.0231) |
| Living situation |  |  |  |  |
| Lives alone | 0.0084 | (0.0190) | −0.0156 | (0.0238) |
| Does not live alone | — |  | — |  |

Table 4:    *Continued*

| Variables | Experienced Beneficiaries | | New Beneficiaries | |
|---|---|---|---|---|
| | *Beta* | *(SE)* | *Beta* | *(SE)* |
| Supplemental insurance | | | | |
|   Employer-sponsored | 0.0325** | (0.0180) | −0.0106 | (0.0294) |
|   Individually purchased | 0.0730*** | (0.0179) | 0.0378 | (0.0290) |
|   Unknown what type | −0.0638* | (0.0287) | −0.1525** | (0.0610) |
|   No supplemental insurance | — | | — | |
| Spousal insurance effect | | | | |
|   Affected choice | −0.0138* | (0.0109) | −0.0004 | (0.0132) |
|   No spouse/no insurance | −0.0337** | (0.0141) | −0.0290* | (0.0155) |
|   Did not affect choice | — | | — | |
| Health Status (SF-12) | | | | |
|   Physical health score | 0.0005 | (0.0005) | 0.0002 | (0.0007) |
|   Mental health score | 0.0009* | (0.0007) | −0.0002 | (0.0009) |
| Hospitalization (12 months) | | | | |
|   Yes | −0.0083 | (0.0132) | 0.0150 | (0.0188) |
|   No | — | | — | |
| MD visits (3 months) | | | | |
|   1 Visit | 0.0080 | (0.0136) | −0.0149 | (0.0137) |
|   2 Visits | 0.0079 | (0.0167) | −0.0082 | (0.0166) |
|   3 Visits | 0.0030 | (0.0157) | 0.0176 | (0.0192) |
|   None | — | | — | |
| Regular source of care | | | | |
|   Yes | 0.0459* | (0.0236) | −0.0035 | (0.0204) |
|   No | — | | — | |
| Number of general information sources | 0.0284*** | (0.0053) | 0.0230*** | (0.0055) |
| Info on quality of care | 0.0415** | (0.0164) | | |
| F test | | | | |
|   Handbook vs. Bulletin | 13.4*** | | 0.2 | |
|   Handbook vs. Handbook† | 9.5*** | | 0.1 | |
| CAHPS | | | | |
|   Handbook† | 1.3 | | 0.6 | |
| CAHPS vs. Bulletin | | | | |
| Adjusted R-squared | 0.338 | | 0.234 | |
| Sample size | 1102 | | 918 | |

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.
*Data Source:* Survey of new and experienced Medicare beneficiaries in Kansas City MSA conducted by Research Triangle Institute between September 1998 and January 1999.

and monotonic relationship between years of education and amount of income and knowledge score. Other sociodemographic variables significantly associated with level of knowledge included race of new beneficiaries (Whites being more knowledgeable) and gender for experienced beneficiaries (men being more knowledgeable).

For experienced beneficiaries, having insurance beyond Medicare was significantly related to higher knowledge, but the effect was more significant for those who purchased supplemental insurance on an individual basis as opposed to in a group through an employer or former employer. For new beneficiaries, the dummy variable reflected a beneficiary had some type of supplemental insurance but was unsure what type and this variable was negatively associated with knowledge. The two utilization variables were not statistically significant at conventional levels in either model, which is consistent with previous research. However, experienced beneficiaries with a usual source of care were more knowledgeable at the alpha <0.10 criterion compared with those with no usual source. This could indicate an ongoing relationship with a provider that educates beneficiaries rather than the actual use of services. Similarly, health status was not significant at the 0.05 level in either model.

For both populations, having been exposed to Medicare-related information other than the treatment interventions was strongly associated with higher knowledge levels. For each information source (not associated with the study), beneficiaries scored two to three percentage points higher on the knowledge measure. It is important to note that these effect sizes are smaller than those achieved by HCFA's new materials. Finally, those who were exposed to quality of care information were more knowledgeable than those who did not.

