MAINTANING RESPONSE RATES IN A PHYSICIAN SURVEY

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I. Introduction

The American Medical Association's (AMA's) Socioeconomic Monitoring System (SMS) is an ongoing annual survey of patient care physicians, which collects data on medical practice characteristics (including hours worked, number of patient visits, managed care participation, fees, practice income and expenses). SMS is administered primarily as a CATI survey. Survey response rates have declined from a high of 70% to about 60% in recent years. Consequently, special efforts, which are becoming increasingly expensive, are needed to obtain acceptable response rates.

The objective of this study is to assess the efforts to enhance survey response. Data comparability and characteristics of respondents to the SMS survey who were "easy" versus "difficult" cases will be examined. Difficulty of response will be modeled utilizing number of calls made. Data quality and estimates for key survey variables for easy and difficult respondents will be compared. Finally, the consequences of accepting lower response rates will be examined by comparing the cumulative estimates of key survey variables that would be obtained if the number of calls were limited. This study uses data from the 1992-1996 SMS core surveys.

II. Survey Description

The first SMS survey was conducted in the fourth quarter of 1981. The survey was conducted quarterly through 1985, then semi-annually through 1991, and annually since then. Starting in 1982 the survey has included a "Core" survey conducted in the spring/summer. It typically has had a larger number of observations (4,000) and is longer (25 minutes) than the quarterly and autumn surveys. Since 1992, the AMA has contracted with RAND for the data collection. Prior to that, Mathematica Policy Research was the survey firm.

The SMS sample design is a random sample from the eligible physicians on the AMA Physician Masterfile. The Masterfile contains current and historical information on every doctor of medicine in the United States. In order to provide reliable estimates of short-term changes in certain indicators the SMS survey also includes a panel component. The panel consists of a portion of the sample interviewed in the prior SMS survey. Approximately one-third of the completed interviews are conducted as reinterviews with physicians who had been interviewed in the SMS survey the previous year.

Since inadequate coverage is a potential problem for telephone surveys, the survey contractor expends considerable effort to locate sample physicians. Field procedures developed for SMS reflect a complex effort to minimize bias from nonresponse and to accommodate the busy schedules of physicians through advance preparation and intensive follow-up efforts to complete interviews. Prior to data collection, advance packets are sent to each physician in the sample. A number of efforts have been implemented over time to ensure a high response rate:

- A toll-free number is provided, allowing physicians to complete the interview at their convenience.
- In some years, mail questionnaires, tailored to each specialty, have been made available to physicians who indicate a preference for responding to the survey in writing (Thran and Wozniak, 1996).
- Repeated callbacks to nonrespondents are made before abandoning efforts to interview the physician.
- Letters encouraging participation and addressing specific objections are sent to physicians who initially refuse to be interviewed.
- Refusal conversion attempts are made by a select group of interviewers.
- The physician may name a proxy respondent to complete some or all of the interview.

III. Background

Berk (1985) examined the value of efforts to increase the response to the Physicians' Practice Survey, a component of the National Medical Care Expenditure Survey. The analysis focused on early, middle, and late survey respondents (i.e., those who responded in months 1-2, 3-4, and 5-6, respectively). Data quality was better among the early respondents than the other groups of respondents. Late-responding physicians differed from early respondents on several characteristics; however, differences in the cumulative estimates that would be obtained if the survey were ended at various times were generally small. The study

concluded that an emphasis on high response rates may be unwarranted.

Mueller, Berk, and Schoenman (1996) repeated the analysis conducted by Berk, examining respondents to the 1994 National Survey of Physicians. Survey respondents were categorized as early respondents if they responded within the first 30 days of the field period, middle respondents if they responded in days 31 to 63, and late respondents if the response was obtained in days 65 to 130. Compared to early respondents, late respondents had higher incomes, were less likely to be salaried, and spent more time providing patient care per week. Early and late respondents were similar with respect to likelihood and extent of participation in managed care, likelihood of board certification, time spent treating Medicare and Medicaid patients, practice ownership, and expected changes in practice organization.

