An Intervention Study to Enhance Medication Compliance in Community-Dwelling Elderly Individuals

Terry T. Fulmer, PhD, RN, FAAN, Penny Hollander Feldman, PhD, Tae Sook Kim, RN, MSN, Barbara Carty, EdD, RN, Mark Beers, MD, Maria Molina, MD, and Margaret Putnam, BA*

Abstract

Objective: To determine whether daily videotelephone or regular telephone reminders would increase the proportion of prescribed cardiac medications taken in a sample of elderly individuals who have congestive heart failure (CHF).

Methods: The authors recruited community-dwelling individuals age 65 and older who had the primary or secondary diagnosis of CHF into a randomized controlled trial of reminder calls designed to enhance medication compliance. There were three arms: a control group that received usual care; a group that received regular daily telephone call reminders; and a group that received daily videotelephone call reminders. Compliance was defined as the percent of therapeutic coverage as recorded by Medication Event Monitoring System (MEMS) caps. Subjects were recruited from 2 sources: a large urban home health care agency and a large urban ambulatory clinic of a major teaching hospital. Baseline and post-intervention MOS 36-item Short-Form Health Survey (SF-36) scores and Minnesota Living with Heart Failure (MLHF) scores were obtained.

Results: There was a significant time effect during the course of the study from baseline to post-intervention (F[2,34] = 4.08, p < 0.05). Over time the elderly individuals who were called, either by telephone or videotelephone, showed enhanced medication compliance relative to the control group. There was a trend, but no significant difference between the two intervention groups. Both SF-36 and MLHF scores improved from baseline to post-intervention for all groups. There was no significant change in the SF-36 scores for the sample, but there was a significant change for the MLHF scores (p < 0.001). The control group had a significant falloff in the medication compliance rate during the course of the study, dropping from 81% to 57%.

Conclusions: Telephone interventions are effective in enhancing medication compliance and may prove more cost effective than clinic visits or preparation of pre-poured pill boxes in the home. Technologic advances which enable clinicians to monitor and enhance patient medication compliance may reduce costly and distressing hospitalization for elderly individuals with CHF.


Medication compliance is a critical element in the successful management of treatable diseases and symptoms. Noncompliance poses a serious health risk to those who are unable or unwilling to take their medications as prescribed, and certain populations may be at increased risk for the complications resulting from poor adherence to a medication regimen. Elderly individuals who live at home are such a population. It has been well documented that the compliance rate, in general, for elderly individuals taking medications is problematic (Cargill, 1992; Kruse et al., 1992; Salzmann, 1995).

Estimates of noncompliance in the geriatric population vary from study to study, depending in part on the definition used and the method of measurement. Kruse et al. (1992) used the microprocessor-based Medication Event Monitoring System (MEMS) (Cramer, Mattson, Prevey, Scheyer, & Ouellette, 1989; Kruse & Weber, 1990) to measure compliance, which was defined as the percentage of prescribed doses taken. The reliability and validity of the MEMS for measuring compliance has been addressed (DeGeest, Dunbar-Jacob, & Vanhaeckel, 1998) in a hypertension study where interviews were conducted to compare patient reports of compliance versus the MEMS data, and superior specificity and reliability were documented. Based on a sample of 18 independently living elderly patients discharged from the hospital, they reported patient-specific noncompliance rates ranging from 0% to 76%, with a mean of 31% in the third week after discharge (DeGeest et al., 1998). Fineman and DeFelice (1992) measured compliance by administering a 20-question survey instrument to elderly individuals attending senior citizen centers. Using this self-report method, they found 15% of their sample to be noncompliant with a prescribed medication regimen (Fineman & DeFelice, 1992).

Regardless of the exact range or percentage of coverage one accepts as the true reflection of medication

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noncompliance, practitioners agree that the health risks associated with poor adherence warrant serious experimentation with strategies designed to improve compliance rates. This article reports one such experiment: a randomized trial aimed at testing two interventions for enhancing medication compliance among elderly patients with congestive heart failure (CHF). The purpose of the study was to determine whether daily videotelephone or regular telephone reminders would increase the proportion of prescribed cardiac medications taken by these patients. The authors anticipated that the modest commitment of time required for a daily call to each elderly individual would yield a significant improvement in compliance.

