

3. Do Consumers Use Information to Choose a Health-Care Provider System?

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EMPLOYERS AND GOVERNMENT PROGRAMS ARE increasingly turning to managed competition in order to control health-care costs and improve quality. Managed competition is built on the concept of a “sponsor,” an organization that creates a health care–buying model based on consumers’ needs and providers’ responses to them. The sponsor fosters competition by obtaining prices from health-care provider systems for standardized benefit packages. At regular intervals, consumers can choose among these competing systems on the basis of price differences that reflect their relative costs. To help them make informed choices, consumers are given information about the alternative provider systems. Advocates of the managed competition approach (McClure 1982; Enthoven 1988a; 1988b) claim that it represents a dramatic improvement over the old model of purchasing health care, which Enthoven (1988a) disparagingly refers to as “guild free choice.” He means that the old model blocked price competition among providers and failed either to control costs or to discipline poor-quality providers.

To keep pace with the accelerating shift toward managed competition, consumers will require accurate information about the price and quality of the health-care provider systems offered by their employer or government program. The consumer’s choice of a provider system establishes, either implicitly or explicitly, how his or her medical care will be

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managed and delivered. Provider systems deploy various methods to influence how, when, and from whom enrollees receive medical care. They limit the size of the provider network, restrict the consumer's ability to self-refer to specialists, and require utilization review of high-cost medical services. Overzealous application of these restrictions may lead to low-quality care.

Without good information on their choices, employees may be unable to distinguish low prices that are due to superior performance by a health-care system from those that are due to low quality. This could lead to a situation that economists call a "lemons market" (Akerlof 1970), in which health-care systems strive to cut quality to the lowest possible level. Thus, provision of accurate information about the choices open to employees is a linchpin of the managed competition approach.

To assist employees in making informed choices, some employers are providing information on health-plan performance. The type of information varies widely, but it typically consists of one or more of the following:

- quality indicators (e.g., screening rates for cholesterol and breast cancer, beta-blocker treatment after heart attacks, immunization rates, prenatal care, rates of cesarean section and vaginal birth after cesarean section, and eye examinations for diabetics) from the Health Plan Employer Data and Information Set (HEDIS)
- enrollee satisfaction or experiences during a particular clinical episode (Cleary and Edgman-Levitan 1997)
- administrative and customer service indicators

The information may be collected and disseminated by individual employers or by "purchasing coalitions," which act as agents for multiple employers (Meyer, Wicks, Rybowski, et al. 1998).

This study reports on the use of information by employees in a purchasing coalition of large employers in Minneapolis, a metropolitan area long known for its support of the managed competition model. Effective January 1, 1997, the Buyers Health Care Action Group (BHCAG), then representing 26 self-insured employers in Minneapolis with approximately 250,000 eligible employees and dependents, implemented a model based on the principles of managed competition (Robinow 1997). BHCAG contracts directly with multiple health-care provider systems that encompass primary-care clinics with affiliated specialty, hospital,

and allied professional arrangements (Buyers Health Care Action Group 1996). The care systems are grouped into three cost tiers, and the employee's out-of-pocket premium is based on the tier that contains his or her care system. The out-of-pocket premium for families is based on the highest-cost tier chosen by any family member. Once a year, the employee may change cost tiers during an open enrollment period. A care system can be changed monthly to one that either is within the same tier or costs less.

BHCAG employers believe that the development of new and more cost-effective care processes depends upon contracting with health-care provider systems rather than with traditional health plans. According to this view, which was reinforced by several events, provider groups were not rewarded for their attempts to improve quality under the old system of health-plan contracting. In one case, a physician group explained to BHCAG that it had streamlined a care process, cutting \$250,000 annually from its costs, but was not rewarded with any financial benefit from its contracting plan as a result (Christianson, Feldman, Weiner, et al. 1999). The BHCAG board felt that competition among provider groups, accompanied by information to assist employees in choosing their care model, would create the incentives that were needed to improve quality. BHCAG employers provide employees with standardized, descriptive information about the care systems (e.g., clinic locations and hours of service) and offer comparisons of perceived quality, customer service, and satisfaction. Thus, BHCAG is striving to create a price- and quality-conscious health care-purchasing system.

A unique feature of the BHCAG model is that each primary-care physician may contract with only one care system. The fact that the systems *do not overlap* has two important implications for consumers: First, it means that consumers have a reason to care strongly about their provider choices. In contrast, the typical employer benefit plan allows physicians to belong to multiple health plans, which permits consumers to gain access to "their" physician through multiple choices. Second, it means that information pertains more directly to specific providers than in a traditional benefit plan. Both factors should promote the use of information by BHCAG employees in the new care-system model.

In 1998, shortly after the close of the second open-enrollment period under the new system, we conducted a survey of employees in the BHCAG purchasing coalition. The survey contained questions designed

to measure the employees' use of the information supplied by their employers when choosing a health-care provider system. This led to our first research question:

- *Do consumers use information from the employer when choosing a health-care provider system?*

We also collected information about how people seek advice from other sources, perhaps by talking to family, friends, or coworkers, or by relying on their own personal experience. This led to our second research question:

- *What factors affect the use of other information sources?*

Finally, we wanted to know if the various information sources are used together or as substitutes (in place of one another). The answer to this question can be important if employers or public health insurance programs want to encourage consumers to use effective information sources and discourage them from turning to ineffective ones. Our third research question, then, was the following:

- *Are different sources of information used together or as substitutes?*

This study does not attempt to measure either the accuracy of information or the exact type of information gathered from different sources. Nor does it pretend to be a randomized experiment or even an observational study with a control group of employers that do not provide information. Instead, it is a large, informative case study of a coalition of employers that are dedicated to providing information to help employees choose a health-care provider system. In this supportive environment, we want to know whether employees actually use the information that is available to help them make choices. In the next section, we explain why the answer to that question in other settings appears to be negative. A theoretical model explains why employees seek information. We then describe the study setting, the data, and the empirical approaches we used to estimate the information-seeking equations. In the final sections, we present and discuss the results and examine the implications for creating a price- and quality-conscious health-care purchasing model.

