Efficacy of Nurse Telehealth Care and Peer Support in Augmenting Treatment of Depression in Primary Care

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Background: Primary care treatment of depression needs improvement.

Objective: To evaluate the efficacy of 2 augmentations to antidepressant drug treatment.

Design: Randomized trial comparing usual care, telehealth care, and telehealth care plus peer support; assessments were conducted at baseline, 6 weeks, and 6 months.

Setting: Two managed care adult primary care clinics.

Participants: A total of 302 patients starting antidepressant drug therapy.

Interventions: For telehealth care: emotional support and focused behavioral interventions in ten 6-minute calls during 4 months by primary care nurses; and for peer support: telephone and in-person supportive contacts by trained health plan members recovered from depression.

Main Outcome Measures: For depression: the Hamilton Depression Rating Scale and the Beck Depression Inventory; and for mental and physical functioning: the SF-12 Mental and Physical Composite Scales and treatment satisfaction.

Results: Nurse-based telehealth patients with or without peer support more often experienced 50% improvement on the Hamilton Depression Rating Scale at 6 weeks (50% vs 37%; P = .01) and 6 months (57% vs 38%; P = .003) and on the Beck Depression Inventory at 6 months (48% vs 37%; P = .05) and greater quantitative reduction in symptom scores on the Hamilton scale at 6 months (10.38 vs 8.12; P = .006). Telehealth care improved mental functioning at 6 weeks (47.07 vs 42.64; P = .004) and treatment satisfaction at 6 weeks (4.41 vs 4.17; P = .004) and 6 months (4.20 vs 3.94; P = .001). Adding peer support to telehealth care did not improve the primary outcomes.

Conclusion: Nurse telehealth care improves clinical outcomes of antidepressant drug treatment and patient satisfaction and fits well within busy primary care settings.

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PATIENTS AND METHODS

SETTING

Patients were referred by physicians at the Hayward and San Francisco primary care clinics within Kaiser Permanente Northern California. Wall charts were placed in examining rooms showing the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, criteria for major depressive disorder; characteristics of patients who should be referred directly to specialty care; and recommended starting doses for selective serotonin reuptake inhibitor medications. Ninety primary care physicians and 10 nurse practitioners received 2 hours of structured training and at least 1 hour of booster training on the detection and management of depression.

STUDY POPULATION

Patients eligible for the study were diagnosed by a primary care physician as having major depressive disorder or dysthymia and given a prescription for a selective serotonin reuptake inhibitor antidepressant. Study participants were prescribed either fluoxetine hydrochloride or paroxetine, reflecting prescribing practices in primary care at the time of the study. Potential participants were excluded if they received a previous antidepressant drug prescription within the past 6 months, had an inadequate command of the English language, reported current problems with substance abuse, showed current suicide risk, or reported thoughts of violence.

TREATMENT ASSIGNMENT

Patients were recruited during an 18-month period. Those who were eligible and consented were randomly assigned to 1 of 3 conditions: (1) usual physician care (physician counseling and treatment with a selective serotonin reuptake inhibitor medication), (2) usual physician care plus nurse telehealth care, or (3) usual physician care plus nurse telehealth care plus peer support. During the initial 9 months of recruitment, patients were randomized only to conditions 1 or 2, with a 40% probability of assignment to condition 1. During the remaining 9 months of recruitment, patients were assigned to all 3 conditions, with 40% assigned to condition 1, 20% to condition 2, and 40% to condition 3. By design, then, the overall study population was allocated 40% to condition 1, 40% to condition 2, and 20% to condition 3; thus, 40% of patients were assigned to an intervention without telehealth care and 60% were assigned to an intervention that included telehealth care. The allocation ratios were designed to change over time so that we could begin the study before we were prepared to deliver the peer intervention. Randomization was stratified by facility. Consent and other procedures of the study were approved by the institutional review board of Kaiser Permanente.