Factors Affecting Medication Compliance

Researchers have studied a variety of factors postulated to affect medication compliance among elderly individuals. Patient-related factors include: knowledge and understanding of the medication regimen and its purpose (Fineinan & DeFelice, 1992; Fitten, Coleman, Siembieda, Yu, & Ganzell, 1995; Klein, German, McPhee, Smith, & Levine, 1982; Wolfe & Schirm, 1992); cognitive functioning (Isaac & Tamblyn, 1993); age; and depressive symptomatology (Spiers & Kutzik, 1995). Overall, researchers have not found a significant relationship between knowledge and compliance behaviors in elderly individuals. In contrast, elderly individuals, ages, cognitive abilities, and levels of depression have been found to be significant predictors of compliance (Isaac & Tamblyn, 1993; Spiers & Kutzik, 1995).

Other factors postulated to affect medication compliance are associated with the medication regimen per se. These include the number of medications, the number of pills, the complexity of the drug regimen, and the packaging of the prescribed medication. Evidence on these factors is mixed. Isaac and Tamblyn (1993) found no relationship between medication compliance and the number of medications, number of pills, or complexity of the regimen. On the other hand, in a randomized study of medication dosing and packaging alternatives, Murray, Birn, Manatunga, and Darnell (1993) found evidence to suggest that simplifying complex drug regimens to twice-daily administration with unit-of-use packages may improve medication compliance rates.

Strategies for Enhancing Compliance

Strategies for improving compliance can be categorized into three groups: enabling, consequence, and stimulant (McKinney, Munroe, & Wright, 1992). Enabling strategies are intended to equip patients to be compliant. Such strategies include counseling patients, providing patient education, simplifying the medication regimen, increasing access to medical care and prescription sources, and prescribing less costly therapies. Consequence strategies are aimed at reinforcing compliant behavior. Instructing patients to maintain records of pill-taking and rewarding them for acceptable compliance levels is an example of this approach. Stimulant strategies are intended to prompt pill taking. Examples of tested approaches include tailoring doses to daily rituals, placing reminder cards in prominent places in patients’ homes, visiting the patients’ homes to reinforce compliance, having spouses or friends remind patients to take their medications, and using special drug packaging to organize and prompt dose-taking.

The results of studies using enabling strategies are mixed, suggesting that neither patient education nor increased knowledge of medications per se necessarily leads to improved compliance. Wolfe and Schirm (1992) investigated the effect of medication counseling by a nurse on elderly individuals’ medication knowledge and compliance behaviors and found no significant compliance differences between patients who received medication counseling and those who did not. Cargill (1992) tested the relative impact of a 20-minute teaching session, including a review of medication times, compared to a similar 20-minute teaching session followed by a 1-week to 2-week follow-up telephone call in which a nurse reviewed the medication regimen with the patients. Those patients who received a telephone call in addition to the teaching session showed a significantly greater improvement in medication-taking behavior ($F = .31, p < .01$). The patients in the teaching group who did not receive a telephone call demonstrated only a weak and insignificant increase in pill percentage compliance. The findings of the Cargill (1992) study suggest that a stimulant intervention (e.g., a follow-up telephone call) added to an enabling strategy may enhance home medication-taking behaviors.

