

AUTOMATED EMERGENCY NOTIFICATION SYSTEMS AND THE DISSEMINATION OF EMERGENCY PREPAREDNESS INFORMATION

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ABSTRACT

The growing use of computerized "ring down" systems for emergency notification raises the possibility that such systems can also be used to convey preemergency information. This is important because research and experience have shown that it can be difficult to get citizens to pay attention to preparedness information in the absence of an actual emergency. To investigate the potential of ring down systems for preemergency public education, we worked with a local government to add instructions on sheltering-in-place to the message on a routine test of a ring down system. We then surveyed a test group and a control group before and after the test call and a second control group only after the call. We found that the test call raised awareness of the emergency notification system without generating undue concern about the possibility of a chemical accident. In addition, those who received the test call demonstrated significant improvements in their knowledge of how to shelter-in-place while no such improvement was observed in those who did not get the call. While the nature of the sample used in this study limits generalizability, we feel this

outcome is positive enough to warrant further exploration of this method of disseminating preparedness information.

1. INTRODUCTION

Both academic research and practitioners' experiences indicate that citizens are often reluctant to pay attention to emergency preparedness information in the absence of an actual emergency.^(1,2,3,4,5) At the same time, strong public reactions to specific hazards have generated concern among public officials that citizens will exaggerate risks once they become aware of them.^(6,7,8) As a result, agencies seeking to inform the public about environmental hazards face the task of effectively capturing people's attention without provoking undue alarm.

Computerized systems that alert the public to hazards by automatically ringing their home phones may offer one mechanism for addressing this problem. Such "ring down" systems are tested periodically by actually calling citizens' homes. This process may overcome natural indifference to preparedness information by alerting citizens to the possibility that they might be affected by an emergency. As a result, test calls may present

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an excellent opportunity to effectively convey preparedness information which is often ignored when distributed in other forms (public service announcements, brochures, etc.).⁽⁹⁾

We sought to evaluate the potential of ring down tests as vehicles for communicating pre-emergency information by working with the Health Services Department in Contra Costa County CA to add information on how to shelter-in-place to the standard message used in a routine test of the County's ring down system known as the Community Alert Network or C.A.N. (The text of this message appears in the appendix to this paper.) We mailed questionnaires to randomly selected residents before and after the test call in order to evaluate its impact.

Our objectives were to learn (1) how the test call was handled when it reached citizens' homes, (2) how receiving it affected citizens' awareness of and attitudes toward chemical hazards and emergency preparedness, and (3) if the shelter-in-place message that accompanied the test call improved citizens' understanding of this self-protective technique. This article describes the methods used in the study, summarizes the findings, and assesses the implications of these results for emergency management.

2. RESEARCH METHODS

Contra Costa County government provided us with address labels corresponding to all the telephone numbers C.A.N. had for the areas scheduled to receive the test call and for selected streets adjoining the test areas. Since C.A.N. was legally prohibited from identifying citizens, the labels had neither residents' names nor apartment numbers on them. This forced us to use an impersonal mailing which probably reduced the response rate. It also meant that we could not be sure of mail delivery to apartments. Accordingly, we removed all multiple labels at the same address in an effort to eliminate apartments from the

sample. This restricted our sample to single-family residences with listed (or voluntarily reported) telephone numbers.

We must also note that while these areas were primarily residential, any businesses in the C.A.N. data base for the area were also included in the set of labels provided by the county. Since they could not be identified as businesses from the labels, they were unavoidably included in the mailing. As a result, we do not know the exact number of valid potential respondents and can not report response rates or calculate sampling errors with complete accuracy. In what follows, we make the conservative assumption that all the addresses to which we mailed questionnaires were residences. To the extent that some of the addresses were commercial (and had no valid respondents), this assumption has the effect of understating the response rates and overstating the sampling errors.

We then drew a systematic random sample of each of three groups from the address labels. They were:

The Test Group consisted of people who were scheduled to receive a phone call as part of the C.A.N. test. This group was sent a questionnaire both before and after the test call. Of the 668 addresses in this group, 209 responded to the pretest mailing (for a 31% pretest response rate). Of this 209, 130 responded to the posttest mailing (for a posttest response rate of 62%).

