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Feasibility and Impact of Telemonitor-Based Depression Care Management for Geriatric Homecare Patients

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Feasibility and Impact of Telemonitor-Based Depression Care Management for Geriatric Homecare Patients


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Abstract

Objective: The objective of this study was to test the feasibility, acceptability, and preliminary clinical outcomes of a method to leverage existing home healthcare telemonitoring technology to deliver depression care management (DCM) to both Spanish- and English-speaking elderly homebound recipients of homecare services. Materials and Methods: Three stand-alone, nonprofit community homecare agencies located in New York, Vermont, and Miami participated in this study. Evidence-based DCM was adapted to the telemonitor platform by programming questions and educational information on depression symptoms, antidepressant adherence, and side effects. Recruited patients participated for a minimum of 3 weeks. Telehealth nurses were trained on DCM and received biweekly supervision. On-site trained research assistants conducted in-home research interviews on depression diagnosis and severity and patient satisfaction with the protocol. Results: An ethnically diverse sample of 48 English- and Spanish-only-speaking patients participated, along with seven telehealth nurses. Both patients and telehealth nurses reported high levels of protocol acceptance. Among 19 patients meeting diagnostic criteria for major depression, the mean depression severity was in the "markedly severe" range at baseline and in the "mild" range at follow-up. Conclusions: Results of this pilot support the feasibility of using homecare's existing telemonitoring technology to deliver DCM to their elderly homebound patients. This was true for both English- and Spanish-speaking patients. Preliminary clinical outcomes suggest improvement in depression severity, although these findings require testing in a randomized clinical trial. Implications for the science and service of telehealth-based depression care for elderly patients are discussed.

Key words: Home health monitoring, telehealth, telepsychiatry

Introduction

The use of home telemonitoring technology is growing at a rapid rate in the homecare industry. There are approximately 9,000 Medicare-certified homecare agencies in the United States, serving approximately 5 million elderly patients. With 21% (1,900) of home health agencies using telehealth disease management systems and an estimated annual growth rate of 17%, telehealth is an area of significant growth. In a recent nationwide survey of almost 1,000 representative homecare agencies, the most commonly reported use for home telemonitoring is the management of cardiac disease, followed by respiratory illness and diabetes, respectively. Almost two-thirds of respondents acknowledged that their telehealth system was part of a chronic disease management program. However, to our knowledge, few home health telemonitor programs include evidence-based depression care management (DCM).

With an estimated prevalence of approximately 14% for major depression and another 10% for minor depression, the rate of this illness in homecare is twice that of primary care and second only to nursing homes. A number of studies have documented the suffering and adverse consequences of geriatric depression, including poor quality of life, higher mortality from illness or suicide, adverse events such as falls and hospitalization, higher healthcare costs, and poor adherence to medical treatments. However, homecare patients often have little access to skilled depression care and most go untreated or inadequately treated, creating a significant public health problem.

Telehealth technology in homecare may offer an opportunity to increase access to depression treatment by incorporating evidence-based depression care guidelines into an agency's existing telehealth infrastructure and coordinating service via a trained and supported telehealth nurse. This approach combines two important elements of both telehealthcare and depression care: (1) the use of telemonitor technology in homecare to manage chronic diseases, and (2) the "Collaborative Care" approach to DCM, which has demonstrated effectiveness in primary care settings (described later).

Among researchers and providers of mental health services, depression is increasingly recognized as an illness that should be managed as a chronic disease. Patients with prior episodes of depression are at increased risk for future episodes, and half or more...
of depressed patients who receive guideline-consistent depression treatment only achieve partial improvement. Ongoing management may help prevent relapse or worsening of the illness. In primary care, a well-validated model for managing depression is the "collaborative care" approach: at least one professional staff member (typically nurse or social worker) is designated the Depression Care Manager, who works with the patient, the primary care physician, and a mental health consultant to treat depression, monitor improvement, and actively engage the patient in their mental health care. Numerous studies have demonstrated that this model improves depression-care and patient outcomes.