Because of advanced technology, several electronic aids currently are available to support stimulant strategies designed to increase medication compliance. Examples are computer-generated reminder charts (Raynor, Booth, & Blenkinsopp, 1993); electronic medication compliance aids (McKinney et al., 1992); and MEMS (Lee et al., 1996; Matsuymama, Mason, & Jue, 1993). The latter have been described extensively in the literature, with excellent validity and with multiple methods of understanding the adherence based on the method of calculation (Rohay, Dunbar-Jacobs, Sereika, Kwoh, & Burke, 1998). McKinney et al. (1992) investigated the impact of an electronic medication compliance aid on long-term blood pressure control in ambulant patients residing in a retirement community or attending a primary care center. Patients were assigned randomly to one of two groups: an experimental group that received antihypertensive medication in vials fit with an electronic timepiece cap; and a control group that received antihypertensive medication in vials fit with standard caps. Patients in the experimental group received one timepiece cap for each drug prescribed. Blood pressure was recorded at the outset of the study and monitored periodically during the subsequent 12 weeks. Subjects using the timepiece...
cap showed an average compliance rate of 95.1%, an average decrease in systolic pressure of 7.6 mm Hg (p < .01), and an average decrease in diastolic pressure of 8.8 mm Hg (p < .01). Subjects in the control group had an average compliance rate of only 78% and a decrease of only 2.8 mm Hg and .2 mm Hg in systolic and diastolic pressures, respectively.

Raynor et al. (1993) studied the effect of computer-generated reminder charts on patients' compliance with drug regimens after discharge from the hospital. Patients were assigned randomly to four groups: Group A received brief counseling from a nurse (usual care); Group B received the counseling from a nurse, plus a reminder chart; Group C received structured counseling from a pharmacist; Group D received structured counseling from a pharmacist, plus a reminder chart. Of those patients who received the reminder chart, 83% correctly described their dose regimen, compared with 47% of those without the chart (p < .001). Raynor et al. (1993) concluded that an automatically generated individualized reminder chart could be a practical and cost-effective aid to compliance.

The study described in this article also used advanced technology to support a stimulant strategy. It was designed to test the effectiveness of videotelephone reminders—compared to regular telephone calls or usual care—in improving medication compliance among a home-based elderly population with a chronic illness. Medication Event Monitoring System caps (MEMS) (Apexx Corporation, Fremont, California)—computerized medication caps placed on a participant's medication bottles—were employed as the means for measuring compliance. Based on the stimulant strategy literature (McKinney et al., 1992), both auditory and visual stimulation were selected as prompts to determine any differences. The Medical Outcome Survey 36-Item Short-Form Health Survey (SF-36) (Ware & Sherbourne, 1992) was selected to determine if quality-of-life scores would be affected by adherence. The Minnesota Living with Heart Failure (MLHF) Questionnaire (Rector, Kubo, & Cohn, 1987) was used to understand specific symptoms of the disease related to medication compliance. It was hypothesized that improved medication compliance would improve both SF-36 and MLHF scores.

Methods

The authors recruited community-dwelling individuals age 65 and older who had the primary or secondary diagnosis of CHF to participate in a randomized controlled study of reminder calls designed to enhance medication compliance. The study consisted of three arms: a control group receiving usual care (n = 18); a group that received daily telephone calls (n = 15); and a group that received daily videotelephone calls (n = 17). The rationale for varying the prompt mode (videotelephone versus telephone) came from a clinical belief that elderly individuals would do better and improve medication-taking behavior with a video (i.e., face-to-face simulation) rather than through a telephone intervention alone. Compliance was defined as the percent of therapeutic coverage (proportion of prescribed medication doses taken) as recorded by the MEMS caps.

Subject Recruitment

Subjects were referred from two sources: a large urban home health care agency and a large urban ambulatory care clinic of a major teaching hospital. Institutional review board (IRB) approval was obtained for each site. Inclusion criteria were:

- Current patient of the Visiting Nurse Service (VNS) of New York or Columbia Presbyterian Medical Center (CPMC).
- Primary or secondary diagnosis of CHF, age 65 or older.
- Resident of Manhattan.
- No pre-pour medications order (i.e., medications were not dispensed via unit of use packages such as daily or weekly dosing dispensers).
- Use of an angiotensin-converting enzyme (ACE) inhibitor, calcium channel blocker, or beta-blocker.
- Fluency in English or Spanish.
- Mini Mental-Status Examination (MMSE) (Folstein, Folstein, & McHugh, 1975) score of 20 or better.
- Experience in using a telephone.
- Home equipped with a telephone and a modular telephone jack.
- Home not in a high-crime building requiring a security guard to accompany research interviewer.