Control Group 1 was drawn from a list of addresses on streets that were adjacent to those scheduled to receive the test call but that were not to receive the call. This group was sent a questionnaire both before and after the date of the test call. Inclusion of this group allows us to isolate the effect of the test call from other factors that

might have changed citizens' responses (like news reports of a chemical accident). Of the 181 addresses in this group, 74 responded to the first mailing (for a 41% pretest response rate). Thirty nine of the 74 responded to the second mailing (to give a posttest response rate of 53%).

Control Group 2 was drawn from addresses that were in the areas scheduled to receive the C.A.N. test call but had not been selected for the test group and to which we did not send a pretest questionnaire. This group received only a post test mailing and was included in the study to allow us to gauge any "test effect" created by sending the first questionnaire. Seventy four of the 222 addresses in this group returned the posttest questionnaire (for a response rate of 33%).

There were no statistically significant differences between the test group and either control group in gender or educational level, and the test group and control group 1 did not differ statistically in age. However, the test group was slightly younger than control group 2. Since age was not a strong predictor of responses to any of the questions on which we compared the test group and control group 2, we do not feel that this small demographic difference makes control group 2 an inappropriate comparison group for purposes of identifying any test effect.

Several features of the sample used in this study must be recognized. First, the sample included only residents of single-family dwellings and excluded most renters. This means that respondents are likely to be a little older, more affluent, and more educated than a cross section of the public would be. As a result, responses from this sample are likely to overstate the level of citizens' information

about chemical hazards and emergency preparedness. Second, while the sample is large enough to represent residents of single-family dwellings in or near the test calling areas, it is small in absolute size and restricted to a single county. Accordingly, we must be cautious about generalizing to other populations from the results of this study.

3. RESULTS

Initial responses from the test group and control group 1 revealed that respondents had very little awareness of emergency procedures. Only 18% said they had seen or heard a description of the emergency notification system, and only 9% claim to have seen instructions on evacuation procedures. When asked if they would know what to do if asked to evacuate, only 28% said they would know what to take with them, 18% said they would know what routes to use, and 9% said they would know where to go for shelter.

Only 13% reported having seen or heard instructions on how to shelter-in-place. When asked in an open-ended format what steps to take to shelter in a chemical emergency, only a minority of respondents were able to identify appropriate actions. In addition, 61% (including many who had guessed at appropriate actions) volunteered that they did not know what steps to take.

3.1 Handling of the Test Call

To be effective as an educational tool, a test call must reach its intended audience. We examined the responses of the 130 members of the test group who returned the posttest questionnaire to determine how effective the test call had been in this regard. Only 42% (55 individuals) reported having received the call. This relatively low contact rate is probably explained by the fact that the test call involved only one attempt to reach each phone number. In an actual emergency, multiple attempts

would be made and the contact rate is likely to be much higher.

Of those respondents who reported receiving the C.A.N. call, 70% said that they personally took the call. Twenty two percent reported that the call went to an answering machine. Forty eight percent of these said that the machine got the full message, 38% said it got only part of the message, and 14% did not know how much of the message was captured.

An impressive 86% of those who received the call said they listened to the entire message, 4% listened to only part of it, and 7% reported hanging up as soon as they heard that it was a C.A.N. test call. The rest indicated that they did not know how much of the message was received or gave some other response.

At the end of the test call citizens had the option of pressing a button to receive additional information on how to shelter-in-place. Twenty two percent said that they took advantage of this option. In an effort to determine how much impact the test call had, we asked if respondents discussed the call with others in their household. Forty seven percent indicated that they did discuss the test call after it came. Of these, 33% said they talked about sheltering-in-place, 3% discussed the emergency notification system, 3% discussed chemical hazards, and 58% gave an answer that was too general to classify, like "how important it was."

Aside from the low contact rate caused by the single attempt at each number, these data indicate that the test call was fairly successful in reaching its intended audience. Answering machines did not prove to be a major problem and most people listened to the full message.

3.2 Impact of the Test Call

This study was designed primarily to ask (1) what difference the test call made in citizens' perceptions of hazards and emergency

notification procedures, and (2) if the preparedness message that accompanied the test call increased citizens' information about what to do in an emergency. To address the first question, compared the pretest and posttest responses of the 55 members of the test group who reported receiving the C.A.N. call with the responses of the 39 members of control group 1 who responded to both mailings.