PROCEDURES

Almost all of the patients referred to the study were recruited through an in-person interview with a research assistant immediately after the clinic visit that led to the referral. The rest of the patients were recruited by telephone within 3 days of referral. During the interview each patient’s eligibility was checked, the study was explained, informed consent was obtained, and baseline data were collected. Baseline measures included the self-report version of the Hamilton Depression Rating Scale, the Beck Depression Inventory, and the SF-12 Mental and Physical Composite Scales. The SF-12 scales measure perceived impairment of functioning due to mental and physical disorders, respectively. Follow-up measures were the same with 2 exceptions. The Hamilton Depression Rating Scale–Interview was used rather than the self-report version. Previous investigators found a high correlation between the self-report and interview versions of the Hamilton scale. The second exception was the deletion of the SF-12 Physical Composite Scale. This measure was included only at baseline to control for global severity of physical illness.

Our primary measure of symptomatic outcome was the Hamilton Depression Rating Scale. This instrument was expected to be the most sensitive measure of symptomatic effects because it has shown this superiority in previous studies.

Trained Kaiser Permanente interviewers (all graduate students in psychology) assessed each patient by telephone 6 weeks and 6 months after study entry. The Beck Depression Inventory was mailed to participants in advance, and their answers were gathered via the telephone. All patients were sought for interview at both follow-up times regardless of their current treatment status, residence location, or membership status in the Kaiser Permanente Health Plan.

Four interviewers were trained by the project clinical director (J.F.M.). Training consisted of mock interviews in which they were taught how to rate the Hamilton Depression Rating Scale, followed by practice interviews in which their ratings were reviewed, critiqued, and discussed. Training on the other study instruments consisted of several mock interviews that were observed and critiqued. Interviewers were allowed to evaluate study patients only after they had successfully completed training. During the study, 2 pairs of interviewers periodically audited each other’s Hamilton interviews and scored them independently. Interrater correlations were 0.95 (n=31) and 0.97 (n=35).

The patient satisfaction with treatment scale consists of 11 items rated on a 5-point scale from 5 (“very satisfied”) to 1 (“very dissatisfied”). A principal components factor analysis with varimax rotation factor analysis of the satisfaction items from the 6-week interview produced 2 factors that accounted for 100% of the shared variance among the items. Factor 1 reflects the degree of general satisfaction with the treatment services respondents received and with the health maintenance organization, whereas factor 2 reflects satisfaction with the...
information provided about medications and medication side effects. The scale and its factor structure are available from the authors.

Medication adherence data were gathered from computerized pharmacy records showing every prescription filled by study patients at a Kaiser Permanente pharmacy. We measured total milligrams of selective serotonin reuptake inhibitors dispensed within 6 weeks and 6 months of randomization. We excluded 15 patients at 6 weeks and 20 at 6 months who had terminated their Kaiser Permanente Health Plan membership or had filled antidepressant prescriptions in a non–Kaiser Permanente pharmacy up to the time of the analysis.

INTERVENTIONS

Usual Physician Care

Patients assigned to this condition continued to be seen as needed by their primary care physician and, except for the 2 experimental interventions, could be referred for other care as indicated. As previously described, most study physicians had received at least 3 hours of training on the identification and treatment of depression. They were asked to continue the same pattern of follow-up visits with the patient regardless of the study arm to which the patient was assigned. It was our goal to have usual physician care represent good care. We made it explicit that we did not intend any reduced contact with the treating physician to “offset” the cost of the supplemental interventions.

Nurse Telehealth Care

Nurse telehealth care consisted of 1 to 2 telephone calls per week during the first 2 weeks of enrollment, 1 call per week during weeks 3 to 8, and then 1 call every 2 weeks up to week 16. The goal was to have 12 to 14 calls to each patient during 16 weeks. Calls were limited to 10 minutes and were scheduled in advance. Extra calls were permitted in urgent circumstances, and the patient could leave telephone messages for the nurse.

In each telephone call the nurse inquired about questions the patient might have had about the antidepressant medication, offered suggestions about how to deal with minor side effects, and emphasized the importance of taking the medication regularly. The nurse offered emotional support and helped patients identify activities that they were willing to try to be more active and to find pleasure. During each telephone call the nurse reviewed the activities of the previous week. With the patient, she developed a plan for the next steps in doing these activities. Follow-up nurses were members of the patient’s primary care clinic. This was an advantage for patients because the nurse could also address issues about other medical conditions and discuss the patient’s overall health as well as his or her mental health. By using regular clinic nurses we therefore hoped to improve the overall care of the patient, not just the care for depression. A log for each telephone call included current medication and dosage, side effect problems, and a behavioral plan. The nurse gave regular feedback on the progress of each patient to the patient’s primary care physician.

