A BRIEF ORIGINAL CONTRIBUTION

Randomized Trial of Leaving Messages on Telephone Answering Machines for Control Recruitment in an Epidemiologic Study

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To determine whether leaving messages on answering machines would aid control recruitment via random-digit telephone dialing, a randomized trial was conducted during 1992–1994 involving 1,323 western Washington households with answering machines. For the experimental group, a message was left informing them about the study and promising a call-back; for the control group, no message was left. Leaving a message increased the response rate by about 20 percentage points (p = 0.002). More households were successfully screened for eligible controls, and individuals found eligible were more likely to participate. Leaving a message can help to improve response rates in telephone surveys. Am J Epidemiol 1996; 144:704–6.

epidemiologic methods; health surveys; telephone

Telephone surveys are often used for sampling and for data collection in epidemiologic studies. Achieving high response rates has been complicated by the increasing use of telephone answering machines, now estimated to be present in over half of US households (1).

A telephone interviewer who reaches an answering machine can either hang up or leave a message. If the potential respondent is at home and using the machine to screen out unwanted calls, a message may convince him or her that the call is for worthy research purposes and motivate acceptance of the call. Even if nobody is home, leaving a message may enhance the likelihood of making contact on a follow-up call. However, interviewer time is required to listen to the machine’s outgoing message and to record the incoming one. This time is wasted if leaving a message fails to increase the response rate.

During a case-control study of amyotrophic lateral sclerosis (Lou Gehrig’s disease), we conducted a randomized trial to determine whether leaving messages on answering machines would aid recruitment of controls identified through random-digit dialing.

MATERIALS AND METHODS

Cases in King, Pierce, and Snohomish counties, Washington, were recruited for the parent study from April 1990 through March 1994. These three adjacent counties have a combined population of about 2,560,000 (1990 census) and are predominantly urban, containing the cities of Seattle, Tacoma, and Everett.

For each case under age 65 years, two matched controls of similar age (within 5 years) and sex were sought via random-digit dialing, using the Mitofsky-Waksberg sampling protocol (2). Each number was called up to nine times—three on a weekday during the day, three on a weekday evening, and three on a weekend—to determine whether it served a residence and, if so, whether the household included an eligible control. Eligible controls were informed about the study and invited to be interviewed later in person at home.

Beginning in January 1992, all newly sampled telephone numbers were randomized to experimental or control conditions. Experimental group numbers were marked as such on the interviewers’ preprinted work-
Randomized Trial of Answering Machine Messages

sheets. If a call to such a number reached an answering machine at a residence, the interviewer was to leave the following message:

Hello, I am (interviewer’s name), calling for Dr. Longstreth from Harborview Medical Center. We are conducting a study of Lou Gehrig’s disease. Your telephone number was selected at random because we are trying to identify, for comparison, a group of people without the disease. I will be calling back to determine if anyone in your household is eligible for this study. Thank you.

This message was left only once, even if subsequent calls to the same number again reached an answering machine. For control group numbers, the interviewer was instructed simply to hang up if an answering machine was encountered. Ultimately, a message was left as intended for 86.1 percent of answering machine numbers in the experimental group and was left in error for 1.4 percent of such numbers in the control group. Analysis was by intention to treat.

If the last planned call to a number in either study group reached an answering machine, the interviewer left a similar message, replacing the last two sentences by the instruction, “Please call (field coordinator) or Dr. Longstreth at (telephone number). Thank you.” If a message had been left earlier at that number, after identifying herself the interviewer added, “I left a message once before on your answering machine and have been unable to reach you.”

Outcomes of interest included the percentage of households that were successfully screened for the presence of an eligible potential control; the percentage of eligible potential controls who agreed to participate; the overall response rate, computed as the product of the first two outcomes (3); and the mean number of calls required to close out a telephone number. Two-tailed $p$ values were obtained using chi-square for the first two outcomes and using Student’s $t$ test for the mean number of calls. For the overall response rate, which was the product of two nonindependent proportions, a randomization test was used (4).

RESULTS

Cases averaged 60 years of age (range, 26–84 years), 55 percent were men, and 94 percent were white.

An answering machine was reached at least once for 32 percent of all residential numbers in each treatment group. Leaving a message increased the overall response rate for such households by nearly 20 percentage points (81.3 percent vs. 61.7 percent, $p = 0.002$; table 1). More experimental group households with an answering machine were successfully screened for the presence of an eligible control (85.2 percent vs. 79.3 percent, $p = 0.007$), and potentially eligible controls were also more likely to be recruited (95.3 percent vs. 77.8 percent, $p = 0.046$). The mean number of calls required to close out a telephone number with an answering machine was slightly lower in the experimental group (4.48 vs. 4.74 calls, $p = 0.07$). The age and sex of the control sought had little influence on these results.