IV. Motivation and Analysis

Between 1992 and 1996, the share of physicians in a practice with at least one managed care contract increased from 70% to 88% (Gillis and Emmons 1993; and Emmons and Wozniak 1997). The proportion of patient care physicians practicing as employees also rose dramatically during much of this period (Kletke, Emmons, and Gillis 1996). If increased managed care participation and employee status make physicians reluctant or unable to participate in surveys, additional efforts may be needed to maintain current response rates. We expect that employee physicians may not have the flexibility to alter their work schedules to allow time to complete the survey or may be instructed by their employer not to participate. Involvement with managed care organizations may also limit physicians' scheduling flexibility. We found that between 1992 and 1996 the average number of calls made to SMS survey respondents increased from 9.6 to 16.6, as shown in Table 1.

The objective of this study is to evaluate the effectiveness of efforts employed to increase survey response, and examine the effect those efforts have on survey responses. The analysis focuses on the number of calls required to complete the survey as a measure of effort. We consider the continuous variable total calls and the four groups of respondents corresponding to the first, second, third and fourth quartiles of the distribution of total calls in each year.

First, we examine demographic and practice characteristics for respondents requiring different levels of effort in a univariate context, using frequency distributions. Next, we use regression analysis to investigate the relationship between demographic and practice characteristics and the number of calls required to complete the survey. We also present the results from regression equations for several key survey variables, to determine whether the number of calls made affects survey responses, when controlling for demographic and practice characteristics. For these survey variables, we also examine the effects on means and standard deviations of limiting the number of calls made, i.e., excluding those cases that required more than 25 calls to complete. As a measure of data quality among the reluctant respondents, we examine logistic regressions on item response to key variables, using number of calls made as well as demographic and practice characteristics as explanatory variables. We also examine the distributions of calls made to survey respondents and to the eligible sample cases who did not respond to the survey.

V. Results

Table 1 presents statistics on the total number of calls made to survey respondents for each year between 1992 and 1996. Except for a decrease in 1994, the mean number of calls increased steadily over this period. The mean in 1992 was 9.6 and in 1996 was 16.6. The distribution of total calls was fairly stable for the 1992 - 1995 period. In 1996, however, the maximum number of calls increased dramatically, as did the median number of calls and the number of calls at the 75th and 90th percentiles.

Distributions of various demographic and practice characteristics for survey respondents in each of the quartiles of total calls were examined (table not presented here). A number of significant differences were found between those who responded after a different number of call attempts. For example, responses involving proxies required more calls than interviews completed by physicians. Physicians who were owners of their practice required more calls than physicians who were not owners, contrary to our expectation that employees would have less control over their time and be more difficult to interview than practice owners. Physicians in practices with managed care contracts required more calls than did those who had no contracts. Also, the average patient waiting time increased with the number of calls required to complete the interview, indicating additional efforts are required to interview busier physicians.

The least squares coefficient estimates from the regression analysis of total number of calls made to survey respondents for 1992 - 1996 are presented in Table 2. The explanatory variables are waiting time, years since graduation and the square of that value (EXPER and EXPER2), dichotomous variables created from demographic and practice characteristics, and dummy variables for survey year. The reference categories are: cases in the initial sample, physician

respondents, non-AMA members, office based, New England, rural, male, solo, self-employed, U.S. medical graduate, not board certified, in general family practice with no managed care contracts who responded to the 1992 survey. Except for the coefficients of the dummy variables for physician gender and some specialties and census regions, all of the coefficients of the explanatory variables are significantly related to the number of calls. These results are generally consistent with those from the univeriate analysis.

To determine the effect of level of effort (i.e., number of calls required) on estimates of key survey variables, regression equations were estimated on total hours per week, total visits per week, the log of annual practice expenses and the log of net income. The explanatory variables include those in the number of calls equation from Table 2, and the number of calls made and the square of that value (TOTC and TOTC2). As shown in Table 3, after controlling for the demographic and practice characteristics, the number of calls required had a significant positive effect on the number of hours worked per week, the number of patient visits per week, the log of practice expenses, and the log of net income. Thus, busier physicians whose time is more valuable require more call attempts.

We examined means and standard deviations for the selected survey variables for each year between 1992 and 1996, and for the combined years (table not presented here). We examined estimates based on all survey respondents. and estimates that would have been obtained if we had set a limit on the number of calls made -- i.e., not allowed more than 25 calls to be made to any case in the sample. Large differences in survey estimates would not be observed if the number of calls was limited in this way. However, the mean values for each of the variables examined would be somewhat lower without these additional cases and standard deviations would generally be lower.