Telehealth care nurses were chosen by a nursing supervisor at each site based on the nurse’s interest in the project and administrative staffing considerations. Fifteen nurses completed a manualized 6-hour training workshop developed and presented by the project clinical director (J.F.M.). In treating study patients we used a single trained nurse at each site with an alternate to cover leave time. Nurses received ongoing weekly supervision from the clinical director, a clinical psychologist, mostly by telephone but with 1 visit to a site each month.

Peer Support

Peer support was provided by health plan members who had experienced a successfully treated episode of major depression or dysthymia and who volunteered to be trained as peer supporters. In each case the volunteer’s mental health provider endorsed his or her participation in the program. Volunteers were recruited through newspaper advertisements, notices posted in Kaiser Permanente waiting rooms, and local television and radio news coverage. All volunteers were carefully screened by an experienced psychiatric social worker, who also trained the volunteers, matched them to study patients, and monitored their performance.

Training lasted approximately 20 hours and consisted of lectures, role play, and discussion. Peer supporters were supposed to model and share their successful coping skills, provide emotional support, and encourage self-monitoring and a continued connection to Kaiser Permanente depression care. They were also expected to help patients develop and keep a hopeful outlook.

Peers were linked with study patients of similar age and sex who had been assigned to the peer support condition. When possible, peers were also linked by similar life experience such as job loss, divorce, or a similar medical problem. Peers were expected to make a telephone or in-person contact with the patient on 1 or more occasions, continuing to contact the person to express an interest in how they were doing for at least 6 months after their assigned person entered the study. Incentives such as movie tickets were offered to encourage face-to-face contact.

STATISTICAL ANALYSIS

Dependent variables were total score on the Hamilton Depression Rating Scale, total score on the Beck Depression Inventory, 2 satisfaction factor scores, and the SF-12 Mental Functioning Scale score. Consistent with previous research, on the treatment of depression in primary care, results for the Hamilton Depression Rating Scale and the
We hypothesized that having nurses and peers assist in the treatment of depression is an efficient way to improve outcomes. We developed a model for treating depression in primary care that includes physician education and telephone follow-up and support by trained primary care nurses (“telehealth care”). In addition, we developed a model of peer support provided by successfully treated, formerly depressed health plan members. We aimed to demonstrate high feasibility, easy implementation, and improved patient outcomes and satisfaction.

We conducted a randomized trial comparing 3 models of care: usual physician care, including use of selective serotonin reuptake inhibitor medication and physician counseling; usual care plus telehealth care provided by trained primary care nurses; and usual care plus telehealth care plus peer support. These treatments were implemented in 2 large adult primary care clinics in the northern California area of the Kaiser Permanente Medical Care Program, a nonprofit group-model health maintenance organization. The additive design enabled us to test 3 hypotheses: (1) depressed patients who receive nurse telehealth care experience greater reduction in depressive symptoms, greater improvement in functioning, and greater satisfaction with their care for depression compared with those receiving usual physician care only; (2) favorable outcomes are mediated by improved medication adherence; and (3) the addition of peer support to nurse telehealth care further improves these outcomes.

RESULTS

PATIENT CHARACTERISTICS

Four hundred eighty-six patients were referred to the study; 116 were ineligible, 68 refused to give informed consent, and 302 were enrolled. The main reasons for ineligibility (some patients had several) included refusing the recruitment interview (n=46), requiring referral to other treatment (n=30), currently receiving an antidepressant drug or psychotherapy (n=21), refusing the prescribed selective serotonin reuptake inhibitor (n=8), and not being literate in English (n=8). There was no difference between the 184 nonparticipants and the 302 participants in age and sex, the only data available for nonparticipants.

