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# Effects of Characteristics of the Survey Instrument on Response Rates to a Mail Survey of Community Hospitals

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MAIL SURVEYS are an important means of obtaining information about the operation of the nation's community hospitals, which the American Hospital Association (AHA) defines as all non-Federal short-term general and other special hospitals—excluding hospital units of institutions—whose facilities and services are open to the public. As is the case with all surveys, the reliability that may be attributed to their findings depends largely on the rates of response to them. If health-care researchers are to increase the reliability of studies using such surveys by increasing the rates of response to them, they must understand what factors determine response rates.

In an earlier study (1), we examined the relationship between response rates and one set of elements in mail surveys of community hospitals; those elements were the institutional characteristics of the hospitals surveyed. We found that bed size, location within or outside a Standard Metropolitan Statistical Area (SMSA), AHA membership status, investor or other form of ownership, and control by State or local government or by another type of organization are strongly and independently associated with hospitals' rates of response to AHA surveys.

In the present study we controlled for the effects of these institutional characteristics on response rates while investigating the relationship between response rates and another set of elements in a survey of community hospitals, elements pertaining to character-

istics of the survey instrument itself: the perceived length of the questionnaire, the order of questions, the orientation of the appeal made in the cover letter, and the inclusion of a promise to share the results of the study with respondents. These are among the elements of the survey process that can be most easily and economically manipulated by researchers.

Studies that have been reported in the literature of the relationship between such elements and response rates have dealt with household surveys or surveys of individuals rather than with surveys of institutions and have yielded results that are diverse and often conflicting.

In several studies, the relationship between the form of questionnaire (its perceived length and appearance) and response rates was investigated by varying the number or dimensions of the pages of the questionnaires while keeping the survey questions constant. Champion and Sear (2), rather surprisingly, found that of their 3-, 6-, and 9-page questionnaires, the longer ones tended to achieve the highest response rates. Childers and Ferrell (3) found no significant differences between the response rates to a 1-sheet (front and back) and a 2-sheet questionnaire, while 8½" x 11" paper, trim size, met with a better response rate than the 8½" x 14." Ford (4) found no significant differences between the response rates to questionnaires printed on 4-page 8½" x 11" folders and those mimeographed on 1 side of 4 pages of 8½" x 14" paper; although the order of questions varied slightly between the forms, it had no effect on response.

The effect of the ordering of questions on response rates has, in fact, received little attention in the literature. Ferber (5) dealt only with the effect of the order of questions on response bias; some of the data

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he presents, however, suggest that it had some effect on his response rates as well.

In numerous studies investigations were made of the relationship between response rates and various rhetorical strategies employed in the cover letter to elicit cooperation. Hendricks and associates (6) found that the "ingratiation tactics" of using adjectives flattering the respondent and adjectives flattering the solicitor had no effect on response rate when the questionnaire was short. When the questionnaire was long, on the other hand, the two tactics combined reduced the response rate; used separately, the two tactics increased the response rate. Linsky (7) found that explanations of the place and importance of the respondent in the study increased response rates, while arguments for the social utility of the research and appeals to help those conducting the study had no effect. Champion and Sear (2) found that "altruistic" appeals made on the grounds that the results of the survey would benefit the research organization met with lower response rates than did "egoistic" appeals made on the grounds that the results would benefit the respondent. Jones and Linda (8) found that cover-letter messages stressing that the survey results would benefit the respondent and altruistic appeals stressing the benefits to "science" achieved similar response rates, which were significantly higher than those achieved by messages stressing the benefit to the survey sponsor. The inconsistent findings of these studies seem in part to be due to conceptual vagueness in determining just what cumulative functions were being performed by the elements in the letters that were manipulated, and, in part, as Jones and Linda (8) point out, to population differences, nonstandardized message manipulations, and "occasional confounding of cover letter manipulation with message order and cover letter length changes."

Although inclusion in the cover letter of a promise to share the results of the study with the respondent might, hypothetically, increase response rates by creating a sense of collegiality between researcher and respondent in the survey process, this possibility has received little attention in the literature. May (9) combined such a promise with an appeal for help, but his results were inconclusive and not fully analyzed.