Past Studies on the Use of Information

Collectively, the provision by employers of comparative information on health-care provider system performance has become known as the “report card” movement (Hibbard and Jewett 1996; 1997; Knutson, Fowles, Finch, et al. 1996; Scanlon, Chernew, Sheffler, et al. 1998; Chernew and Scanlon 1998; Fowles 1998). A small, but growing, body of research has evaluated the likelihood of employees’ seeing report cards, the seriousness with which they read them, and the degree to which the report cards are helpful. The findings from these studies generally are not encouraging. For example, Knutson et al. (1996) evaluated the helpfulness of report cards prepared by employers for their own employees versus community-wide report cards prepared for the general public. Only 25 percent of the targeted employee groups reported seeing the community-wide report card. A significantly higher percentage (76 percent) saw the employer-specific report card, but employees who saw report cards of either type did not find them helpful in selecting a health plan. The mean degree of helpfulness was 3.87 for the community-wide report card and 3.32 for the employer-specific report card on a scale of 1 (extremely helpful) to 5 (not at all helpful).

Another study (Chernew and Scanlon 1998) found that report-card ratings were related to enrollment choices, but not with the positive association that the researchers had predicted. Enrollees actually were *less* likely to choose health plans rated superior in “enrollee satisfaction.” In a second study on plan performance ratings and enrollment choices, Scanlon and Chernew (1999) found that employees do not respond strongly to report-card ratings. The authors believe that the lack of response can be partly attributed to the fact that employees obtain information informally from past experience, friends, family, and colleagues.

Finally, Fowles (1998) did not discover many factors associated with reading report cards, based on an analysis of employees in three cities (Denver, Minneapolis, and St. Louis). The results were not consistent across markets and did not coincide with predictions that women, employees with high medical-care use or chronic diseases, and those who were dissatisfied or not attached to their doctor should be more interested in reading the report cards. The only predicted association to be confirmed by Fowles was that people who found the health-plan choice decision extremely difficult read more of the report card. Analysis of factors related to finding the report card helpful also failed to support the predicted associations.

Research utilizing focus groups and surveys reveals why employees either do not use report cards or do not find them helpful. Although focus groups show that consumers have a high interest in information on quality, they also demonstrate that the subjects often do not understand how managed care works or why an indicator is related to quality of care (Isaacs 1996; Hibbard and Jewett 1996; 1997). Poorly understood indicators are viewed as not useful. Many employees are confused by the information in report cards because it is poorly presented. Bettman and Zins (1979) report that some consumers process information by examining one choice at a time, in contrast to those who examine each aspect (e.g., premiums or quality scores) sequentially across all the choices. Presentation of the report-card data exclusively in one format may be confusing to those consumers who would prefer the alternative kind of display. Bettman and Zins suggest that a “matrix” format may be ideal for presenting general information.

Other employees may distrust *any* information given to them by employers (Meyer et al. 1998). In a recent national survey (Agency for Health Care Policy and Research [AHCPR] 1999), 58 percent of respondents said employers cannot be trusted to provide reliable information about the quality of different health plans “because employers’ main concern is saving money on health benefits.”

Lacking trustworthy sources of information, consumers rely extensively on informal advice from family and friends to help them make health care decisions (Sangl and Wolf 1996; Edgman-Levitan and Cleary 1996). For example, 52 percent of the respondents to the national AHCPR survey cited above say they would select a health plan strongly recommended by a friend rather than one rated much higher by independent organizations that evaluate plans. However, we are unaware of any study that has examined the number and types of information sources that consumers use when multiple sources are available.

The lack of evidence regarding the sources of information used by consumers may lead employers to ask the wrong questions about report cards. If consumers use only one information source but are willing to switch, then employers might want to convince them to select the report card as their favored source, assuming that the report card is valid and reliable. Alternatively, if employees will not switch to report cards, then employers must improve the accuracy of traditional information sources. For example, employers can work with health plans to improve the information content of their radio, television, and print advertisements for consumers who rely on these sources.

On the other hand, if consumers rely on multiple sources of information, the optimal employer strategy might be to ensure that employees receive consistent messages. For example, suppose that report-card users were to receive contradictory advice about the quality of health plans from their doctors. Each opposing message may “cancel out the other,” leaving consumers confused and unable to make informed choices. Employers would need to know this in order to devise strategies to promote informed employee choices (e.g., distributing report cards and working with physicians to improve quality).

This study asks consumers to report on the use of multiple sources of information. By linking consumers’ responses with variables that are theoretically related to the reasons why consumers seek information, we are able to explain their decisions to seek information from multiple sources. In the next section, we will present our theoretical model of why consumers seek information about health-care provider systems.

Theoretical Model

We based our theoretical model of why consumers seek information on earlier work by Hirshleifer and Riley (1979); we use a less technical presentation of their fundamental concepts. They consider an individual who must choose one of several alternatives, based on imperfect information about the value of those alternatives. The individual has an initial probability distribution of beliefs about different “states of the world.” To be specific, suppose an employee has to choose one of two alternative care systems under BHCAG. He or she knows there are two states of the world: either System 1 is better or System 2 is better. The individual’s initial beliefs relate to the probability that System 1 is better versus the probability that System 2 is better. The probabilities of all possible states of the world must sum to 1.0.

Before choosing, the consumer can acquire new information about the alternatives after receiving one of a known set of possible messages. In our context, a “message” may be conveyed through a report card, which states that System 2 has better perceived quality than System 1. After receiving a message, the consumer may revise his or her beliefs and possibly make a different choice. Hirshleifer and Riley note that, in the extreme case, the message about the true state of the world might be conclusive (i.e., the consumer is now certain that System 2 is better). More generally, however, the consumer’s revised, or “posterior,” belief after receiving the

message still reflects some uncertainty about the superiority of either system. The posterior belief can therefore be viewed as a compromise between the initial belief and the new belief that would be implied by accepting the message at its face value.

The individual's confidence in her initial beliefs is indicated by the degree to which she assigns a high probability to one of the states and low probabilities to the others. The greater her confidence, or the "tighter" her initial beliefs, the lower the likelihood that her posterior belief will be affected by new information. This implies that individuals who are confident that their current care system is the better choice will be less interested in acquiring new information.