Women comprised 69% of the sample. The average age was 55.4 years (range, 19-90 years). Patients were white (63%), Hispanic (16%), African American (9%), Asian (7%), and of other racial and ethnic backgrounds (5%). The population was well educated: 90% were high school graduates and 27% were college graduates. Household income was reported to be less than $25,000 by 34% of the sample and greater than $60,000 by 18%. More than half of the participants lived with a spouse or partner, and 22% lived alone. Full- or part-time employment was reported by 53% of the sample, of whom 49% reported that they held managerial or professional or technical positions.

Using the unbalanced randomization described in the “Treatment Assignment” subsection of the “Patients and Methods” section, 123 patients (41%) were assigned to usual physician care, 117 (39%) to nurse tele-
Table 1. Treatment Group Differences in Demographic, Symptom, and Functioning Variables at Baseline

<table>
<thead>
<tr>
<th>Measure</th>
<th>Treatment Group</th>
<th>Patients, No.</th>
<th>P†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Usual Physician Care (n = 123)</td>
<td>Nurse Telehealth Care (n = 179)</td>
<td></td>
</tr>
<tr>
<td>Women, %</td>
<td>66</td>
<td>72</td>
<td>.30</td>
</tr>
<tr>
<td>Minority ethnic group, %</td>
<td>39</td>
<td>35</td>
<td>.48</td>
</tr>
<tr>
<td>Education beyond high school, %</td>
<td>56</td>
<td>52</td>
<td>.46</td>
</tr>
<tr>
<td>Income &lt;$40,000, %</td>
<td>62</td>
<td>56</td>
<td>.38</td>
</tr>
<tr>
<td>Employed, %</td>
<td>54</td>
<td>53</td>
<td>.89</td>
</tr>
<tr>
<td>Professional or managerial job type, %</td>
<td>47</td>
<td>49</td>
<td>.75</td>
</tr>
<tr>
<td>Married, %</td>
<td>58</td>
<td>53</td>
<td>.39</td>
</tr>
<tr>
<td>Living alone, %</td>
<td>7</td>
<td>25</td>
<td>.07</td>
</tr>
<tr>
<td>Hamilton Depression Rating Score</td>
<td>17.4</td>
<td>16.6 (6.6)</td>
<td>.26</td>
</tr>
<tr>
<td>Beck Depression Inventory Score</td>
<td>19.9</td>
<td>18.4 (8.1)</td>
<td>.12</td>
</tr>
<tr>
<td>SF-12 Mental Functioning Scale Score</td>
<td>32.1</td>
<td>32.6 (9.2)</td>
<td>.64</td>
</tr>
<tr>
<td>SF-12 Physical Functioning Scale Score</td>
<td>43.1</td>
<td>43.1 (17.9)</td>
<td>.98</td>
</tr>
</tbody>
</table>

*Data are given as mean (SD) except as noted otherwise.
†By $2 \times 2$ test for count variables and 1-way analysis of variance for quantitative variables.

Table 1 shows that there were no significant differences between those assigned to nurse telehealth care vs usual physician care on any of the demographic variables or in baseline values of dependent variables. Although peer support vs no peer support comparisons within the telehealth care group were not emphasized in this article, those subgroups were also similar at baseline on all variables. The proportion of patients initially prescribed fluoxetine vs paroxetine was almost identical across all treatment groups.

SAMPLE ATTRITION

Of 302 patients enrolled, we interviewed 271 (90%) at 6 weeks and 256 (85%) at 6 months. At 6 weeks, attrition was due to 10 patients refusing to participate and interviewers being unable to contact 21. At 6 months, attrition was due to 13 patients refusing to participate, 5 having physical illnesses that prevented participation, and 28 being unable to be contacted by interviewers. Logistic regression analysis showed that attrition was not related to treatment assignment at 6 weeks (Wald $\chi^2 = 1.42; P = .23$) or 6 months ($\chi^2 = 0.01; P = .90$).

TREATMENT IMPLEMENTATION

Nurse Telehealth Care

Eight of 179 patients randomized to nurse telephone follow-up were unable to be reached by trained primary care nurses. The nurses made a mean (SD) of 10.1 (3.6) calls per patient to the 171 patients who spoke to a nurse at least once during the 4 months of intervention. These calls lasted a mean (SD) of 5.6 (2.3) minutes. The estimated time for each telephone call, including callback attempts and documentation, was 20 minutes. We estimate that 20 patients could be contacted in a full workday.