The diversity and disparity of the findings of these studies, no doubt partly the result of differences in conception and design and differences in the populations surveyed, make it unclear to what extent they are representative and generalizable. It is also unclear to what extent these studies—all dealing with household surveys or surveys of individuals—are relevant to the problem of response rates to surveys of hospitals. These are in many ways a special case of mail

surveys. Such surveys are designed to obtain information about the institutions to which they are sent, rather than about the people who complete them. Thus, response or nonresponse may result not merely from the decision of a person, but from the decision of a group, and may additionally be conditioned by corporate policy. It seems likely that the factors that determine response rates to mail surveys operate differently than they do in surveys of people.

## Methods

We used the AHA's 1980 Selected Topics Survey, the eighth in an annual series. Each year the survey, sent to all U.S. community hospitals registered with the AHA, asks from 8 to 12 questions about hospital topics of current interest; although some topics are covered repeatedly, the questions generally are new each year. The 1980 survey was sent to 5,842 hospitals, addressed to the chief executive officer (CEO). It asked about the process of corporate planning, risk management programs, expenditures for hospital supplies, representation in collective bargaining, work stoppages, admitting privileges of physicians, qualifications of dietitians, ambulatory care billings, support groups to assist in followup care, programs of special services for the elderly, and audiovisual equipment.

A 4-factor, 16-cell experimental design was employed. The 16 survey instruments represented all possible combinations of the 4 following dichotomous variables:

1. Perceived length of the questionnaire: (a) 1-page front-and-back continuous form, 8½" × 14" and (b) 4-page booklet, 8½" × 11".
2. Order of questions: (a) questionnaires began with questions about the topics assumed to be of greatest saliency and relevance to the main purposes and operations of the hospital (corporate planning and risk management) and ended with those of the least (audiovisual equipment) and (b) questionnaires followed the reverse order.
3. Orientation of the appeal made in the cover letter, addressed to the chief executive officer: (a) impersonal in tone; stressed the value of the survey to the hospital industry in general and (b) personal in tone; used the second-person pronoun to refer to the respondent and the first-person plural pronoun to refer to the solicitor; stressed the value of the survey to the CEO's institution and profession.
4. Cover letter; promise of results: (a) promise present and (b) promise absent.

The 5,842 hospitals were divided into 16 experimental groups; each group received 1 of the 16 survey instruments. To control for the effects of the hospitals'

Table 1. Response rates for each of 16 experimental groups in a mail survey of community hospitals

Questionnaire format and order of questions	Orientation of cover letter	Promise of results	Experimental group	Number in cells <sup>1</sup>	Overall response rate (percent)	Response rate to first mailing (percent)
<b>Booklet</b>						
Most salient and relevant first	CEO <sup>2</sup> and institution	Present . . . .	1	371	70.9	51.8
		Absent . . . . .	2	367	68.1	50.1
	Hospital industry	Present . . . .	3	369	70.5	48.2
		Absent . . . . .	4	366	66.9	43.4
Most salient and relevant last	CEO and institution	Present . . . .	5	366	64.2	41.8
		Absent . . . . .	6	365	67.1	46.6
	Hospital industry	Present . . . .	7	355	69.3	50.1
		Absent . . . . .	8	363	64.5	45.7
<b>Continuous form</b>						
Most salient and relevant first	CEO and institution	Present . . . .	9	360	74.4	54.4
		Absent . . . . .	10	369	72.3	52.8
	Hospital industry	Present . . . .	11	365	76.4	59.5
		Absent . . . . .	12	361	74.5	54.0
Most salient and relevant last	CEO and institution	Present . . . .	13	360	68.3	47.2
		Absent . . . . .	14	358	67.0	44.7
	Hospital industry	Present . . . .	15	360	70.3	45.6
		Absent . . . . .	16	362	69.1	43.6
<b>Total</b> . . . . .			<b>5,817</b>	<b>69.6</b>	<b>48.6</b>	

<sup>1</sup> Cells differ slightly in size because the study was originally designed with cells of approximately 365 hospitals, each representing one-sixteenth of the 5,842 community hospitals existing at the end of 1978. During the course of the study, the American Hospital Association learned that some

of these hospitals had closed or merged, while new ones had opened. The former were dropped from the cells, and the latter were randomly allocated among them.

