Implementation and Evaluation of a Depression Care Model for Homebound Elderly

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Depression affects 14% to 46% of homebound elderly and is costly and disabling. Home health agencies face significant challenges delivering effective depression care. In response, an evidence-based depression care model was developed in a home health agency. Twelve-month program evaluation data demonstrated a 2.99 mean reduction in depression scores ($P < .0001$) on the Geriatric Depression Scale and confirmed that a clinically effective, operationally feasible, and financially sustainable depression care model can be implemented in home health care. **Key Words:** *cognitive behavior therapy*, *depression*, *geriatrics*, *home care*

THE PREVALENCE OF DEPRESSION ranges from 14% to 46%[1-3] in the homebound elderly. In addition, homebound elderly patients are twice as likely to have depression compared with those in primary care.[1] Estimates of the direct and indirect medical costs of patients with depression are approximately 83.1 billion in the year 2000.[4] However, there remains a lack of screening for patients with depression and an under-treatment of their diagnosis and symptoms. Bruce and associates[1] found that 78% of pa-tients with depression studied were not re-ceiving treatment and 40% of the patients on treatment were receiving inadequate ther-apy. Other studies indicate that depression is a prevalent comorbidity with heart disease, cancer, and diabetes, and depression is asso-ciated with hastened mortality in these med-ical conditions.[5] According to Carson and Vanderhorst,[6] there is a 36% to 38% mortal-ity rate associated with depression and dia-betes alone over a 2-year period. Depression is associated with increased medical and func-tional disabilities in the homebound elderly and an increased risk for falls, even when con-trolling for antidepressant use.[7,8] Importantly, customary home care is not sufficient to treat depression, as Raue and colleagues[9] docu-mented the persistence of depression even after 1-month receipt of standard home care services.

Two major changes in home health care have highlighted the need to implement and sustain evidence-based care for patients with depression. The first occurred in 2008 when the Medicare payment reimbursement sys-tem added psychiatric diagnoses, such as depression, to the case mix.[10] This adjust-ment reflects the federal movement to address

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resource management in caring for patients with psychiatric illnesses such as depression and encourage certified home health agencies to provide services. The second significant change took place in January 2010, when the Patient Health Questionnaire–2 and the depression screening, care planning, and intervention process questions were added to the OASIS C data set (a mandated home health assessment tool).[11]

Certified home health agencies encounter significant patient, provider, and system challenges in trying to provide clinically appropriate and cost-effective psychiatric care. Barriers include the following: (1) lack of patient and provider awareness of depression; (2) patient reluctance to seek treatment; (3) navigation of complex regulatory and reimbursement requirements;[12] (4) misconceptions that these programs are under-reimbursed, expensive in terms of resource utilization, and not financially sustainable; (4) impressions that the processes needed for recruitment and training of qualified, competent staff to deliver psychiatric home care nursing are impractical[13,14]; (5) complexities associated with various risk screening tools and assessments[1,11,14,15]; and (6) and logistical challenges related to extensive planning, oversight, and follow-up required for a coordinated care and communication model with primary care physicians, psychiatric specialists, and home health nurses.[8,12]

EVIDENCE BASE FOR THE DEPRESSION CARE MODEL

Clinical practice guidelines exist for depression, some of which specifically target the elderly. These guidelines state recommendations for screening for depression and treatment using cognitive behavioral therapy (CBT) alone, medications alone, or a combination of CBT and medications as the most effective approach.[4,16-19]

Several systematic reviews[5,20-23] also support combination therapy as effective for depression care, and in some cases, treatment efficacy has been reported specifically for homebound elderly. Researchers also examined the collaborative models of "geropsychiatric teams" of psychiatrists, advanced practice nurses, psychiatric nurses, and social workers to deliver psychiatric evaluations, psychotherapy, and psychopharmacology interventions.[24] These overall results showed compelling evidence for the efficacy of these practice models and depression care model (DCM) teams in reducing depression in the homebound elderly. This evidence provided the impetus for creation of this DCM and team in a home health agency, using a combination approach to depression care.