At VNS, eligible subjects were identified through an automated flag implemented via the agency's management information system. At CPMC, eligible subjects were identified by the use of a medical logic module in the CPMC informatics network. Both methods had IRB approval. After referral, subjects were either asked in person by the nurse or asked by telephone by a research assistant to participate. All subjects were offered $20 to participate. Approximately 600 eligible patients were referred; of these, 60 agreed to participate. The major reason for refusal to participate was the patient's or their family's perception that the patient was too ill to comply with the study protocol. In fact, the target group for the study was a very frail group with repeated hospitalizations. Randomization occurred using a table of random numbers after the elderly individuals agreed to participate and finished an in-person baseline data-collection interview. Subsequent to randomization, 4 patients died, 2 sets of caps were lost, and 4 people withdrew before completing the study. These 10 subjects were excluded from the analysis.
Data Collection Procedures

After consent was obtained, a research assistant went to the subjects’ homes to complete the mental status screen (Folstein et al., 1975) and collect the baseline battery data, which included the SF-36 (Ware & Sherbourne, 1992) and the MLHF (Rector et al., 1987).

The MMSE was selected for its clinical brevity and widespread use in the field. It is a 30-item inventory divided into two sections which gives a gross measure of cognition (Folstein et al., 1975). A score of 20 or less greatly increases the chance of cognitive impairment; therefore, the authors selected a cut score of 20 to exclude individuals who may be very impaired, and yet enroll the maximum number of subjects into the study (Siu, Reuben, & Moore, 1994). The SF-36 contains eight scales that measure both physical and mental dimensions of health status: physical functioning, role limitations secondary to physical functioning, bodily pain, general health perception, vitality, social functioning, role limitations because of emotional problems, and mental health. Each scale is scored separately, resulting in a profile of eight scores for each respondent. Items are answered in a Likert-response format. This measure was selected to obtain a baseline of physical and mental function to compare the groups. Similarly, the MLHF questionnaire (Rector et al., 1987), a 21-item survey based on a range of ranking from 0 to 5 was administered at baseline and at the end of study to determine the degree of symptom management difficulty across groups. All of the aforementioned instruments have extensive psychometric testing (Folstein et al., 1975; Rector et al., 1987; Ware & Sherbourne, 1992). After the questionnaires were completed, MEMS caps were placed on a maximum of four medication bottles for each enrolled elderly patient. The number four was selected to provide an average across medications and control for variance. The cost of the caps precluded topping all pill bottles. Medications selected for capping were: ACE inhibitors, calcium channel blockers, beta-blockers, and thereafter, cardiac-related medications such as digoxin, diuretics, and vasodilators. Some elderly patients were taking fewer than four medications and, therefore, had fewer caps. The protocol included a 2-week period of baseline compliance monitoring, a 6-week intervention phase with daily telephone or videotelephone calls, and a 2-week post-intervention compliance monitoring period. Caps were picked up by the research assistant at the end of the 2-week post-intervention period. At that time, a post-interview was conducted, consisting of the SF-36, MLHF, and a set of questions regarding the patient’s experience with the study.

The Intervention

After the 2-week baseline compliance monitoring period had ended, patients were randomized to one of the three study arms. The research assistant went to the home of those in the videotelephone group, installed the videotelephone apparatus and taught the patients how to use it. At that point, the research assistant also determined a convenient time for the patient to receive daily medication reminder calls. Patients in the standard telephone group provided this information via the telephone. Thereafter, during the 6-week intervention period, a telephone or a videotelephone call was made daily (Monday through Friday) during the time window agreed on by the patient and the research assistant. Whether by telephone or videotelephone, the research assistant’s reminder call consisted of a brief greeting and the patients then were asked whether they had taken their medications the previous day. No effort was made to conduct directly observed therapy, and this was not a goal of the study. Calls usually lasted from 3 to 5 minutes, with longer calls occurring when the patient had questions. If there was no answer, the call was placed at regular intervals for the remainder of the day until contact was made. When no contact was made, a notation was made on the study protocol records, and calls were resumed the next day. The only difference between the videotelephone and regular telephone reminder was that the videotelephone group could see the image of the research assistant on the videotelephone screen and vice versa. The videotelephone images are limited by a 2-second frame delay, which can make motion choppy for the individual on the other end of the phone but allows the two individuals to see each other as they speak.