Table 4 presents the odds ratios from logistic regressions on the probability of response to the net income and practice expense items. We expected that data quality may suffer as a result of the extra effort being expended by making numerous calls. In support of this hypothesis, we found that the number of calls made has a significant negative effect on item response for both net income and practice expenses (as indicated by an odds ratio of less than 1.0). Apparently, reluctant survey respondents are also reluctant to respond to specific survey items.

Finally, we examined the frequency distribution of the number of calls made to eligible sample members who did not complete the survey, and the call distribution for survey respondents (figure not presented here). The lower tails of the two distributions are similar, but the upper tail is much longer for the non-respondents. This is an indication that extreme efforts at repeated calls are not efficient, since they rarely lead to survey responses.

VI. Conclusion

The number of calls required to complete an interview is related to physician demographic and practice characteristics, e.g., practice ownership and managed care participation. The level of effort is related to survey responses for key variables; the respondents requiring more effort tend to work more hours and have higher incomes and practice expenses. Data quality appears to be lower for the respondents requiring the greatest number of calls.

Limiting the number of calls made (while improving the efficiency of call scheduling) should be seriously considered. However, we would not want to make a strict limitation since estimates of survey variables and survey response rates would be affected. Alternate approaches for obtaining responses from reluctant respondents should be considered.

References

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Table 1: Number of Calls Made to Survey Respondents

	'92	'93	'94	'95	'96
Mean	9.6	13.1	11.1	13.8	16.6
Std. Deviation	5.4	8.9	7.8	9.8	12.9
Minimum	1.0	1.0	1.0	1.0	1.0
Maximum	59.0	51.0	45.0	59.0	81.0
Mode	5.0	5.0	3.0	6.0	5.0
25th Percentile	5.0	6.0	5.0	6.0	6.0
Median	9.0	11.0	9.0	11.0	13.0
75th Percentile	14.0	19.0	16.0	20.0	24.0
90th Percentile	17.0	26.0	23.0	29.0	35.0

Table 2: Regression Equation for Total Number of Calls, 1992-1996 combined

Variable	Parameter Estimate	Variable	Parameter Estimate
INTERCEPT	8.16	OBGYN	0.31
PROXY	6.44***	RAD	--
REINT	0.33***	PSYCH	-0.72
WAITTIME	0.01**	ANES	5.37
HOSPBASE	-0.46	PATH	-5.57
CERT	-0.39*	EM	-3.78
EXPER	0.09**	OTHER	-0.56
EXPER2	-0.003***	EMPLOYEE	-0.18
MIDATL	-0.86*	GROUP	1.18**
ENCENT	-0.52	YR93	3.55**
WNCENT	-0.67	YR94	-2.11**
SATL	-0.88*	YR95	4.33**
ESCENT	-0.91*	YR96	6.53**
WSCENT	-1.22**	FEMALE	0.13
MOUNTAIN	-0.35	FMG	0.57**
PACIFIC	-0.27	AMA	-0.53**
GIM	0.05	SMALLMET	0.90**
IMSUB	0.61	LARGEMET	1.11**
GSUR	-0.53	MCCONT	0.39*
SURSUB	-0.76**		
PED	-0.54	ADJUSTED R^2	0.19
		F value	77.22**

Note: All results are weighted. Radiologists are excluded because they were not asked about waiting times.
*, **, *** p=0.05, 0.01, and 0.001 respectively