Peer Care

Of 62 patients randomized to peer support, 11 refused a peer assignment and 9 had a peer contact for other reasons. Among the remaining 42 patients, 11 had 1 contact, 13 had 2 contacts, 14 had 3 to 5 contacts, and 4 had 9 to 20 contacts. Most patients were only contacted by telephone, but 6 had at least 1 face-to-face contact.

TREATMENT EFFECTS

Nurse Telehealth Care vs Usual Physician Care

Nurse telehealth care was hypothesized to be superior to usual physician care with respect to reduced symptoms, improved functioning, and greater satisfaction with care for depression. These hypotheses were confirmed. Table 2 shows the effect of nurse telehealth care on each of these patient outcomes and the proportion of patients who met the criterion of 50% improvement from baseline on the Hamilton scale or the Beck Depression Inventory. Fifty percent of patients receiving nurse telehealth care experienced a 50% reduction in the Hamilton scale score at 6 weeks compared with 37% receiving usual physician care ($P = .01$). At 6 months, 57% of those receiving nurse telehealth care showed a 50% improvement in the Hamilton scale score compared with 38% in usual physician care ($P = .003$). Hamilton Depression Rating Scale quantitative scores showed a nonsignificant trend favoring nurse telehealth care at 6 weeks and a significant effect at 6 months (usual physician care = 10.38, nurse telehealth care = 8.12; $P < .006$). The 50% improvement score for the Beck Depression Inventory shows an effect at 6 months (usual physician care = 37%, nurse telehealth care = 48%; $P = .05$). Satisfaction with care showed a robust incremental effect for nurse telehealth care. General satisfaction with health care (factor 1) is significantly greater among patients receiving nurse telehealth care at 6 weeks (nurse telehealth care = 4.41, usual physician care = 3.97; $P < .001$).

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Effect of Nurse Telehealth Care on Medication Adherence

Contrary to our second hypothesis, we did not find that medication adherence improved with nurse telehealth care. At 6 weeks, 73% of the usual care patients and 80% of those receiving nurse telehealth care reported taking an antidepressant medication ($P = .17$), whereas at 6 months 54% in usual care and 56% in nurse telehealth care were taking an antidepressant medication ($P = .74$). For those still taking an antidepressant, there were no significant differences in days missed in the past week or days on which they took less than the prescribed dose. Antidepressant dispensing data from our pharmacy database show that treatment groups did not differ in mean milligrams dispensed during the first 6 weeks of enrollment (usual physician care = 957, nurse telehealth care plus peer support = 867, $t_{286} = 1.13; P = .26$) or from enrollment to 6 months (usual physician care = 2267, nurse telehealth care plus peer support = 2111, $t_{281} = 0.73; P = .45$). If anything, the trends suggest that patients receiving usual care used more medication. When we repeated these analyses in subgroups who were above or below a baseline Hamilton Depression Rating Scale score of 19.75, we also found no significant differences.

Table 2. Outcomes 6 Weeks and 6 Months After Study Entry by Treatment Group

<table>
<thead>
<tr>
<th>Measure</th>
<th>6 wk</th>
<th>6 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton Depression Rating Scale</td>
<td>Usual Physician Care</td>
<td>Nurse Telehealth Care</td>
</tr>
<tr>
<td>Score, mean</td>
<td>10.09</td>
<td>8.71</td>
</tr>
<tr>
<td>50% Improvement, %</td>
<td>37</td>
<td>50</td>
</tr>
<tr>
<td>Beck Depression Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score, mean</td>
<td>13.30</td>
<td>11.03</td>
</tr>
<tr>
<td>50% Improvement, %</td>
<td>33</td>
<td>38</td>
</tr>
<tr>
<td>Treatment satisfaction score, mean</td>
<td>4.17</td>
<td>4.41</td>
</tr>
<tr>
<td>Drug information satisfaction score, mean</td>
<td>4.08</td>
<td>4.18</td>
</tr>
<tr>
<td>SF-12 Mental Functioning Scale score, mean</td>
<td>42.64</td>
<td>47.07</td>
</tr>
</tbody>
</table>

*Thirty-five percent of the nurse telehealth care group also received peer care.
†Boldface values indicate statistically significant.