Data Analysis

Using the Statistical Package for the Social Sciences-Personal Computer (SPSS-PC) and MANOVA, the three groups were compared to determine any differences in medication compliance as recorded by the MEMS caps. The cap printouts were reviewed, and a percent compliance rate was calculated for each of three time periods: T1 (average of 2-week baseline percent compliance), T2 (average of 6-week intervention compliance), and T3 (average of 2-week post-intervention compliance). Compliance was calculated using the approach described by Kruse et al. (1992), and expanded by Rohay et al. (1998). Using the daily events adherence method of calculation, which is based on the number of events that occur each day and then averaged over the interval, the method is stated to be comparable to the average of daily pill counts. An average compliance measure was calculated for each of the three time periods using repeated measures ANOVA. The compliance rates were compared in a three-by-three design (i.e., control, telephone, and videotelephone at T1, T2, and T3). Pre-intervention and post-intervention scores were calculated for the MLHF and SF-36.
Results

Baseline Equivalence

Table 1 reports selected demographic data for the study sample. The mean age was 74.2 (SD = 6.8), with a median age of 72. The mean number of years of education was 9.3 (SD = 4.9; median, 10.5). More than 70% of subjects were either widowed or divorced. Only two individuals were working for pay outside of the home on a part-time basis. The group was 14% White, 30% Black, 54% other, and 2% “missing,” reflecting the diversity of New York and the limitations of racial labels. Half of the interviews were conducted in Spanish to accommodate the language of preference. There were no statistically significant demographic differences between the experimental and control groups.

Table 1
Selected Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Telephone</th>
<th>Videotelephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>18</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Black</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Widowed</td>
<td>7</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Divorced or separated</td>
<td>8</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Never married</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Years of Education</td>
<td>mean = 7.8 (SD = 5.7)</td>
<td>mean = 11.5 (SD = 3.8)</td>
<td>mean = 9 (SD = 4.7)</td>
</tr>
<tr>
<td>Age</td>
<td>mean = 73.7 (SD = 5.3)</td>
<td>mean = 76.2 (SD = 8.8)</td>
<td>mean = 73.1 (SD = 6.5)</td>
</tr>
</tbody>
</table>

*Not significant across groups.

Intervention Effects

During the 2-week baseline compliance monitoring period, there were no statistically significant differences in the compliance rates of the intervention and control groups. The average compliance rates across the three groups were: 81% for the controls, 76% for the telephone group, and 82% for the videotelephone group. During the subsequent two time periods (6 weeks intervention and 2 weeks post-intervention), the compliance rate of the control group dropped significantly (from 81% at T1 to 57% at T3, p < .04), while the compliance rates of the two intervention groups remained steady (Table 2, Figure). Thus, there was a statistically significant time effect during the course of the study from baseline to post-intervention (F[2, 34] = 4.08, p < .05). Over time, the elderly patients who were called either by telephone or videotelephone showed enhanced medication compliance relative to the control group, demonstrating an effect from the calling interventions. However, there was no significant difference in compliance rates between the two intervention groups. The enhanced technology offered by the videotelephone images apparently did not offer a relative advantage over regular telephone reminders regarding the elderly patients’ compliance behavior. Multiple regression analysis did not yield any demographic predictors for better compliance.

Both the SF-36 scores and the MLHF scores improved from baseline to post-intervention for all groups. There was no significant change in the SF-36 scores for the sample, but there was improvement in the MLHF scores (p < .001), indicating improved self-reported clinical status. Group membership did not make a difference for either score (Table 3).