DEPRESSION CARE MODEL DESIGN AND IMPLEMENTATION

Organizational setting

The Visiting Nurse Service of New York (VNSNY) is a large, complex community health organization in New York City. The VNSNY is the largest not-for-profit home health agency in the United States, with an average daily census of 31 000 patients. The organization provides a vast array of services including traditional and nontraditional home health care, hospice, and various community-based services programs. The organization is centrally hierarchical but regionally operated and deployed from 7 regions including the 5 boroughs of New York City and 2 metropolitan area suburbs. The organization has a strong reputation as a "safety net" provider of care.

Description of DCM innovation

The DCM is a model of care delivered by a team of psychiatric home care nurses, advanced practice psychiatric nurses, and psychiatrists, known in the VNSNY as the behavioral health (BH) program. This psychiatric team implements a 3-component model: (1) a team of specialty-trained psychiatric home care nurses screen for depression, using a validated instrument: the Geriatric Depression Scale (GDS); (2) psychiatric home care nurses provide patient visits using CBT as counseling techniques in addition to providing ongoing monitoring, psychoeducation,

and medication management; and (3) psychiatrists and psychiatric nurse practitioners are available and provide "in-home" patient psychiatric evaluations and diagnostic consultations with recommendations for medications. The psychiatrist or psychiatric nurse practitioner consultations are then e-faxed to their primary care physicians via an electronic medical record (EMR) application.

The clinical care protocol includes a prescribed set of depression care interventions based on the severity level of a patient's assessed depression score at the first evaluation visit. The protocol specifies clinical visit guidelines that have been internally developed on the basis of a combination of in-house expertise and a review of home care and depression care best practices. The visit guidelines also include "home care" program/visit requirements specified in federal and state home health agency rules and regulations, such as recording of patient response to treatment and documentation of specific psychiatric assessments, care plans, and orders.

The clinical visit guidelines begin with an initial assessment (pretreatment) visit by a psychiatric home care nurse to determine eligibility and medical necessity, using a valid and reliable depression instrument: the GDS, which is considered effective for detecting depression in the elderly (84%-92% sensitivity rates and 89%-95% specificity rates).[25] Geriatric Depression Scale scores are also obtained at 55 to 60 days (prior to recertification) to evaluate continued medical necessity or at the discharge visit (posttreatment visit), whichever comes first. Documentation of continued skilled need and continued medical necessity is required by Medicare for continuing skilled home care into a second episode.

Psychiatric home care CBT counseling visits are typically delivered once a week; however, the guidelines allow for more frequent visits if indicated by the patient's clinical condition or depression level. Psychiatric home care visits include delivering the CBT techniques, which are aimed at reducing and eliminating automatic unhealthy cognitive thoughts that lead to depression. Verbal or written patient response to treatment assignments is also included.

Access to psychiatric specialists is provided to the patients and their primary care physicians. At the request of the primary care physician, psychiatric consultation visits are made by a psychiatrist or psychiatric nurse practitioner to collect diagnostic information and make treatment suggestions including recommended psychotropic medications. This DCM component is designed to assist the primary care physician, who by regulation is responsible for the home care patient's entire plan of care, in treating the patient's psychological as well as medical needs. This DCM is designed to routinely bridge the gaps between multiple unrelated providers in primary, psychiatric, and home care while also giving primary care physicians the "total patient picture" of their homebound elderly patient.

EVALUATION

Design

A retrospective program evaluation was conducted from September 2010 to September 2011 to address the following question: Can an evidence-based DCM for homebound elderly (aged 65 years and older) be implemented in a certified home health agency that is clinically effective, operationally feasible, and financially sustainable? The study used the RE-AIM model through the assessment of 5 dimensions, which include: reach, effectiveness, adoption, implementation, and maintenance.[26] The RE-AIM model is a comprehensive evaluation framework used to determine the overall impact of a population-based or public health program.