Hirshleifer and Riley turn next to the revision of optimal actions, given the new information. They assume that a consumer maximizes expected utility, given his set of final probability beliefs. The value of any message may now be defined as the gain in utility that the consumer expects from shifting to a better choice after that message is received. No messages have negative value because the consumer can always make the old choice again after receiving new information. However, he does not know which message he will receive when he decides to seek information from a particular source, and thus not all information sources have the same value. As a general rule, the value of an information source is derived from the values of the different messages that may be received from it, weighted by the probability of receiving each message. To use our example again, suppose the consumer belongs to System 1 but would switch to System 2 were his doctor to recommend it highly, which he believes the doctor is likely to do. Therefore, "talking to my doctor" should have a high value for this consumer. Another consumer who believes his physician would recommend the care systems equally should place less value on this information source.

The model suggests several factors that may be related to the value of an information source. The first of these is the consumer's confidence in his initial beliefs. As noted above, a greater degree of confidence in those beliefs—that is, their tightness—makes it less likely that he will be influenced by new information. Conversely, a consumer with uncertain or "diffuse" beliefs will revise his probability estimate to accommodate the state of the world implied by the new message. As the size of the probability revision increases, so does the value of the information source that produces that message.

The second factor affecting the value of information relates to the consequences of the consumer's choices. In essence, if the consumer does not

care much about quality or customer service, then even conclusive information will have little value, and he will be unlikely to seek information about the alternative care systems.

Finally, the cost of acquiring information is a factor to be considered. Our model predicts that consumers would use all possible information sources if they were free. However, searching for information is costly, so the consumer is more likely to use low-cost information sources. Hirshleifer and Riley mention the cost of acquiring information but do not discuss how it might differ among sources, so they do not consider cost as a predictive factor in seeking information. If the cost of using different sources can be related to measured variables that differ among consumers, such variables can be included in our empirical models.

Study Setting and Data

The setting for our study is the Buyers Health Care Action Group, a coalition of 26 large employers in Minneapolis. Founded in 1991, BHCAG's mission is to stimulate reform of the health-care system by building a program based on four principles: improved quality; intensified provider competition; a growing assumption of responsibility by individuals themselves to become informed health-care consumers; and enhanced efficiency of health-care delivery (Robinow 1997). Since 1993, BHCAG has offered a health plan, called Choice Plus, to about 250,000 eligible employees and dependents. Choice Plus is a self-insured plan with out-of-network coverage. Until 1997, Choice Plus was offered under one contract with HealthPartners, a local health maintenance organization. Beginning in 1997, BHCAG altered the Choice Plus model by contracting with 15 distinct health-care provider systems, each constructed within a network of primary-care providers who can participate in only one care system. Care systems submit premium targets that are risk adjusted and grouped into three "cost tiers" (low, medium, and high) to establish employees' out-of-pocket premiums. Employees who select a lower-cost tier pay a lower premium contribution for the same set of benefits; the amount of the contribution varies across participating employers.

BHCAG offers a wide range of comparative information so that employees and their dependents can compare the care systems and the providers within them. All employers distribute a standardized report card that contains information on employee-reported satisfaction and

perceived care system quality. Employers also use internal communications (e.g., the company newsletter or e-mail) to inform employees of the options. Web sites, kiosks, educational sessions, and visits from care-system representatives round out the methods used by BHCAG employers to disseminate information. These activities are designed to make quality and cost differences visible to consumers, thus supplying them with the necessary information to select a care system intelligently.

In early 1998, shortly after the conclusion of the second open-enrollment period under the new care-system model, we conducted a telephone survey of about 1,800 BHCAG employees. The survey had two goals: to document how BHCAG employees used information in their enrollment decision; and to collect data for estimating models of cost-tier choice. We report here on our analysis of the information related to the first goal.

The survey was conducted with samples of employees from 19 of the 26 BHCAG employers. Those employers were selected because they were committed to offering Choice Plus as their only health plan and their open-enrollment periods occurred during the same period. The seven excluded companies either had late open-enrollment periods or offered additional health-plan options similar to Choice Plus. Selecting employers that offered only Choice Plus simplified the analysis by enabling us to focus on a subset of employees, all with the same choices. Selection of employers with the same open-enrollment period controls for the length of time between an employee's enrollment decision and the survey. Variation in the length of this period might otherwise affect the accuracy of an employee's recall about the information sources that he or she used to help with the choice of a care system.

Within these 19 firms, employees were sampled randomly, but the samples were stratified to increase the probability of drawing from employees in small companies. This approach ensured that employees from smaller firms were represented in the data. To be included in the survey, employees had to be enrolled in Choice Plus, with no eligibility for dual or substitute coverage through other private or public health insurance programs. Enrollment in Choice Plus was determined a priori from membership files, and screening questions on the survey were used to rule out dual eligibility. The screening questions also were used to limit the samples further: single-coverage employees had to be single with no dependents, and the spouses of employees with family coverage could not be eligible for any health insurance policy of their own. The

response rates to the survey were 96 percent for family coverage and 91 percent for single coverage.

The employee survey was supplemented with data obtained directly from BHCAG employers. The primary data required from employers comprised information about their initiatives to distribute information on the cost and quality of care systems. For example, we asked employers to define the methods they used to distribute information about health-plan options. Information on monthly out-of-pocket premiums (1997 and 1998) for single and family coverage in each cost tier also was collected from the employers.

This study analyzes the responses from 927 employees with single coverage (analysis of the family-coverage sample is ongoing). Sixty-five percent of the respondents with single coverage were female. Table 1 shows that their mean age was 37 years (the median age is 35 years) and that they had lived in the Twin Cities for 23 years. The average tenure with their present employer was eight years. Various occupations were represented in the survey, with the most common being office or clerical workers and professionals. The most common income category (50 percent of the sample) was \$20,000 to \$40,000 per year, with a median income of \$32,000.

Seventy-three percent of the employees reported themselves to be in excellent or very good health; 23 percent were in good health; only 4 percent reported fair or poor health. About 15 percent of the employees reported having one or more of the chronic health conditions listed in table 1. Slightly less than 80 percent had seen a doctor or other health professional in the last 12 months.