<sup>2</sup> CEO indicates chief executive officer.

institutional characteristics on response rates, the multiple logistic technique described by Mullner and associates (1) was used to predict the hospitals' relative probability of response from their combinations of institutional characteristics. Hospitals were ranked according to their predicted probability of response and were divided into groups of 16. The 16 hospitals within each of these groups were then allocated by randomization to the 16 experimental groups.

One month after the first mailing, nonresponders were sent a second copy of the survey instrument, identical to the one they had received earlier except for notification that it was a second mailing.

## Results

Overall response rates and response rates to the first mailing are shown for each of the 16 experimental groups in table 1. The total overall response rate to the survey was 69.6 percent, ranging from 64.2 percent to 76.4 percent among the 16 groups. The total response rate to the first mailing was 48.6 percent, ranging from 41.8 percent to 57.5 percent among the groups. The pattern of variance in response to the first

mailing tended to parallel that to the survey as a whole (product moment correlation:  $r = 0.88$ ).

Marginal overall response rates and marginal response rates to the first mailing are shown for each of the four dichotomous variables in table 2. Again, the patterns of the latter parallel those of the former. As the table indicates, only two of the four variables show significant variations in response rates. One of these is the order of questions: the questionnaires that began with questions about the topics of greatest saliency and relevance to the main purposes and operations of the hospitals achieved an overall response rate of 71.72 percent, while those that began with questions about topics of least saliency and relevance achieved an overall response rate of 67.46 percent ( $P < .001$ ). The other is the perceived length of the questionnaire: the 1-page 8½" × 14" continuous form achieved an overall response rate of 71.52 percent, while the 4-page 8½" × 11" booklets achieved an overall response rate of 67.69 percent ( $P < .001$ ). Neither of the cover letter variables show significant variations in response rates.

To further analyze the significance of each of the four survey instrument variables as determinants of

Table 2. Marginal response rates for each of four survey instrument variables, mail survey of community hospitals

Variable	Overall response rate (percent)	Response to first mailing (percent)
<b>Order of questions:</b>		
Most salient and relevant first .....	171.76	151.5
Most salient and relevant last .....	67.46	45.7
<b>Questionnaire format:</b>		
Booklet .....	67.69	47.2
Continuous .....	171.52	250.0
<b>Orientation of cover letter:</b>		
Hospital industry .....	69.07	48.5
Chief executive officer and institution .....	70.18	48.7
<b>Promise of results:</b>		
Present .....	70.54	49.6
Absent .....	68.74	47.6

<sup>1</sup> P < .001.    <sup>2</sup> P < .01.

response, while controlling for confounding by the other survey instrument variables, we used the LOGIST program in the SAS Supplemental Library (10), fitting our data to the multiple logistic regression model given by the equation

$$Y = \frac{\exp(b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5Z)}{1 + \exp(b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5Z)}$$

where,

Y = 1 if hospital responded to the survey, and 0 if otherwise,

X<sub>1</sub> = 1 if the most salient and relevant questions appeared first in the questionnaire, and 0 if last,

X<sub>2</sub> = 1 if a continuous form was used, and 0 if a booklet was used,

X<sub>3</sub> = 1 if a promise of results was made in the cover letter, and 0 if not,

X<sub>4</sub> = 1 if the orientation of the cover letter was toward the CEO and his particular institution, and 0 if toward the hospital industry as a whole, and

Z = the logistic response probability determined on the basis of institutional characteristics of the hospital by means of the technique described by Mullner and associates (1).

We investigated the significance of the association between each of the four survey instrument variables and response rates by examining each of the regression coefficients *b*<sub>1</sub>, . . . , *b*<sub>4</sub> divided by its estimated standard error. This analysis was carried out by using both overall response rates and response rates to the first mailing as the dichotomous dependent variable.