Researchers at The Weill Cornell Homecare Research Partnership and the University of Southern California have drawn upon this model to create successful DCM protocols for homecare, in which a visiting nurse serves the role of Depression Care Manager. A natural extension of this approach is to utilize an agency's existing telemonitor technology to deliver this care, with the telehealth nurse serving the role of a centralized Depression Care Manager. Studies in primary care and the Veterans Administration have found that telehealth-based screening and collaborative care for depression is feasible and effective. Applying this model in homecare could address gaps in service by providing a clinician who is a centralized care manager without the travel or other demands of a visiting nurse, has on-site supervisory support and oversight, and has immediate access to the patient via the in-home telemonitor and telephone. The sustainability demands of this approach are also reduced, because dramatically fewer nurses require training (often only 1-2 telehealth nurses per agency), compared with training all visiting nurses, and thereby placing fewer turnover-related training demands on the agency.

The goals of this pilot study were to test the feasibility, acceptability, and preliminary clinical outcomes of a protocol to use home telemonitoring technology to provide geriatric DCM to participating elderly homecare patients (Depression TeleCare Protocol). The protocol was developed for both English- and Spanish-only-speaking patients in order to evaluate the program in a diverse population. The intervention brought together (1) the existing approach in homecare for using telemonitor technology to manage chronic disease and (2) the components of DCM found to be effective in adult and elderly-focused primary care and homecare settings. The primary outcomes were (1) success in implementing the protocol, (2) patient and telehealth nurse satisfaction with the protocol, and (3) patient pre-post depression severity outcomes.

**Materials and Methods**

**PARTICIPANTS**

This study was approved by the institutional review boards of Rhode Island Hospital, Weill Cornell Medical College, and the University of Vermont College of Medicine. English- and Spanish-speaking participants were recruited from three homecare agencies between November 2009 and May 2010. All three agencies were Medicare certified and located in Colchester, VT, White Plains, NY, and Miami, FL, providing care to a wide range of urban, suburban, and rural residents with ethnic diversity. As a feasibility trial, we sought to have as many participants as possible who use the technology and, therefore, chose not to assign patients to a control group. All eligible and consenting participants received the intervention. Patients were eligible to participate if they were enrolled in homecare services, aged 65 and older, and potentially needing DCM, defined as (1) screening positive for depression on homecare's Medicare-mandated intake form, the Outcome and Assessment Information Set (OASIS), (2) admitted to homecare with a diagnosis of depression, or (3) taking antidepressant medication at homecare admission. Patients were English or Spanish speaking, nonaphasic, not hearing impaired, nondemented, able to give consent, and able to use the telemonitor. Participants had to be able to receive the intervention for a minimum of 3 weeks.

Agency staff participants included four telehealth nurses from each of the three homecare agencies and three telehealth/clinical managers who completed satisfaction surveys.

**DEPRESSION TELECARE PROTOCOL**

In homecare, telemonitor technology is typically used to augment and support skilled care by visiting nurses and other professionals (e.g., physical therapy). Generally, patients are referred to homecare from a hospital, rehabilitation center, or primary care for skilled care related to medical conditions (e.g., congestive heart failure [CHF], wound care). The patient is assigned a visiting nurse or other professional, who goes to the patient's home to provide care. Patients for whom telehealth is appropriate also receive a home health monitor in their home. *Figure 1* below shows a typical home health monitor, with peripherals that measure weight, blood sugar, heart rate, etc. These devices are part of an integrated disease management program at the agency and used to measure medical indicators associated with the patient's primary illnesses. They are used daily, using a chime, synthetic voice through speakers (for some devices), and/or touch screen, and patients are prompted to measure weight, blood pressure, pulse, etc. Through an online interactive screen, these monitors also can "ask" patients simple questions about their health and healthcare needs and can provide basic education about illness, treatment, health, and wellness. Each of the three agencies participating in this project...
study used a different telehealth vendor, providing an opportunity to test the intervention across a variety of platforms.

The DCM model assigns a key professional staff member (e.g., nurse, social worker) to the role of Depression Care Manager. This individual coordinates depression care among the patient, the physician, and when needed, a mental health specialist. Key components include symptom assessment, treatment evaluation, patient education, and behavioral activation. This model needs to be adapted to the homecare and telehealth system. Table 1 outlines the key components of collaborative depression care and how the tasks were adapted to telehealth in homecare.