We were concerned that knowledge items that simply asked about awareness of Medicare plan options were too easy to answer and may not tap actual awareness or knowledge; thus, we tested a model that omitted these items. When the three "awareness" questions were removed from the knowledge index, the findings were essentially unchanged. We also explored how oversampling interested beneficiaries may have affected the results, and we found that larger gains in knowledge were associated with lower levels of self-reported interest. That is, beneficiaries who were least interested in receiving the materials experienced the greatest gains in knowledge, presumably because they had not been exposed to other information sources and had a lower knowledge base.

## DISCUSSION

These findings suggest the new Medicare information materials had a positive effect on beneficiary knowledge. Higher levels of knowledge were evident among all three treatment groups in both new and experienced beneficiary populations. However, the absolute gain in knowledge, even for the most detailed materials, appears to be modest. Yet, the gains were greater than those achieved by traditional Medicare information sources used by beneficiaries. Learning about a complicated health insurance program and increasingly diverse plan options may take repeated exposure. Thus, we may see increases in knowledge over time with HCFA's annual dissemination of the *Medicare & You* handbook. It is also possible that beneficiaries may only glean a limited amount of information from such sources, consulting them when questions arise in their personal health care situation.

Although the materials improved beneficiary knowledge relative to the controls, the improvement did not differ by the type of material in the new beneficiary population. The type of intervention did have an effect in the experienced beneficiary population. The larger coefficient for the handbook-only group in comparison to the bulletin group suggests some improvement in knowledge associated with the intensity and type of *Medicare & You* intervention. However, this difference may be attributed in part to the fact that the bulletin provided answers to only 13 of the 15 knowledge questions. Even though the handbook + CAHPS group received the greatest volume of informational materials, we suspect that the coefficient for this group is smaller than the handbook-only group because beneficiaries split their time between the handbook and the CAHPS report, which provided additional information not measured in the index. It might also be that this group of beneficiaries could not digest all of the information received.

Younger experienced beneficiaries who received only the handbook answered nearly two times as many knowledge questions correctly relative to those who only received the shorter bulletin, suggesting there may be more value from using a more intensive information intervention. The added value though may be small, because the additional information and detail about increasingly complex aspects of the Medicare program impose an added cognitive burden that beneficiaries may not or cannot cope with.

Refining the type and amount of information used in the coming years for the entire Medicare population is an important topic for further research.

Several other variables in the model were significant as hypothesized, most notably, education level. Finding that type of intervention and education affect knowledge independently strengthens our conclusion that the information materials improved beneficiary knowledge. The findings also have educational policy implications for vulnerable populations—including low-income persons, non-Whites, women, and those without supplemental insurance—who, compared with the less vulnerable, did not gain as much from the new information. Simplifications to the handbook and/or alternative transmission strategies to reach these populations should be considered to address this limitation.

In summary, our bivariate results demonstrate overall knowledge among Medicare beneficiaries seems low in some key areas while moderate in others, and the multivariate findings suggest that educational interventions can increase beneficiary knowledge. It is important to keep in mind that both study samples comprised individuals who agreed to look at the materials and were able to participate in the study and, therefore, are likely to be healthier and more educated than the average beneficiary. The same increases in knowledge may not occur in a "natural" experiment in which recipients are not explicitly asked to look at the materials (as they were in this study), which could have sensitized them to the experiment. The results pertain specifically to the 10-county Kansas City MSA—an area with moderate managed-care penetration—and can only be generalized to the populations not excluded by the sampling procedures. However, the samples represent the aged Medicare population in Kansas City. Because the sampled population was randomly selected and did not reflect the joint knowledge and perspective of the family unit, the true population may be more "informed" than the findings suggested by this investigation.

This study represents the first empirical, quantitative test of the impact of these materials on Medicare beneficiaries, and thus, it is an important milestone in the development of meaningful information for beneficiaries about the increasingly complex Medicare program. Our investigation of beneficiaries' perspectives on the new materials and the effect of the materials on beneficiary decision making will be reported in subsequent articles.