The results of the multiple logistic regression analysis are shown in table 3. The findings mirror those of the

analysis of the preceding marginal response rates: for both the overall response and the response to the first mailing, significant regression coefficients were found for the order of questions and for perceived questionnaire length but not for the orientation of the appeal made in the cover letter nor for the promise of results to respondents.

Regression coefficients for a more complete model including two- and three-way interactions between the five variables indicated in the preceding equation were also estimated. However, no significant interactions were found, either for overall response or for response to the first mailing.

## Discussion and Conclusion

To summarize, the results of our experiment with a survey of institutions indicate that the order of questions and the perceived length of the questionnaire significantly affect response rates, while the orientation of the appeal made in the cover letter and the inclusion in it of a promise to share the results of the study with respondents do not. As is inevitably the case, however, the particular context and circumstances in which the study was conducted make the question of its generalizability difficult to answer at certain points.

Ferber (5) noted with some surprise that bias due to question order, frequent in personal interview surveys, is likely in mail surveys as well, even though in mail surveys the respondent can inspect the entire questionnaire before answering any question and does not have to answer the questions in the order in which they appear. It was our hypothesis that question order can also affect response rates to mail surveys, and that questionnaires beginning with the most salient and relevant topics would achieve higher response rates than questionnaires following a reverse order. Our results seem clearly and unambiguously to confirm this hypothesis.

We also hypothesized that the continuous form would be perceived as shorter than the booklet and would therefore receive a higher rate of response. Again, our hypothesis seems to have been confirmed. However, it should be noted that all hospital CEOs were familiar with this particular survey, and that the continuous form was the one used in earlier years. It is therefore possible that hospital CEOs responded more readily to the continuous form as the one most familiar to them. Nevertheless, we do not consider it likely that familiarity or novelty were significant factors since all hospitals receive several surveys from the AHA each year, some of which are in the continuous and some of which are in the booklet form.

Table 3. Estimated multiple logistic regression coefficients for the four survey instrument variables, mail survey of community hospitals

Variable	Overall response as dependent variable		Response to first mailing as dependent variable	
	Regression coefficient	Significance of regression coefficient (P value)	Regression coefficient	Significance of regression coefficient (P value)
Constant term ( $b_0$ ) . . . . .	-.3750	.0016	-.8203	< .0001
Order of questions ( $b_1$ ) . . . . .	.2074	.0003	.2378	< .0001
Questionnaire format ( $b_2$ ) . . . . .	.1875	.0011	.1135	.0315
Promise of results ( $b_3$ ) . . . . .	.0866	.1328	.0773	.1431
Orientation of cover letter ( $b_4$ ) . . . . .	.0518	.3686	-.0077	.8843
Logistic response probability score based on institutional characteristics ( $b_5$ ) . . . . .	.00000181	< .0001	.00000104	< .0001

The familiarity of hospitals with AHA surveys does, however, cast some doubt upon our findings about the lack of effect of the orientation of the appeal made in the cover letter and the inclusion of a promise to send the results of the survey to the respondents. It is possible that the CEOs felt that they already understood the content and purpose of the survey and therefore paid little heed to the cover letter and its contents, and that the results might have been different had the survey been a new one. It was of course impossible to control for this possibility. More research is clearly needed.

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## SYNOPSIS

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A 4-factor, 16-cell experimental design was used to investigate the relationship between response rates of community hospitals to a survey conducted by the American Hospital Association (AHA) and 4 characteristics of the survey instrument, each

varied dichotomously: the perceived length of the questionnaire, the order of questions, the orientation of the appeal made in the cover letter, and the presence or absence of a promise to share the results of the study with respondents.

Response rate variations between the various cells were examined and multiple logistic regression was used to analyze the significance of the association between response rates and each of the four survey instrument variables while controlling for the effect of the others. At the same time, control was also maintained for

the effects of five institutional characteristics of hospitals which a previous study had shown to have a significant relationship to response: bed size, location within or outside a standard metropolitan statistical area, AHA membership status, type of ownership, and form of control.

The perceived length of the questionnaire and the order of questions were found to have a significant effect on response rates, but the orientation of the cover letter and a promise to share the results of the study with the respondents were found to be insignificant.