First, it is worth noting that, when asked how they expected to be notified in the event of an emergency, 71% of those who got the call identified the C.A.N. while only 11% of those who did not get the call mentioned the C.A.N. Since less than 10% of both the test and control groups expected to be notified by the C.A.N. in the pretest, it seems safe to assume that the test call alerted people to the existence and purpose of the notification system.

Second, in light of the common view that efforts to educate the public about chemical hazards might create undue concern, we wanted to know if the test call increased citizens' estimates of the possibility of a chemical accident. In both the pretest and posttest questionnaire we asked residents what they thought the chances were that their neighborhood might be affected by a chemical emergency "within the next year or so". The results are reported in Table I.

Table I
Perceived Chance of a Chemical Accident

Response	Test Group (N=55*)		Control Group1 (N=39*)	
	pretest	posttest	pretest	posttest
NO CHANCE	20%	13%	26%	23%
LITTLE CHANCE	50%	52%	28%	36%
SUBSTANTIAL CHANCE	30%	33%	43%	41%
DON'T KNOW	0%	2%	3%	0%

*Includes only those who returned both the first and second questionnaires and received the test call.

*Includes only those who returned both the first and second questionnaires but did not receive the test call.

While members of the control group were more likely to feel that there was "a substantial chance" of a chemical accident in the pretest, there was no statistically significant overall increase or decrease in their estimates from pretest to posttest. Similarly, while those who got the test call were less likely to say that there was "no chance" after the call than before, there was no dramatic increase in their overall likelihood estimate from pretest to posttest. While 64% of those receiving the call who had said "no chance" in the pretest switched to the objectively more realistic "very little chance" response in the posttest, none of them switched to the "substantial chance" category. Only 12% of the test group members who had said "very little chance" in the pretest switched to "a substantial chance" in the posttest.

Our use of a single-item indicator of the concept of "perceived risk" calls for caution in drawing conclusions from this study. However, these results indicate that the test call successfully alerted some who received it to the possibility of a chemical emergency without causing any undue alarm.

To judge the success with which ring down tests can be used to educate the public

we must ask if citizens learned anything about sheltering-in-place from the call. To answer that question, we compared the pretest and posttest responses of the 55 citizens who both got the C.A.N. call and returned the second questionnaire, and then contrasted those responses with the reactions of the two control groups.

As background, it is important to note that while only 20% of the 55 citizens who got the test call said they had seen or heard instructions on how to shelter-in-place prior to the call, after the call, 64% said that they had seen or heard such instructions. Seventy seven percent of those who said they had received such instructions cited the C.A.N. test call as the source. By comparison, in the posttest only 10% of control group 1 who did not get the test call indicated that they had seen or heard instructions on how to shelter.

Table II compares those who got the call with those who did not get the call with respect to their knowledge of what steps to take to shelter-in-place. For those who received the call, there were statistically significant improvements in the percent of respondents who named every step in effective sheltering. For those who did not receive the call, there

was a significant improvement in only one category -- "go or stay indoors". Our prior experience with questions on sheltering suggests that this one difference may be a matter of chance since some respondents assume that people will go indoors and do not bother to mention it.⁽¹⁰⁾ In addition, there was a dramatic reduction in the proportion of the test group who said that they did not know what to do to shelter (from 46% to 20%) but no statistically significant change in the proportion of control group 1 who indicated that they did not know what to do.

Table II
Respondents' Knowledge of Sheltering-in-Place

Step Named	Test Group (N=55)		Control Group1 (N=39)	
	Pretest	Posttest	Pretest	Posttest
Go/stay indoors	27%	65%	18%	33%
Close doors/windows	47%	85%	46%	46%
Seal doors/windows	9%	50%	13%	18%
Shut off ventilation	22%	40%	5%	5%
Listen to TV/radio	18%	29%	3%	10%
Close Fireplace	6%	27%	8%	5%
Don't use phone	0%	4%	0%	0%
Don't know what to do	46%	20%	54%	49%

Did this improvement in knowledge of sheltering procedures result from the test call or did our first questionnaire cause people to learn about sheltering in some other way? To answer this question we compared the test group to control group 2 whose members got the test call, but did **not** get a pretest mailing. Table III shows the results. In the posttest members of control group 2 exhibited a knowledge of sheltering that was statistically indistinguishable from that of the test group. This indicates that there was no "test effect." This conclusion is consistent with the fact that the overwhelming majority of respondents in both groups who said they had been exposed to information on how to shelter cited the test call as the source of that information.