The survey asked employees whether or not they used the following six information sources when selecting their care system:

1. their employer
2. friends, relatives, or coworkers
3. a physician or other health professional
4. advertisements from the care systems
5. previous experience with doctors or hospitals in the care system
6. "other"

Inspection of written answers showed that the "other" source of information often was prior experience with clinics in the care systems. These answers were recoded as a subset of previous experience with doctors

TABLE 1
Descriptive Statistics

Variable	Definition ^a	Mean	SD	Min	Max
<i>Sources of information</i>					
INFOEMPL	used information from employer	0.591	0.492	0.000	1.000
INFOFRND	talking to friends, relatives, or coworkers	0.330	0.470	0.000	1.000
INFOMDS	talking to physician or other health professional	0.07667	0.266	0.000	1.000
INFOADS	advertisements from the care systems	0.131	0.337	0.000	1.000
INFOEXP	previous experience with doctors and hospitals in the care system	0.500	0.250	0.000	1.000
<i>Independent variables</i>					
AGE	age in years	37.721	12.075	19.00	71.00
TECHSCH	some college or technical school	0.325	0.469	0.000	1.000
COLLEGE	four-year college degree	0.370	0.483	0.000	1.000
POSTGRAD	postgraduate or professional education	0.126	0.332	0.000	1.000
INC2	annual income \$20,001–\$40,000	0.500	0.500	0.000	1.000
INC3	annual income \$40,001–\$60,000	0.145	0.352	0.000	1.000
INC4	annual income over \$60,000	0.0702	0.256	0.000	1.000
INCMISS	dummy variable for missing income	0.123	0.329	0.000	1.000
YEARINTC	number of years lived in Twin Cities	23.160	16.155	0.000	71.00
TENURE	number of years worked for current employer	7.999	8.253	0.000	43.00
CHRONIC	chronic health condition	0.154	0.362	0.000	1.000
SEEDOC	saw doctor or other health professional in last 12 months	0.789	0.408	0.000	1.000

TABLE 1 *continued*

Variable	Definition ^a	Mean	SD	Min	Max
<i>Independent variables (continued)</i>					
SPECIMP	rated importance of ability to see specialists in care system without any additional costs, even without a referral	0.422	0.494	0.000	1.000
INTCOMM	company used internal communication (newsletter, e-mail) to inform employees of health plan choice	0.594	0.491	0.000	1.000
CLASS	company held education sessions for all employees	0.470	0.499	0.000	1.000

^a*Dummy variable values:* 0 = no/not important, 1 = yes/important; *reference categories:* high school education or less, annual income \$2,000–\$20,000; *chronic conditions:* diabetes, asthma, hypertension, cancer, pregnancy, heart disease, depression (outpatient).

or hospitals in the care system. Because this left few people who used unclassified sources of information, the sixth category was dropped from the analysis.

Each employee could respond to questions about whether he or she used each source. Employers constituted the most popular source; and 76 percent of the employees turned to this source for information. Respondents were coded as using employer information to pick their current care system if they reported “using information from your employer (mail/e-mail/kiosk)” *or* if they reported seeing the “performance results” book that rated all care systems on several aspects of performance. In some of the analyses, we used a narrow definition that required a positive answer to the question on using employer information. Sixty percent of employees met this narrow definition, followed, in order, by previous experience with doctors and hospitals in the care systems (50 percent), talking to friends, relatives, or coworkers (33 percent), advertisements from the care systems (13 percent), and talking to a physician or other health professional (8 percent). On average, employees used 1.8 of the 5 information sources when they chose their current care system.

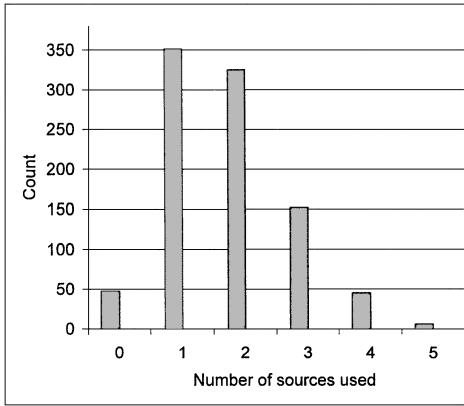


FIG. 1. Number of information sources used.

To help clarify the content of employer information, we asked employees whether they recalled seeing the report card distributed by employers. Sixty-three percent of individuals who used employer information recalled seeing the report card, and 59 percent of that group reported that they found it helpful when picking their current care system. Of those individuals who found the report card helpful, 40 percent thought the ratings on overall quality of care and service were most useful. Only 8 percent (eight individuals) of those who did not find the report card helpful expressed distrust of the information.

Figure 1 shows that 351 employees—the highest number—relied on a single information source, and, less commonly, two and three sources were consulted, a strategy reported by 325 and 152 employees, respectively. Forty-eight employees did not use any of the five information sources, and a few (45 and 6) used four or five sources. Employees who used only one source tended to rely on information from their employer or on their own experience. They were less likely than other users of information to rely on friends, advertisements, and physicians. Information from friends is added next, with advertisements and the advice of physicians rounding out the picture of those who took advantage of all sources of information.

Table 2 presents the other side of the picture: employers' efforts to inform consumers of their choices. All surveyed employers distribute report-card booklets to all eligible employees or on request. Most employers utilize internal communication, kiosks, and company-wide

TABLE 2
Employers' Information Programs

Company	Survey questions							
	Booklets	Booklets on request	Internal communication	Web	Kiosks	Education sessions	Education on request	Other
1	X	—	X	—	—	—	—	—
2	X	—	X	—	X	—	—	—
3	—	X	X	X	X	—	—	—
4	X	—	X	—	X	X	—	—
5	X	—	—	—	—	—	—	—
6	X	—	X	—	—	X	—	—
7	X	—	—	—	X	X	—	—
8	X	—	—	—	—	X	—	—
9	X	—	X	—	X	X	—	—
10	X	—	X	X	X	—	—	X
11	X	—	—	—	—	X	—	—
12	—	X	X	—	X	—	—	—
13	X	—	—	—	—	—	—	—
14	X	—	X	—	X	X	—	—
15	X	—	—	—	—	X	—	—
16	X	—	X	—	X	X	—	—
17	X	—	X	—	X	X	—	—
18	X	—	X	—	—	—	—	—
19	X	—	—	—	X	—	—	X

education sessions. Web sites and “other” forms of communication (from health-plan representatives) are each used by two employers.