Table 3: Regression Equations for Key Variables, 1992-1996 Combined

Variable	Hours/Week	Visits/Week	Log Practice Expenses[a]	Log Net Income[a]
INTERCEPT	60.93	129.60	10.66	10.86
TOTC	0.17**	0.45**	0.01**	0.01**
TOTC2	-0.002*	-0.01	-0.0002*	-0.00
PROXY	-0.63	-3.91**	0.24***	0.09***
REINT	-1.09***	-1.14	0.05	0.01
HOSPBASE	-1.12*	-12.01***	-0.24***	0.05**
CERT	-0.82**	-2.55*	0.08*	0.17***
EXPER	0.01	1.50***	0.04***	0.04***
EXPER2	-0.01***	-0.04***	-0.0008***	-0.00***
MIDATL	1.99***	10.77***	-0.01	0.03
ENCENT	1.13*	12.35***	0.02	0.07**
WNCENT	3.17***	17.88***	0.04	0.07*
SATL	2.29***	11.06***	0.12	0.06*
ESCENT	1.91**	21.11***	0.09	0.04
WSCENT	2.83***	11.85***	0.11	0.09***
MOUNTAIN	1.79*	6.20*	0.04	0.00
PACIFIC	1.29*	3.62	0.07	0.03
GIM	2.93***	-20.66***	0.23***	0.15***
IMSUB	3.67***	-40.23***	0.36***	0.46***
GSUR	3.88***	-50.03***	0.23***	0.51***
SURSUB	-1.32**	-37.53***	0.67***	0.57***
PED	1.53**	-1.59	0.19**	0.11***
OBGYN	4.20***	-30.17***	0.61***	0.51***
RAD	-2.27***	16.47	- -	0.63***
PSYCH	-5.61***	-56.97	-0.66***	0.20***
ANES	-0.23	- -	- -	0.65***
PATH	-6.78***	-11.30	-0.66***	0.45***
EM	-4.33***	-7.62**	-1.09***	0.42***
OTHER	-2.23***	-29.38***	0.22***	0.26***
EMPLOYEE	-4.49***	-9.23***	- -	-0.01
GROUP	-0.86**	11.06***	0.11***	0.25***
YR93	-0.27	-1.90	0.06	0.03
YR94	0.08	-1.82	0.04	0.06***
YR95	-1.62***	-3.90**	-0.03	0.00
YR96	1.57**	0.81	0.07	0.05*
FEMALE	-5.58***	-19.12***	-0.15**	-0.26***
FMG	2.48***	-0.77	-0.02	0.01
AMA	2.57***	5.20***	0.24***	0.12***
SMALLMET	-1.35***	-12.76***	-0.01	0.04*
LARGEMET	-2.32***	-22.82***	-0.07	0.04*
MCCONT	1.59***	4.75***	0.11***	0.05***
Adjusted R^2	.1138	.1595	.1464	.2462
F	60.640***	67.749***	40.565***	123.549***

Note: All results are weighted.
[a] Adjusted for inflation
*, **, *** p=0.05, 0.01, and 0.001 respectively

Table 4: Logistic Regression on Probability of Item Response, 1992-1996 Combined

	Response to Net Income	Response to Practice Expenses
Variable	**Odds Ratio**	**Odds Ratio**
INTERCPT	5.378	2.415
PROXY	0.259***	0.497***
REINT	1.447***	1.285***
TOTC	0.946***	0.943***
TOTC2	1.000**	1.001**
HOSPBASE	1.101	1.128
CERT	1.085	1.151*
EXPER	0.993*	1.026**
EXPER2	1.000	0.999***
MIDATL	0.835*	0.993
ENCENT	0.830*	0.976
WNCENT	1.202	1.122
SATL	0.895	1.083
ESCENT	0.918	1.041
WSCENT	1.043	1.190
MOUNTAIN	1.232	1.363*
PACIFIC	1.204*	1.129
GIM	1.081	1.120
IMSUB	0.794**	0.893
GSUR	0.952	1.174
SURSUB	0.785**	1.080
PED	0.792*	0.930
OBGYN	0.996	0.930
RAD	0.411***	0.701**
PSYCH	1.435**	2.035***
ANES	0.868	1.357*
PATH	0.569***	0.790
EM	1.178	1.393
OTHER	0.846	0.996
EMPLOYEE	1.448***	- -
GROUP	1.210***	0.726***
YR93	1.773***	2.308***
YR94	2.606***	2.626***
YR95	1.637***	1.939***
YR96	2.208***	2.081***
FEMALE	1.022	0.751***
FMG	0.879*	0.921
AMA	1.136**	1.193***
SMALLMET	0.947	0.840*
LARGEMET	0.762***	0.745***
MCCONT	1.188***	1.155*

Note: All results are weighted.
*, **, *** p=0.05, 0.01, and 0.001 respectively