### TABLE 1. Final disposition for answering-machine households randomized to experimental and control groups and for households with no answering machine encountered: King, Pierce, and Snohomish counties, Washington, 1992–1994

<table>
<thead>
<tr>
<th>Final disposition</th>
<th>Answering machine encountered</th>
<th>No answering machine encountered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental</td>
<td>Control</td>
</tr>
<tr>
<td>Eligible, recruited</td>
<td>41</td>
<td>6.1</td>
</tr>
<tr>
<td>Eligible, refused</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Ineligible</td>
<td>529</td>
<td>78.8</td>
</tr>
<tr>
<td>Eligibility unknown</td>
<td>13</td>
<td>1.9</td>
</tr>
<tr>
<td>Refused screening</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>Language/illness</td>
<td>77</td>
<td>11.5</td>
</tr>
<tr>
<td>Answering machine</td>
<td>7</td>
<td>1.0</td>
</tr>
<tr>
<td>Ring, no answer</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>99</td>
<td>14.8</td>
</tr>
<tr>
<td>Total</td>
<td>671</td>
<td>100.0</td>
</tr>
</tbody>
</table>

% of households successfully screened for eligibility (A) | 85.2 | 79.3 | 0.007 | 83.1 | 0.024 |
% of persons eligible who consented (B) | 95.3 | 77.8 | 0.048 | 76.5 | 0.960 |
Response rate (A x B) | 81.3 | 81.7 | 0.002 | 63.5 | 0.791 |

* Experimental versus control.
† No answering machine encountered versus control.
The rightmost part of Table 1 shows final results for presumably residential numbers at which no answering machine was ever reached. A "ring, no answer" final result was much more common for this group. Nonetheless, the proportion of such households that were successfully screened for the presence of an eligible control was slightly greater than for control group numbers with an answering machine. Success in recruiting potentially eligible controls and the overall response rate were similar between answering machine numbers in the control group and no answering machine numbers. An average of 2.63 calls was required to close out residential numbers without an answering machine.

When an answering machine was reached on the last planned call, leaving a message asking the recipient to return the call achieved very little. Only two such calls were received, although 177 messages were left. Neither yielded an eligible control.

**DISCUSSION**

Answering machines have become a fact of life for epidemiologists who use telephone surveys. In our study, an answering machine was encountered at least once for 32 percent of residences called. The true prevalence of answering machine ownership is undoubtedly even higher, since many owners answer the telephone themselves when at home. Oldendick and Link (5) found ownership to be associated with young adulthood, higher income or educational level, urban or suburban residence, and white race.

Persistence seems to help penetrate the answering machine barrier. We obtained an overall response rate for answering machine households in our control group close to that for households without an answering machine by calling each number up to nine times and distributing calls between workdays, weekends, daytime, and evening. An average of 2.1 more calls was required to close out a telephone number when an answering machine was present, however.

Although answering machine owners can limit their accessibility by using the devices to screen out unwanted calls, answering machines can also improve access to people who are often away from the telephone but who are willing to be surveyed. We found that leaving a brief message about the study and promising a call-back improved the response rate by nearly 20 percentage points. Our ability to screen for potentially eligible controls increased slightly, but the larger effect appeared to be on the willingness of eligible controls to participate. Xu et al. (6) suggested that a message left on an answering machine may be analogous to an advance letter in a mail survey, introducing the research project and distinguishing it from mass telemarketing. Our interviewers felt that subjects were indeed more receptive when a message had preceded the first live voice contact.

We reasoned that there would be little to lose by leaving a parting message when a number was about to be abandoned. The yield of this strategy proved to be very low, however, probably because it required relatively inaccessible people to play an active role in arranging their own study participation. Perhaps a parting message mentioning stronger incentives for participation would be more effective.

Our results agree with those of Xu et al. (6), who evaluated leaving messages on answering machines during a 1990 public opinion survey in Lubbock, Texas. Their randomized study of 391 households involved at most three call-backs and achieved a response rate of only 33 percent in the no-message group. Three slightly different messages all raised the response rate by about 13 percentage points. Harlow et al. (7) used a nonrandomized design to study the effect of leaving messages on answering machines among 191 female nonrespondents to an earlier mailed survey. After adjustment for several factors, the estimated improvement in response rates associated with leaving a message was about 15 percentage points.

This study and others thus suggest that leaving messages on answering machines can improve response rates in telephone surveys. The growing use of answering machines will probably require making more calls to achieve a target response rate.

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**REFERENCES**