These descriptive statistics indicate that 95 percent of the sampled employees used *some* information—most frequently from their employer—to choose a care system. However, most employees used only one or two sources, and almost 25 percent did not take advantage of their employer’s efforts to disseminate information (see table 2).

In the next section, we will discuss the degree to which empirical models can predict the use of different information sources.

Empirical Models

Our empirical models are based on the idea that the expected utility of a care system depends on the consumer’s out-of-pocket premium and the quality of the system. We assume that premiums are known with certainty because every BHCAG employer distributes this information at open enrollment. However, the quality of care systems is not known with certainty. Consumers may search for information from different sources to improve their estimates of the quality of their current system and the alternative choices.

The dependent variables in our models are the five information sources listed on page 57. Use of each source was coded as 1.0, and nonuse, as 0.0. The independent variables represent factors that may provide either positive or negative incentives to search for information. A consumer who has less confidence in his or her prior estimate of care-system quality is more likely to be influenced by new, contradictory information and to place more value on searching for information. Diffuse prior beliefs could be related to lack of experience with doctors and hospitals in the care system. Nelson (1970) refers to goods whose quality can only be determined through purchase and sampling as “experience goods.” This is an apt description of medical care because respectful treatment and involvement in decisions about their care are paramount issues for patients (Cleary and Edgman-Levitan 1997). These features of quality must be evaluated by experience, for which we have three measures:

1. the individual’s age
2. length of residence in the Twin Cities
3. whether a visit was made to a doctor or other health professional for any reason during the previous year

We hypothesize that older employees and those who have resided longer in the Twin Cities will have more experience with their current health care–system providers. If these hypotheses are correct, such employees will be less likely to search for new information.

Having at least one recent contact with a doctor is another indicator of experience with health-care providers. This variable may be interpreted in another way, however. People who visited a doctor at least once in the last year may be more concerned with the quality of alternative plans than those who do not visit the doctor. Such concern would increase the value of searching for better information. To reduce the ambiguity in predicting the effect of a recent physician visit, we included self-reported measures of health status and chronic conditions in the empirical model. Health status was coded in three mutually exclusive categories relative to the omitted category of “excellent”: very good, good, and fair or poor health. A dummy variable coded the presence of one or more of the following chronic health conditions: diabetes, asthma, hypertension, cancer, pregnancy, heart disease, or outpatient depression. We predict that poor health status or a chronic health problem will increase the value of information. After controlling for health status and chronic conditions, we predict that individuals who saw a doctor at least once in the last year will be less likely to use information from employers, friends, or advertisements. However, we predict that they will be more likely to use information conveyed by physicians and derived from their own experience because a visit to a physician lowers the cost of acquiring information.

Before including the measures of physician contact, health status, and chronic conditions in the model, we examined them for collinearity. Surprisingly, we found that they were not highly correlated. Thus, they all can be included in the model.

The next two variables in the empirical model are related to the expected quality of each care system: First, employees who rate as very important the ability to see a medical specialist at no additional cost, without the need even for a referral, should place a high value on knowing whether a care system permits self-referrals. Therefore, we predict that they will be more likely to use all sources of information. Of course, not all sources may provide sufficient information on specialty referrals, but we cannot identify those sources a priori. Insignificant guidelines for the importance of self-referral will determine insufficient sources. We coded this variable as 0.0 if self-referral is not very important or is somewhat important, and 1.0 if self-referral is very important.

Second, we predict that well-paid workers will place a high value on systems that are perceived to offer the best quality of care, which will lead to a positive association between the use of information sources and income. However, higher pay also increases the cost of a search if the opportunity cost of time is considered. Annual income is measured by three dummy variables:

1. \$20,001 to \$40,000
2. \$40,001 to \$60,000
3. greater than \$60,000

The omitted category is \$2,000 to \$20,000.

Care systems whose premiums have increased should be less attractive to consumers, but we assume that premiums are known with certainty. This assumption implies that employees do not need to search for information about premium increases. We included the premium increase for the employees' 1997 care system in the model because we expected that premium increases would not be related to the employees' use of the five information sources. Of course, high premium increases could be related to seeking information if they induce individuals to change care systems. However, the small premium increases that occurred between 1997 and 1998 may not have induced either switching or an information search. Because some employees did not report the name of their 1997 care system, we created a dummy variable to indicate missing data on premium increases (the dummy variable equals 1.0, and the premium increase equals 0.0 if the premium increase is missing).

We also used the employees' self-reports on the importance of low premiums to determine whether employees who view this feature as critical will search for more information. Again, we do not believe this will be the case if premiums are known with certainty.

We also included cost-tier dummy variables, based on the hypothesis that employees selecting low-priced care systems may be more concerned about potential "skimping" on care and thus may be more likely to look at quality data. However, the use of quality data may also determine the choice of cost tier. We believe that individuals who use quality information will select the high-cost tier. In other words, information and cost-tier choice may be simultaneously determined, with one possibly offsetting the other as a causal effect.

The next variable in the empirical model is related to the use of a specific source: information from the employer. We hypothesize that people who have worked longer for their current BHCAG employer will have more trust in information from that source. The Hirshleifer and Riley model might define “trust” as a high probability of receiving a message that corresponds to the true state of the world. This would imply that the employee pays more attention to a message from her employer that contradicts her own prior estimate of health-plan quality. The hypothesized relation between job tenure and trust could be either causal or the result of self-selection (distrustful employees will move to another employer). In either case, employees with longer tenure should be more likely to utilize information from the employer. Our measure of tenure is the number of years worked for the current employer.

The hypothesis that certain groups would use different methods of seeking information led to the inclusion in the models of three interactions: high-income workers with a chronic health condition; highly educated workers with longer residence in the Twin Cities; and workers with a chronic health condition and longer residence in the Twin Cities. High-income workers with a chronic condition may choose not to use employer information—namely, the report card—because this information represents the experience of a typical worker, and neither their health nor their economic status is typical. Highly educated or chronically ill workers with longer residence in the Twin Cities may rely on information sources that they consider to be more trustworthy than any that their employer would supply, such as previous experience with doctors in the care system or having a friend who is a physician. In order to limit the number of variables in the model, these interactions were created with continuous measures of income and years of schooling.