## NOTES

1. Seven percent of the new beneficiary (including those who self-reported being on Medicaid) and 10 percent of experienced beneficiary samples were classified as ineligible. Less than 1 percent of the new and experienced beneficiary interviews were completed with proxy respondents. A proxy respondent was permitted to complete the survey for a beneficiary only if he or she resided with the sample member and was the person who made the health insurance decisions for the sample member.

2. This response rate was comparable to those obtained in several other studies of the Medicare population conducted around the same time (Carman, Keller, and Hays 1999). Experienced beneficiary respondents were more likely to be younger, male, White, and interested in the information relative to nonrespondents. New beneficiary respondents were more likely to be White than nonrespondents, and the new beneficiary respondents were more likely to be female and White relative to all 65 years olds in Kansas City.

3. We found the knowledge index both reliable and valid using standard psychometric tests. We estimated the internal consistency of the index using Cronbach's alpha coefficient (Cronbach 1951), a commonly used reliability estimate for scores comprising multiple items from cross-sectional data. The alpha for the knowledge index was 0.73, which indicates that we had a reliable measure of knowledge. Evidence for the validity of an index score is obtained by observing how that score is associated with separate measures of the same attribute. A high correlation between the score and other measures of the same attribute is evidence of validity. Using general linear models, we tested for evidence of the validity of the index. Self-rated understanding of Medicare was positively related to knowledge index ($p < 0.0001$), and the ordering of means by self-rated level of knowledge was monotonic. Duncan's Multiple Range Test (Duncan 1975) detected significant differences between the mean index scores at each level of self-rated understanding, with one exception: There was not a significant difference in index between those who rated their understanding "very good" and "excellent," although the mean index for those in the excellent group was higher. These associations support the validity of the index.

## REFERENCES

Cafferata, C. 1984. "Knowledge of Their Health Insurance Coverage by the Elderly." *Medical Care* 22 (9): 835–47.

Carman, K. L., S. D. Keller, and R. D. Hays. 1999. *Consumer Assessment of Health Plans (CAHPS): Medicare Fee-for-Service Field Test Analysis Report.* Washington, DC: Research Triangle Institute.

Craik, F. I. M., and J. M. Jennings. 1992. "Human Memory." In *The Handbook on Aging and Cognition.,* edited by F. I. M. Craik and T. A. Salthouse. pp. 51–110, Hillsdale, NJ: Erlbaum.

Cronbach, L. J. 1951. "Coefficient Alpha and the Internal Structure of Tests." *Psychometrika* 16 (3): 297–334.

Duncan, D. B. 1975. "T-tests and Intervals for Comparisons Suggested by the Data." *Biometrics* 31: 339–59.

Ethridge, L. 1998. "The Medicare Reforms of 1997: Headlines You Didn't Read." *Journal of Health Policy, Politics, and Law* 23 (3): 574–9.

Hibbard, J. H., J. J. Jewett, S. Englemann, and M. Tusler. 1998. "Can Medicare Beneficiaries Make Informed Choices?" *Health Affairs* 17 (6): 181–93.

Lambert, Z. V. 1980. "Elderly Consumers' Knowledge Related to Medigap Protection Needs." *The Journal of Consumer Affairs* 14 (2): 434–51.

Marquis, M. S. 1983. "Consumers' Knowledge About Their Health Insurance Coverage." *Health Care Financing Review* 5 (1): 65–80.

McCall, N., T. Rice, and J. Sangl. 1986. "Consumer Knowledge of Medicare and Supplemental Health Insurance Benefits." *Health Services Research* 20 (6): 633–57.

Rice, T., N. McCall, and J. M. Boismier. 1991. "The Effectiveness of Consumer Choice in the Medicare Supplement Health Insurance Market." *Health Services Research* 26 (2): 223–46.

Shah, B. V., B. G. Barnell, and G. S. Bieler. 1997. *SudAAN User's Manual* (Release 7.5). Research Triangle Park, NC: Research Triangle Institute.

United States General Accounting Office. 1998. Balanced Budget Act: Implementation of Key Medicare Mandates Must Evolve to Fulfill Congressional Objectives. Testimony of William J. Scanlon before the Subcommittee on Health, Committee on Ways and Means, House of Representatives. GAO/T-HEHS-98-214.