All relevant protocol elements were created in English and Spanish, including telemonitor items and telehealth nursing materials (e.g., Patient Health Questionnaire [PHQ]-9 and antidepressant management guidelines). When available, we used established Spanish version measures (e.g., Spanish PHQ-9). Otherwise, we used a healthcare-certified translation company. A bilingual telehealth nurse delivered the Spanish version. Per Table 1, the telemonitors were programmed to briefly assess depression using the two-item PHQ-2, inquire about medication adherence (e.g., “have you been taking your medicine for depression as your doctor has prescribed?”) and side effects (e.g., “is your antidepressant medicine causing any unpleasant side effects or other problems?”), and provide simple education about depression and treatment adherence (e.g., “you should start to feel better within 2–4 weeks of starting your medicine. If you don’t, tell your doctor or nurse”). The questions were developed to use the same format that home telemonitors typically use for other disease management and were intended to address each of the key domains while imposing as little burden as possible on patients.

Each of the agencies’ telehealth nurses received a full day of training on the Depression TeleCare Protocol, which included all of the key collaborative care components described earlier. Telehealth nurses were trained on (1) depression diagnosis and assessment using the PHQ-9, (2) basic information about antidepressant medication and medication management, (3) patient education about depression and depression care (including pleasurable activities), and (4) professional communication and coordination. At the end of training, nurses were expected to have the skill set to review telemonitor items, interpret the data within the context of their training on depression care, their medical training, and their knowledge of the patient’s health status, and contact patients via telephone as needed to follow-up on care, educate and reassure patients, encourage pleasurable activities, and assess depression status using the PHQ-9.

Finally, telehealth nurses were expect to coordinate depression care with the patient’s visiting nurse, primary care physician, and/or mental health professionals. Nurse competency was evaluated using knowledge tests and scenario-based roleplays.

In addition, we established procedures for suicide risk prevention, communication with other professionals, supervision and support, and care coordination among the telehealth nurse, visiting nurse, and primary care physician. Over the period of the study, the investigators and agencies held conference calls every 2 weeks to monitor study progress, discuss cases as needed, and respond to technical or implementation challenges. Between conference calls, cases and challenges also were discussed on an ad-hoc basis as the need arose.

### DATA COLLECTION, MEASURES, AND ANALYSIS

On-site research assistants (RAs) collected research data at each of the three sites, going to patients’ homes conducting baseline interviews within 5 days of start of care and completing follow-up interviews upon discharge. Each RA was brought to Cornell for training in the protection of human subjects, Health Insurance Portability and Accountability Act (HIPAA) research guidelines, recruiting participants, consenting procedures, and administration of study measures. RAs were supervised via weekly conference calls, during which all assessments were reviewed, reliability and validity issues were addressed, and implementation progress was monitored. Measures were the Structured Clinical Interview for DSM-IV (SCID), the Hamilton Depression Rating Scale, 24-item (HDRS), and a patient survey of satisfaction with the Depression TeleCare Protocol, using a measure adapted from Bratton and Short for geriatric patients, and items recommended by the Medicare Quality Improvement Organization for telemedicine. The Mini Mental State Exam was administered at baseline to exclude patients who had significant cognitive...
impairment, Agency telehealth nurses and telehealth managers also completed a satisfaction survey adapted from Hicks et al. Descriptive statistics were used to characterize the participant demographics and user satisfaction. Pre and post-depression severity scores were compared using the Statistical Program for the Social Sciences (SPSS) general linear model repeated measures test of the null hypothesis of no within-subject differences at follow-up versus baseline.

Results
We recruited an ethnically diverse sample of 48 English- and Spanish-only-speaking patients (34% Hispanic, 14% African American, and 2% Native American). We also surveyed seven agency telehealth nurses and managers about their satisfaction with the Depression TeleCare Protocol and the degree to which they believed it helped their patients.

PATIENT CHARACTERISTICS
The patient characteristics are presented in Table 2. A total of 68 patients were identified as potential study participants. Thirteen (19%) refused participation, three (4%) could not be contacted, two (3%) had telemonitor problems, one (1.5%) was excluded because of diagnosis of bipolar disorder, and one (1.5%) was excluded because of high suicidality. Because of agency differences in record keeping, identified demographic data were available on only a subset of patients who refused (n=8 of 13). However, we found no differences between participants and nonparticipants on age, marital status, race/ethnicity, or gender. The final sample consisted of 48 participants, a large proportion of which (27%) spoke only Spanish. Participants had a wide range of national origins, coming from different countries in North and South America, Europe, the Caribbean, and the Mediterranean. Gender of origin was unknown for one patient.