BHCAG employers conduct programs to inform employees of the cost and quality of different care systems. We used three dummy variables to represent the use of three of these programs:

1. internal communication (e.g., the company newsletter or e-mail)
2. kiosks
3. education sessions for all employees

Each dummy variable is coded as 1.0 if the employer uses the program. We expect that employees in these firms will be more likely to report using information from the employer. Several other programs were not

included in the model because they were either used by all employers or were used infrequently. The next section provides detailed information on the patterns of employer information programs.

Our model includes one variable related to the cost of seeking information: the worker's education. We predict that highly educated workers will spend less when seeking information. Education is measured by three dummy variables: some college or technical school; a four-year college degree; and postgraduate or professional education. The omitted category is high-school education or less.

Finally, the employee's gender was included in the model as a control variable. We have no hypothesis on how gender affects the search for information.

Statistical Methods

Three statistical methods were used to estimate the empirical models. The first method relies on *univariate probit analysis*, which estimates the probability of using *each* information source independently of the probabilities of using other sources. The second method is *ordered probit* (McKelvey and Zavonia 1975), which estimates a single equation to predict the *number* of information sources used. The third method, *multivariate probit analysis*, which is a direct extension of univariate probit, estimates the information-seeking equations *jointly*, assuming that the error terms are correlated among the equations. Multivariate probit avoids an important shortcoming of univariate probit for the analysis of multiple, discrete choices (e.g., of information sources): it is not subject to the problem of unobserved employee attributes. For example, employees with chronic health problems that cause them to be loyal to their current care system may not search for any new information. Because our measures of health status are imperfect, some of these variables will be omitted from the empirical models. This will cause the errors in the univariate probit equations to be correlated, overstating the precision of the estimates. Multivariate probit avoids this problem by estimating the correlations among the error terms in the information-seeking equations. This method relies on the Geweke-Hajivassiliou-Keane simulator for the multivariate, normal, cumulative distribution function (see Greene 1997, chapter 5, for details).

Results

Our first results are the univariate probit models. We estimated several preliminary models before arriving at the final specifications reported in table 3. The preliminary models indicated that the employee's gender and self-reported health status never reached statistical significance at the 10 percent confidence level. These variables were dropped from further consideration. Neither the self-rated importance of out-of-pocket premiums nor the premium increase for the employee's 1997 care system was significant. These results are consistent with the hypothesis that employees do not need to search for information about premiums. The variables related to premium increases, premium importance, and cost tier also were dropped. The insignificance of the cost-tier variables could be a result of the two opposing effects mentioned above. The signs, magnitudes, and significance of the remaining coefficients are not changed by the elimination of any of these variables.

The first univariate probit equation in table 3 shows that post-high school education is positively related to the use of information from the employer. This finding is consistent with our hypothesis that education reduces the cost of searching for information. Having a college education adds 14 percent to the probability of using employer information, compared with high school; postgraduate education adds 16 percent. Even the category of technical-school education increases the probability of using employer information by 10 percent, compared with high school.

The interaction variables have mixed effects on the probability of seeking employer information. As we expected, highly educated workers who have resided longer in the Twin Cities are less likely to use employer information; the probability of using employer information is also reduced when a higher value is placed on the ability to see a specialist without a referral. It is possible that employees who want access to specialists will seek information on this care-system attribute from other sources.

For every additional year the employee has lived in the Twin Cities, the probability of using employer information increases by .7 percent. Years of tenure (TENURE) with the current employer and the employer's use of internal communications (INTCOMM) are positively related to using information from the employer, but these effects are not significant at conventional confidence levels. However, when we analyzed the narrow definition of employer information ("using information

TABLE 3
Results from Univariate Probit Models

Variable	Information from									
	Employer		Friends		Physicians		Ads		Experience	
	Marginal ^a	<i>t</i> -ratio	Marginal	<i>t</i> -ratio	Marginal	<i>t</i> -ratio	Marginal	<i>t</i> -ratio	Marginal	<i>t</i> -ratio
CONSTANT	0.138	1.74*	0.067	0.747	-0.189	-3.99***	-0.328	-5.20***	-0.213	-2.16**
AGE	-0.00003	-0.017	-0.006	-3.26***	-0.0006	-0.621	0.002	1.76*	0.0003	0.13
TECHSCH	0.108	2.21**	0.031	0.541	-0.04	-1.43	-0.024	-0.624	0.003	0.046
COLLEGE	0.145	2.32**	0.097	1.34	-0.055	-1.49	0.005	0.107	-0.152	-1.93*
POSTGRAD	0.162	1.93*	0.125	1.31	-0.118	-2.26**	0.015	0.227	-0.14	-1.35
INC2	-0.039	-0.93	-0.038	-0.828	0.008	0.335	0.016	0.509	0.039	0.766
INC3	0.079	1.34	-0.123	-1.96**	-0.01	-0.31	-0.004	-0.094	0.007	0.105
INC4	-0.014	-0.195	-0.151	-1.86*	0.079	2.18**	-0.109	-1.72*	-0.032	-0.371
INCMISS	-0.073	-1.35	-0.147	-2.33**	-0.028	-0.816	-0.054	-1.19	0.037	0.556
YEARINTC	0.007	2.25**	0.006	1.66*	-0.003	-1.77*	0.00004	0.015	-0.004	-1.10
TENURE	0.003	1.28	0.002	0.654	-0.0003	-0.254	0.002	1.1	-0.003	-1.07
CHRONIC	0.047	0.488	0.021	0.186	0.064	1.29	0.07	0.921	-0.105	-0.857
SEEDOC	-0.043	-1.17	-0.068	-1.74*	0.054	2.16**	0.03	1.04	0.165	3.79***
INTCOMM	0.035	1.21	-0.007	-0.215	-0.015	-0.931	0.014	0.619	-0.06	-1.71*
CLASS	-0.012	-0.413	0.071	2.25**	0.028	1.72*	0.024	1.08	0.007	0.201
SPECIMP	-0.056	-1.94*	-0.029	-0.889	-0.015	-0.913	-0.057	-2.51**	0.072	2.07**
EDRES	-0.002	-2.17**	-0.001	-1.327	0.001	2.46**	-0.0003	-0.389	0.003	2.89***
INCHRON	-0.000002	-0.936	0.000002	0.779	-0.0000002	-0.265	-0.0000004	-0.293	0.000004	1.71*
RESCHRON	-0.001	-0.421	-0.003	-1.068	-0.00002	-0.015	-0.001	-0.66	-0.0009	-0.293

* = significant at $\alpha = .10$ in 2-tailed test; ** = significant at $\alpha = .05$; *** = significant at $\alpha = .01$.