Discussion and Nursing Implications

The most striking finding of this study is the significant falloff in the control group’s medication compliance rate over time, compared to the rates of the two intervention groups. Between T1 and T3, compliance in the control group fell 24 percentage points, while compliance in the two reminder groups fluctuated by no more than 2 percentage points. By the end of the 10-week period during which compliance rates were measured, the control group was taking on average only 57% of prescribed medication doses, while the
Table 3
Intervention Effects

<table>
<thead>
<tr>
<th>Group</th>
<th>MEASURE</th>
<th>SF-36 Scores</th>
<th></th>
<th></th>
<th>MLHF Scores</th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(n = 14)</td>
<td>87.3</td>
<td>24.3</td>
<td>91.7</td>
<td>22.7</td>
<td>46.6</td>
<td>27.7</td>
<td>32.9</td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(n = 13)</td>
<td>81.0</td>
<td>15.2</td>
<td>90.1</td>
<td>20.6</td>
<td>54.4</td>
<td>21.1</td>
<td>32.9</td>
</tr>
<tr>
<td>Videotelephone</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 15)</td>
<td>86.1</td>
<td>17.0</td>
<td>85.9</td>
<td>18.9</td>
<td>43.1</td>
<td>20.8</td>
<td>36.7</td>
</tr>
</tbody>
</table>

other two groups—exposed to daily medication reminders—were taking between 74% to 84%. With the advent of managed care and cuts in home care reimbursement, the ability to enhance medication compliance by such simple means as a telephone call is important. The usual practice of pre-pouring medications for the week, often performed by home care nurses at the cost of a visit may be replaced by telephone calls by the home care nurse, saving travel time, increasing the number of contacts, and obtaining better compliance. In large part, these are patients who are quite ill, and the daily reminder to take medications could have a positive effect on overall symptom management and well-being, which should be investigated in the future.

One may ask why the baseline compliance rates across the three groups were so high, ranging from 76% to 82%, and why the pattern of compliance observed in the study involved differential falloff from a relatively high percentage of doses completed rather than a differential improvement from a relatively low level of initial compliance. One plausible explanation is that the compliance rates observed during the 2-week baseline monitoring period may have been an artifact of the study’s measurement technology. One could argue that the action of placing MEMS caps on patients’ pill bottles—an action necessary for measuring compliance throughout the study—was itself an intervention and could have produced a Hawthorne effect that raised compliance beyond its natural level in the study population. Because the protocol of placing caps on bottles was identical across the three groups, this effect was observed more or less uniformly across the control and intervention groups at baseline. As the presence of the electronic bottle caps became routine, its effect could be expected to wear off, leaving compliance rates to fall to what was presumably their prior level. In the absence of any other intervention, this is apparently what happened in the control group. In contrast, the introduction of the telephone and videotelephone reminders in the two intervention groups evidently worked to sustain the relatively high levels of compliance that were observed at baseline. Why these levels were sustained during the 2 weeks post-intervention (after daily reminders were no longer received) and for how long the apparent benefit associated with the reminders will endure are questions for future study.

The second substantive finding of this study is the absence of a significant difference between the two intervention groups. The opportunity afforded by the videotelephone for the patient and the individual providing the medication reminder to see each other was presumed to establish greater rapport through visual contact and was expected to yield a stronger compliance effect relative to regular telephone communication. However, no significant advantage could be detected, although the trend for a greater effect was there. This may be partly because of the small sample participating in the study because the trend toward a stronger effect with the videotelephone is evident. It may also be partly because of perceived limitations of the videotelephone technology. The videotelephones are somewhat more awkward to use than regular phones and the images are neither vivid nor in real time. In any case, the small magnitude of the discernable difference between the two types of reminders suggests that either technology could be used to positive effect. Since this study, technology has improved and the “CU-SeeMe” (Cornell University, Ithaca, NY) systems along with Internet television hold promise as creative venues for personal contact. Finally, the change in the MLHF scores cannot be interpreted meaningfully in this study because of sample size but warrant further consideration in a larger trial. Further, in a next phase, the investigators hope to explore the question of “dose.” That is, how frequently must calls be made to get the desired enhanced compliance effect.