Table III
Posttest Knowledge of Sheltering Procedures

<u>Step Named</u>	Test Group (N = 55)	Control Group2 (N = 38)
Go/Stay Indoors	65%	62%
Close doors/windows	85%	74%
Seal doors/Windows	50%	53%
Shut off ventilation	40%	41%
Listen to TV/radio	29%	29%
Close fireplace	27%	35%
Don't use phone	4%	3%
Don't know what to do	20%	20%

4. CONCLUSIONS

Overall, our findings suggest that the test call served to educate those who received and listened to it about both emergency notification and shelter-in-place procedures. While recognizing the limitations imposed by the nature of this sample, we would argue that the outcome is positive enough to warrant further exploration of this method of disseminating preparedness information. Future research on this topic should address the following issues. (1) Finding ways to ensure that the contact rate on test calls is high enough to inform most citizens. This will involve both efforts to obtain unlisted numbers for the notification system and making multiple attempts to reach each number even in the test calls. (2) Verifying the results of this study with a larger and more diverse sample than was available for this study. (3) Testing to see how long the information is retained by reinterviewing citizens after the posttest. (4) Assessing the impact of test calls on risk perceptions more thoroughly than our single-item measure of risk perception allowed. (5) Evaluating the effectiveness of this technique with other

message content like evacuation procedures. If future research confirms our findings, communities with ring-down systems may want to experiment with using routine tests calls to disseminate emergency preparedness instructions to their citizens.

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APPENDIX

TEXT OF THE TEST CALL MESSAGE

THIS IS A TEST OF CONTRA COSTA COUNTY'S COMMUNITY ALERT NETWORK. AGAIN, THIS IS ONLY A TEST. IF THIS HAD BEEN A REAL EMERGENCY INVOLVING HAZARDOUS CHEMICALS, YOU MIGHT HAVE BEEN ASKED TO "SHELTER-IN-PLACE". IT IS USUALLY SAFER TO REMAIN INSIDE A BUILDING WHILE A CLOUD OF CHEMICALS PASSES OVERHEAD, INSTEAD OF TRYING TO EVACUATE IMMEDIATELY. IF THIS WERE AN ACTUAL EMERGENCY AND YOU WERE ASKED TO SHELTER-IN-PLACE YOU SHOULD STAY INSIDE, LOCK ALL DOORS AND WINDOWS, TURN OFF HEATING AND COOLING SYSTEMS, PUT OUT FIREPLACE FIRES AND CLOSE THE FIREPLACE DAMPERS. ANY OPENINGS AROUND DOORS, WINDOWS, AND VENTS SHOULD BE SEALED WITH TAPE OR ANY AVAILABLE MATERIALS. STAY OFF YOUR PHONE UNLESS YOU HAVE A LIFE THREATENING EMERGENCY. IN A REAL EMERGENCY YOU SHOULD TUNE YOUR RADIO TO KISS AM990 OR FM92 FOR FURTHER INFORMATION AND INSTRUCTIONS. AGAIN THIS HAS BEEN A

TEST. IF YOU WOULD LIKE MORE INFORMATION ON SHELTER-IN-PLACE LISTEN CAREFULLY TO THE FOLLOWING INSTRUCTIONS. IF YOU WOULD LIKE MORE INFORMATION, PLEASE PRESS THE NUMBER 5 ON YOUR TOUCH TONE PHONE NOW. IF YOU HAVE A ROTARY PHONE PLEASE CALL 646-2286 DURING NORMAL BUSINESS HOURS AND REQUEST THIS INFORMATION. AGAIN THAT NUMBER IS 646-2286. THANK YOU.

RESPONSE TO THOSE REQUESTING MORE INFORMATION: YOU HAVE INDICATED THAT YOU WOULD LIKE MORE INFORMATION ON SHELTER-IN-PLACE. PLEASE ALLOW THREE WEEKS FOR DELIVERY. IF YOU DO NOT RECEIVE THE INFORMATION, PLEASE CALL 646-2286. AGAIN THAT NUMBER IS 646-2286. THANK YOU!