^aThe marginal effect of employee attribute X is $\delta\Phi/\delta X = \beta\phi$ where Φ is the standard normal distribution function, ϕ is the density function, and β is the coefficient of X . Φ and ϕ are evaluated at the means of all the independent variables in the univariate probit equation.

from your employer [mail/e-mail/kiosk]”), TENURE and INTCOMM were significant. These findings support our hypotheses that employees’ trust in employer information is directly related to their tenure with the employer, and that employers can influence the use of information through internal communications. The employer’s use of internal communications increases the probability that an employee will utilize information from the employer by about six percentage points, according to this analysis.

Younger workers and those with lower incomes are more likely to rely on information from friends. The effect of age was predicted, but that of income was not. Holding classes (CLASS) also promotes the use of information from friends. Employees may view classes as an opportunity to talk with friends about health insurance, rather than as a forum for listening to messages from the employer. The marginal effect of holding classes raises the probability of using information from friends by seven percentage points. Finally, as we predicted, employees who saw the doctor at least once last year (SEEDOC) were less likely to use information from friends when they picked their current care system.

Using information from physicians is influenced by six variables: First, employees who have seen a doctor at least once in the last year are more likely to use information from physicians. We had predicted that individuals who saw a doctor would have lower costs for acquiring this type of information, so this effect is consistent with our prediction. High-income workers (INC4) are more likely to use information from physicians. Those who have resided longer in the Twin Cities or have received a postgraduate degree are less likely to use information from physicians. However, the interaction of residence and education produces the opposite effect: greater reliance on information from physicians. Finally, employees are more likely to seek information from physicians if their employers hold education sessions.

High-income employees are less likely to rely on advertisements from the care systems, as are employees who place more importance on the ability to see specialists without a referral (SPECIMP). There are several possible explanations for the negative effect of SPECIMP: care systems that restrict self-referrals may not wish to emphasize that restriction in their advertisements; employees who particularly value self-referrals may not trust this information source; older workers may rely more heavily on information derived from advertisements.

The probability of using information from the employee's own experience is negatively related to higher education but positively related to the interaction of education and number of years of residence in the Twin Cities. Employees who value the ability to self-refer to specialists tend to rely on their own experience to select a care system, as do high-income workers with chronic health problems. These findings suggest that workers who want unrestricted access to specialists prefer to confirm this feature of care systems firsthand rather than through other sources (e.g., relying on employer information). Finally, the use of internal communications by BHCAG employers reduces the degree to which employees rely on their own experience in choosing a care system by six percentage points.

The next result, shown in table 4, is an ordered probit equation for the number of information sources used. This equation assumes that the propensity to seek information from all sources is monotonically related

TABLE 4
Results from Ordered Probit Model: Number of Sources Used

Variable	Coefficient	<i>t</i> -ratio
CONSTANT	1.46	7.07***
AGE	-0.004	-0.938
TECHSCH	0.113	0.937
COLLEGE	0.092	0.587
POSTGRAD	0.093	0.441
INC2	-0.034	-0.31
INC3	-0.074	-0.491
INC4	-0.209	-1.14
INCMISS	-0.289	-2.02**
YEARINTC	0.007	0.838
TENURE	0.004	0.628
CHRONIC	0.145	0.581
SEEDOC	0.127	1.37
INTCOMM	-0.03	-0.409
CLASS	0.126	1.74*
SPECIMP	-0.093	-1.25
EDRES	0.0006	0.257
INCHRON	0.000002	0.506
RESCHRON	-0.005	-0.882

* = significant at $\alpha = .10$ in 2-tailed test; ** = significant at $\alpha = .05$;
*** = significant at $\alpha = .01$.

both to observed attributes of the employee and to the employer's educational efforts. However, the only significant variable in this equation is the employer's use of classes, which increases the number of information sources consulted. The overall significance level for this equation is just 5 percent. This reinforces the findings, shown in table 4, that different variables influence the use of each information source.

The multivariate probit models mostly agree with the univariate probits. These results are reported in table 5 and 6. We focus on the correlation coefficients in table 6, which measure the relations among the error terms in the information-seeking equations. Positive correlations imply that common, unmeasured factors leading employees to use one information source also lead them to use another. Negative correlations indicate inverse relations or substitution among information sources.

Table 6 shows that four of ten correlation coefficients are statistically significant. Omitted variables associated with seeking information from the employer also lead employees to rely on friends and physicians. Use of information from friends is positively associated with relying on physicians and advertisements. None of the significant correlations is negative, which implies that information sources are not substitutes. They tend to be used together, but in specific ways that appear to center on the employer, friends, and physicians.

To aid in interpreting these correlations, we specified additional univariate probit models that used several information sources as right-hand-side regressors in the equations for other sources. For example, we included information from friends in the equation for using employer information and found that the estimated coefficient was positive. In the information-from-friends equation, we included information from physicians and advertisements (both effects were positive).