The model's *reach* or ability to increase patient access was examined by assessing referral volume, targeted at 50 per month, which corresponded to a 15% prevalence rate of patients under care by VNSNY with suspected depression during a 2009 analysis. Evaluation of the model's *adoption* was measured by

referral and admission volume and team transfer rates. Referral and admission volume represented the program's acceptance by referred patients, their primary care providers, and the BH team's nurses. Transfer rates reflected the program's diffusion into "business as usual" and an increased awareness by agency staff that depression may continue beyond their patient's medical needs and are best served by psychiatric services rather than standard home care. These *reach* and *adoption* measures were reported quarterly both by program performance indicator reports and by the program's intake coordinator.

Three *implementation* or fidelity of process measures and an effectiveness measure were used to assess clinical performance. The *implementation fidelity* measures included the following: (1) triggered CBT care plans as the treatment protocol in the clinical system for these patients; (2) the presence of a pre- and posttreatment GDS scores documented in the EMR; and (3) the number of psychiatric nursing visits made per episode of care compared with the recommended episode number of visits in the clinical protocol. *Effectiveness* was measured by mean change in GDS scores from pre- to posttreatment.

In addition, financial sustainability was evaluated by *maintenance* metrics for overall program margin and the program's ability to provide favorable results with regard to organizational revenue and budget targets. These targets include the following: (1) average episode margin, defined by average revenue versus cost for each episode; (2) overall program revenue compared with budget targets; (3) the percentage of contribution margin compared with budget targets; and (4) the volume of payer denials. These financial metrics were preset in January 2011 and are reported in financial statements as revenues and program contribution margin percentages. The reports are available monthly via the financial reporting systems and are available online for review and analysis. Specific indicators of each metric are summarized in the Table.

Sample

Patients included in the program evaluation were homebound patients aged 65 years and older who (1) were admitted into the BH program and treated between September 2010 and September 2011, (2) had a complete home care OASIS C assessment, (3) received the depression care interventions, (4) had a primary or comorbid diagnosis of depression and had signs/symptoms of depression as evidenced by a score of 6 or greater on the GDS, or whose condition had not been formally diagnosed but had a score of 6 or greater on the GDS, and (5) had a pre- and posttreatment GDS score. Patients were excluded if they were (1) rehospitalized and thus did not complete the program or (2) did not complete the treatment for other reasons such as patient refusal or moved out of service area. A power analysis indicated that a sample size of 57 had 80% power ($\alpha = .05$, 2-tailed) to detect an effect size of 38% to 40% and a sample of 92 had 99% power. The final sample included 191 patients who met all study criteria and thus was adequately powered to assess program effectiveness.

Data collection and analysis

Data collection and analysis occurred between September and December 2011 after institutional review board approval was obtained for the study. Data were collected and reported by using agency research and finance/operational analysts and 2 work study BSN interns. The interns assisted with medical record abstraction, audits, and data recording to prevent bias and preserve the integrity of results. De-identified data reports were provided to this evaluator by the analysts and interns.

The program's *reach* was evaluated using descriptive statistics on the demographic and clinical attributes of clients served. Referral volume was then assessed to evaluate *reach* or access to the program. To evaluate the *effectiveness* of the DCM, changes in pre- and posttreatment depression scores on the GDS were obtained and then analyzed for statistical

Table. Metrics Used in Evaluation

Evaluation Domain	Measure	How Obtained	Notes
Reach	Demographics Clinical attributes (eg, diagnoses) Referral volume	Secondary data from agency EMR Intake coordinator's referral database	
Effectiveness	Change in GDS score	Data extracted from agency EMR and analyzed for statistical significance	
Adoption	Team transfer rate and referral and admission yield metrics	Scorecard measures retrieved from the EMR, operations information systems, and intake coordinator referral database	
Implementation fidelity	Activation of CBT care plans Completion of pre- and posttreatment GDS Number of psychiatric nursing visits per episode	Scorecard data extracted from the EMR and financial and operational information systems Medical record abstraction	Medical record extraction and analysis of fidelity measures Scorecard measures analyzed for the number of nursing visits per episode
Maintenance	Program/episode margin and data on variance to revenue and budget targets Number of payer denials	Financial information systems	Monthly performance indicator reports and financial reports