Analysis of agency differences in patient characteristics indicated that there were significantly more Hispanic patients at the Miami agency (73%) than the White Plains (6%) or the Colchester (0%) agencies (X²(2) = 13.3; p < 0.001). Additionally, the Miami agency had a higher percentage of patients without a high-school education (73%) than the Colchester (31%) or White Plains (18%) agencies (X²(4) = 13.3; p = 0.01). Finally, although not statistically significant, the Colchester agency had a lower percentage of Black/African American patients (0%) compared with the White Plains (18%) and Miami (20%) agencies. With the exception of an overrepresentation of Hispanics, the demographics of this sample was similar to that of a national sample.

USER SATISFACTION AND ACCEPTABILITY
Both patients and telehealth nurses reported high levels of acceptability and satisfaction with the Depression TeleCare Protocol. The survey covered four broad outcomes: (1) ease of use and technical feasibility, (2) user enthusiasm for the service and willingness to use it again, (3) satisfaction with service delivery, and (4) self-reported outcomes. Overall, patient ratings of satisfaction were very high: 83% reported that they were satisfied or very satisfied with the protocol. A majority also reported that they quickly became comfortable using the equipment (78% in less than a week and 84% within two weeks), that there were few technical problems (72%), that it improved care (58%), and that they would be willing to use it again (82%). Similarly, the telehealth nurses reported that with the majority of their patients, the Depression TeleCare Protocol was easy to implement (90%), that there were few technical problems (71%), that it improved care (70%), and that it improved depression outcomes.

Table 2. Most Common Positive and Negative Comments to Telemonitor and Depression Protocol

| Table 2. Demographic Characteristics Pilot Study Participants (n=48) |
|-----------------|-----------------|-----------------|
| CHARACTERISTIC  | N (%)           | CHARACTERISTIC  | N (%)           |
| Gender          |                | Marital status  |                |
| Female          | 30 (62)        | Married         | 14 (29)         |
| Male            | 18 (41)        | Widowed         | 22 (46)         |
| Race/ethnicity  |                | Separated/divorced | 10 (21)       |
| White           | 39 (81)        | Never married   | 2 (4)           |
| African American| 6 (13)         | Education       |                |
| Native American | 2 (4)          | Less than high-school education | 19 (40) |
| Hispanic        | 13 (27)        | High-school graduate/some college | 19 (40) |
| Other           | 1 (2)          | College graduate | 10 (21)        |
| Primary language|                | Living circumstances |            |
| English         | 35 (73)        | Alone           | 23 (48)        |
| Spanish         | 13 (27)        | With spouse/partner | 16 (33)       |
|                 |                | With others     | 9 (19)         |
| MEAN SD         |                |                 |
| Age (years)     | 76.2 (7.7)     |                 |

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Both patients (94%) and nurses (90%) believed that confidentiality was maintained. As anticipated, a proportion of patients were not satisfied with the protocol (n=4; 8.3%). The most common reasons were resistance to using the technology to discuss depression and perceived burden. The most frequent positive and negative patient comments are provided in Table 3.

DEPRESSION OUTCOMES

Depression characteristics are presented in Table 4. At baseline, more than half of participating patients reported at least one of the two cardinal symptoms of depression: depressed mood or lack of interest or pleasure in activities (anhedonia). Nineteen (40%) of these patients met full diagnostic criteria for major depression, with a mean depression severity score in the “markedly severe” range on the Hamilton Rating Scale for Depression. Sixteen of these patients received follow-up interviews at the end of the intervention and had mean scores in the “mild” range, indicating significant improvement in depression severity.

Table 4. Depression Status for Study Participants (n=48)

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<td><strong>MEAN (SD)</strong></td>
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<tr>
<td>Depression severity (HRRS)* for all participants (n=48)</td>
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<td>Depression severity for patients with DSM-IV depression diagnosis (n=19)</td>
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<td>Baseline and follow-up depression severity (n=16 patients received baseline and follow-up interviews)</td>
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<td>Baseline HDRS</td>
<td>20.9 (5.0)</td>
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<tr>
<td>Follow-up HDRS</td>
<td>14.3 (10.2)*</td>
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*Hamilton Depression Rating Scale (24-item); score of 11 or higher suggests clinically significant depression.

†t(1,18) = 12.1, p=0.003.

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Acknowledgments

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Disclosure Statement

No competing financial interests exist.

REFERENCES