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might reflect specific effects of peer support, and there were a few that showed effects at 6 months. These will be presented elsewhere.

**COMMENT**

We sought an effective model for improving depression treatment outcomes that could be implemented easily within busy primary care settings. Our model uses the nurses already in the primary care setting, builds on the existing bond between primary care providers and patients, and provides expert consultation and treatment by mental health specialists when necessary. The model uses medication, behavioral activation, education, brief counseling, emotional support, monitoring of suicide risk, and integration of depression care with ongoing care for other chronic illnesses.

Our findings regarding nurse telehealth care have been received with great interest by clinical leaders in the Kaiser Permanente Health Plan and in other health maintenance organizations. An implementation kit is being distributed to other Kaiser Permanente regions as part of a new depression disease management program developed by Kaiser Permanente’s Care Management Institute.

We expected that one reason nurse telehealth care would be superior to usual patient care is that it would increase patients’ adherence to their prescribed medication. We did not find this. Although further work is needed to better understand the reasons for the effect, the mechanism seems to be more psychosocial than pharmacological.

Nurse telehealth care is significantly more effective than usual care. But is the difference clinically important? The most recent meta-analyses39,40 of antidepressant drug treatment estimated a response rate of 50% for antidepressant medications vs 32% for placebo in major depressive disorder. Similarly, antidepressant treatment for dysthymia produced a 59% response vs 37% for placebo. Nurse telehealth care produces a 57% response rate vs 38% for usual care. The difference between nurse telehealth care and usual care is almost as large as that between drug and placebo.

Comparisons specific to primary care can be made using 2 studies by Katon et al.8,53 In one study (n = 217), usual care was compared with collaborative care that involved increased physician visits during the first 4 to 6 weeks of treatment, including 2 visits by the primary care physician and 2 or more by a psychiatrist. Eighty-nine percent of all patients in this study were treated with tricyclic antidepressant drugs. In the other study (n = 153), usual care was compared with a structured depression treatment program provided in four to six 30-minute sessions with doctoral-level psychologists that included behavioral treatment to increase the use of adaptive coping strategies and counseling to improve medication adherence. The percentage of patients who started taking tricyclic antidepressant drugs in this study was not reported but probably included a larger proportion who had begun taking selective serotonin reuptake inhibitors. In both studies, patients were stratified by severity into those with major vs minor depression, and the enhanced intervention showed a clear advantage for major depression. It showed a much smaller or nonsignificant advantage for minor depression. Although it is difficult to compare the effects on depressive symptoms that Katon et al.8,53 obtained with those of nurse telehealth care because different measures were used, the size of their effects on major depression seems similar to what we saw in our total sample of patients with major depression or dysthymia.

Another difference was the intervention comparison. Although all 3 studies differed in the specific content of the interventions, both of the Katon et al8,53 interventions involved considerable additional patient contact by physicians or doctoral-level psychologists, whereas the intervention reported herein used less staff time, mostly of primary care nurses.

Peer support was operationally feasible in our setting in the sense that we could recruit, train, and match a sufficient number of qualified peers. However, unlike nurse telehealth care, we did not set specific expectations for the number and type of contacts between peers and patients. As a result, only half of the patients randomized to peer support had more than 1 contact with a peer and less than 10% had a face-to-face contact. This was less than we had hoped for. Although we did not find that peer support improved our primary outcomes in the presence of nurse telehealth care, we think it might be worthwhile to explore its value when it is more clearly structured and is the only augmentation to usual physician care.

This is only the first evidence of the effectiveness of nurse telehealth care, and the findings need to be replicated in other circumstances to judge how confidently we can recommend broad adoption. If nurse telehealth care is broadly effective, its main advantage will be its ease of implementation in primary care settings because it does not require major staffing changes. We also believe that nurse telehealth care can be improved with further research.

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