Discussion

Cleary (1999) cites the need for research to clarify how people value different types of quality information. He suggests designing the research so that it measures how these values differ among subsets of the population, such as individuals with different educational backgrounds, financial resources, and health status. He also notes the paucity of research that evaluates how information influences health-care decisions, or even how consumers interpret the information once it is presented. Cleary calls

TABLE 5
Results from Multivariate Probit Model

Variable	Information from									
	Employer		Friends		Physicians		Ads		Experience	
	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio
CONSTANT	0.671	2.74***	0.320	1.370	-1.898	-4.76***	-1.564	-5.02***	-0.792	-3.24***
AGE	0.0002	0.042	-0.017	-2.95***	-0.005	-0.568	0.012	1.62	-0.00006	-0.012
TECHSCH	0.159	1.11	-0.031	-0.224	0.015	0.063	-0.149	-0.850	0.252	1.91*
COLLEGE	0.145	0.999	0.074	0.506	0.135	0.547	-0.025	-0.136	0.044	0.319
POSTGRAD	0.092	0.493	0.107	0.555	-0.152	-0.474	0.020	0.077	0.215	1.21
INC2	-0.113	-0.780	-0.091	-0.691	0.024	0.096	0.069	0.405	0.087	0.664
INC3	0.217	1.07	-0.324	-1.75*	-0.111	-0.344	-0.055	-0.253	0.077	0.443
INC4	-0.063	-0.257	-0.364	-1.57	0.581	1.72*	-0.577	-1.51	-0.028	-0.125
INCMISS	-0.195	-1.07	-0.427	-2.35**	-0.209	-0.666	-0.255	-1.09	0.032	0.186
YEARINTC	0.002	0.599	0.003	0.794	0.007	1.25	-0.005	-1.25	0.016	4.49***
TENURE	0.009	1.09	0.004	0.537	-0.003	-0.276	0.009	1.03	-0.008	-1.12
CHRONIC	-0.097	-0.694	-0.001	-0.010	0.404	2.24**	0.123	0.746	0.002	0.012
SEEDOC	-0.126	-1.02	-0.183	-1.63	0.421	1.85*	0.149	0.968	0.395	3.52***
INTCOMM	0.115	1.16	-0.014	-0.144	-0.126	-0.846	0.078	0.628	-0.150	-1.65
CLASS	-0.045	-0.448	0.196	2.13**	0.212	1.390	0.111	0.956	0.028	0.313
SPECIMP	-0.187	-1.86*	-0.079	-0.823	-0.103	-0.590	-0.286	-2.43**	0.178	1.98**

* = significant at $\alpha = .10$ in 2-tailed test; ** = significant at $\alpha = .05$; *** = significant at $\alpha = .01$.

TABLE 6
Multivariate Probit Correlation Coefficients^a

Sources	Friends	Physicians	Ads	Experience
Employer	.2031 (3.24)***	.1874 (1.65)*	.0373 (.449)	-.0419 (-.684)
Friends	—	.3253 (3.95)***	.1970 (2.63)***	.0256 (.435)
Physician	—	—	.1211 (1.14)	.1145 (1.19)
Ads	—	—	—	-.0632 (-.876)

^at-ratios are in parentheses.
* = significant at $\alpha = .10$ in 2-tailed test; *** = significant at $\alpha = .01$.

for testing of the assumption that public dissemination of information is the best way to facilitate the provision of high-quality care. Several conditions are necessary before the disclosure of quality information will result in better care:

1. The information must be valid.
2. The information must be salient to decisions.
3. The information must be presented in a useful format.
4. The information must be read and understood.
5. The information must either influence decisions or be perceived to influence them.
6. A sufficient number of providers must participate.
7. Poor providers must either fail or improve in response to the information.

This is an extensive agenda, and our study deals with only a few of these conditions, notably salience and usefulness of information. However, we found some significant results.

First, conventional wisdom holds that employees do not trust information from their employer and do not rely on this information to make health care choices. Our study has shown that this generalization is not always appropriate. Sixty to 76 percent of the employees in the BHCAG purchasing coalition referred to employer information when selecting a

care system, depending on our coding of this variable. Only eight individuals reported that they did not trust the report card distributed by BHCAG employers. Predictions about the use of information from employers can be derived from knowledge of employee demographics, such as education and years of residence in the Twin Cities. Employer strategies that supplement the distribution of internal information to employees, through, for example, mail, e-mail, and kiosks, are also important. The results from the employer-information equation may explain the apparent lack of success of other studies in predicting the use of information supplied by employers. Fowles's (1998) model did not include two variables related to the use of employer information: tenure with the employer and length of residence in the area (both with positive effects). On the other hand, we did not follow Fowles's lead of including the employee's assessment of the difficulty of choosing a health care system in our models. This variable may be influenced by the use of information—ideally, employees who use information will view the choice as easier, rather than as more difficult. If this is the case, then the difficulty of choosing a care system is endogenous and should not be included in the information equations.

We also made some progress in answering our second research question about the factors that affect the use of other information sources. From a policy perspective, it may be important that holding classes increases the probability of employees' using information from friends and physicians rather than from their employer. It may also be of interest that older and low-income workers are more likely to use information from advertisements. To the degree that such information is not accurate, these workers might be influenced by misleading advertisements. As we pointed out earlier, our analysis does not suggest which information sources are more accurate, so we stop short of recommending more use of internal communication and classes or less exposure to advertisements. However, these are options that employers might want to investigate.

Third, we found that certain information sources tend to be used together. Use of information from the employer is associated with obtaining information from friends and physicians. Employees who talk to friends also listen to physicians and advertisements. However, we did not find support for the existence of an "information-seeking" employee whose observed attributes cause him or her to use more information sources.

The empirical estimates provide modest support for Hirshleifer and Riley's model of seeking information. For example, longer tenure appears

to promote greater trust in mail, e-mail, or kiosk information from the employer. Employers with stable workforces who are not currently providing information to employees may wish to begin doing so. In addition, individuals who have been seeing a doctor during the last year are more likely to select a care system based on information from physicians and on their own experience. We had hypothesized that employees who saw a doctor should have greater confidence in their assessment of quality and, hence, a lower probability of using informal sources of information, such as friends and advertisements. Those predictions were confirmed. However, our overall impression is that we need to learn more about the expected benefits and costs of a *specific* information source before applying the model. For example, the use of information based on experience is strongly linked to the number of years lived in the Twin Cities. This effect suggests that the cost of obtaining information from experience is lower for employees with longer residence in the Twin Cities.

The results suggest that employers can predict which information source or sources their employees will use. However, the employer's strategy must be matched with the characteristics of its workforce because what works in one situation may not apply in another. This conclusion is important for employers who want to promote a price- and quality-conscious health-care purchasing program.

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