This study has at least two important limitations. First is the extremely low participation rate (approximately 10%), which reflects national trends in heart failure studies (Goodyer, Miskelly, & Milligan, 1996). The refusal-to-participate rate is a concern. Focus groups using potential subjects to help understand their hesitation to participate would be of value. Selecting younger, healthier subjects is always an option but would result in a different study. Given the large numbers of very frail community-dwelling elderly individuals in the United States, it makes more sense to focus on their participation. The modest stipend for enrollees ($20) did not provide a strong incentive for
participation, although elderly individuals were not asked specifically if more money would change their minds. Furthermore, the severity of illness of the patients referred to the study was clearly a deterrent to participation. Sicker individuals were more likely to decline to participate, and sensory impairments such as hearing and vision deficits further reduced participation.

The second limitation of the study was the exclusion of individuals who routinely relied on pre-poured medications, such as daily or weekly pillboxes and dosing dispensers. Because the MEMS compliance measurement methodology requires that computerized medication caps be placed on the patients' medication bottles, individuals who did not routinely take their pills from the bottle, but rather from a special pillbox, could not be included. It should be stressed that this exclusion was a requirement of the research measurement methodology and not the reminder strategy per se. There is inherently no obvious reason why such individuals could not benefit from daily medication reminders. However, any research study designed to include this group would have to rely on some other method of measuring compliance.

Given the mixed results of patient education interventions designed to increase medication compliance among frail elderly individuals, increasing attention has focused on stimulus strategies designed to augment medication information and to prompt pill-taking behavior. Despite its small sample, this study demonstrated that daily telephone calls or electronic home visits could improve medication compliance significantly in a sample of elderly individuals with CHF who took, on average, 3 to 15 doses of medication every day. In addition, monitoring with computerized medication caps provided an accurate and consistent method of electronic observation. Patients who have been hospitalized for CHF have a high rate of rehospitalization, which may be attributable in part to poor medication compliance and to resultant illness. This pilot study demonstrated a simple, inexpensive approach with promising results. These results suggest the importance of conducting the intervention on a larger scale.

References


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Exercise for Article 8

Factual Questions

1. Which one of the three types of strategies for enhancing compliance is intended to prompt pill taking?

2. Subjects were recruited from what two sources?
3. How many of the original subjects in this study withdrew before completing it?

4. What precluded capping all pill bottles?

5. Which one of the three groups had the highest average years of education?

6. Was the drop in the control group’s compliance rate from Time 1 to Time 3 statistically significant?

7. According to the researchers, what is the “second substantive finding” of the study?

Questions for Discussion

8. Speculate on what the researchers mean by “Likert-response format.” (See lines 284–287.)

9. The footnote to Table 1 indicates that the differences in demographics across groups were not significant. Is this important information? Explain.

10. In the paragraph beginning on line 443, the researchers speculate on why the initial (baseline) compliance rates were so high. Does their speculation make sense? Why? Why not?

11. In the paragraph beginning on line 506, the researchers identify the low participation rate as an “important limitation.” Do you agree that it is important? Explain.

12. If you were to conduct another study on the same topic, what changes in the research methodology, if any, would you make?

Quality Ratings

Directions: Indicate your level of agreement with each of the following statements by circling a number from 5 for strongly agree (SA) to 1 for strongly disagree (SD). If you believe an item is not applicable to this research article, leave it blank. Be prepared to explain your ratings.

A. The introduction establishes the importance of the study.
   SA 5 4 3 2 1 SD

B. The literature review establishes the context for the study.
   SA 5 4 3 2 1 SD

C. The research purpose, question, or hypothesis is clearly stated.
   SA 5 4 3 2 1 SD

D. The method of sampling is sound.
   SA 5 4 3 2 1 SD

E. Relevant demographics (for example, age, gender, and ethnicity) are described.
   SA 5 4 3 2 1 SD

F. Measurement procedures are adequate.
   SA 5 4 3 2 1 SD

G. All procedures have been described in sufficient detail to permit a replication of the study.
   SA 5 4 3 2 1 SD

H. The participants have been adequately protected from potential harm.
   SA 5 4 3 2 1 SD

I. The results are clearly described.
   SA 5 4 3 2 1 SD

J. The discussion/conclusion is appropriate.
   SA 5 4 3 2 1 SD

K. Despite any flaws, the report is worthy of publication.
   SA 5 4 3 2 1 SD