Abbreviations: CBT, cognitive behavioral therapy; EMR, electronic medical record; GDS, Geriatric Depression Scale.

significance using a paired *t* test. Agency-wide *adoption* of the model was measured through evaluation of both admission yield volume and transfer volume expressed as team transfer rates. The team transfer report represents patients under care in one of the other agency home care programs (identified and evaluated as patients with depression) and then subsequently formally transferred to BH as the primary program. The referral/admission volume yield report identified the number of referrals made to the program that translated into actual admissions. This report also highlighted reasons for the unsuccessful conversion of referrals to admission such as patient refusal or patient not identified as depressed on the GDS instrument at the evaluation visit. The fidelity of the program's *implementation* included (1) activated CBT care plans, (2) completion of the pre- and posttreatment GDS, and (3) the number of nursing visits per episode. Audits and data extraction of fidelity measures determined the proportion of records where a pre- and posttreatment GDS had been completed and a CBT care plan had been opened as was required by the clinical guidelines.

The first 2 of the fidelity measures were reported as proportions on a 3 × 2 contingency table, and the psychiatric nursing visits per episode were reported as a mean. *Maintenance* metrics were evaluated through financial sustainability metrics including episode margin, number of payer denials, and success with meeting revenue and budget targets. Financial and operational metrics are routinely reported on a program-specific performance indicator and monthly financial reports.

RESULTS

Reach

During the 12-month evaluation period, 597 referrals were made to the BH program which yielded a total of 546 admissions for the DCM. This referral volume was slightly lower than the targeted referral volume for the 12-month period. Of those admitted to BH, 220 of the 546 (40%) completed an entire treatment episode without interruptions such as hospitalizations or facility transfers. In addition, 29 of the 220 patients had no documented post-treatment GDS score. Therefore, a descriptive analysis was performed on the remaining sample of 191 patients.

Descriptive analysis of the patients served by the DCM in the BH program included age, gender, lives with status, common diagnoses, and number of comorbidities. The BH program sample (N = 191) was then analyzed in comparison with a corresponding (age 65 years and older) VNSNY sample (N = 56 281). The mean age for the BH group was 75 years compared with 79 years for the VNSNY group. The proportion of females in the BH program was 80% compared with 64% in the VNSNY group. Likewise, the proportion of persons living alone in the BH sample was greater, with 38% living alone compared with 27% in the VNSNY group. Both groups displayed the presence of up to 6 comorbidities, with most patients having 3 or more comorbidities for both samples. The most common diagnoses according to frequency in BH sample were hypertension (75%), heart disease (30%), af-

fective disorders/other psychoses (37%), diabetes (27%), gait abnormalities (17%), and other orthopedic disorders (16%).

Effectiveness

Change in pre- and posttreatment GDS scores for the study sample was used to evaluate effectiveness of the DCM. A paired *t*-test analysis found a mean reduction of 3 (SD = 3.30) points in the GDS score from baseline to posttreatment. This decrease is both clinically and statistically significant ($t_{190} = -12.57$; $P < .0001$; 95% confidence interval, -3.47 to -2.53). Distribution of the change in scores (posttreatment GDS score minus baseline score) is presented in the Figure. This decrease represents an overall reduction in depression severity or elimination of depression symptoms for most patients posttreatment.

Adoption

The referrals to admission yield and team transfer rates were used to evaluate DCM adoption. Study results showed that 91% of the patients referred to the DCM were accepted and admitted. The 9% of patients who were not admitted to the program were analyzed for reasons and included the following categories: patients refused services, patients already receiving "in-home" mental health services, patients not admitted because the primary care physician determined services were not necessary, and other such as patients moving out of the service area. Team transfer rates were evaluated as an additional measure of adoption. These rates reflect how embedded or diffused the model is within routine processes, workflows, and agency operations. Overall, the 2011 transfer rate was 29.2% compared with the agency target of 30%. Actual transfer rates ranged from 23% to 40% and were highest in regions where the DCM was pilot tested.

Implementation

Fidelity of *implementation* measures was examined for all patients in the original sample (N = 220) who completed the DCM
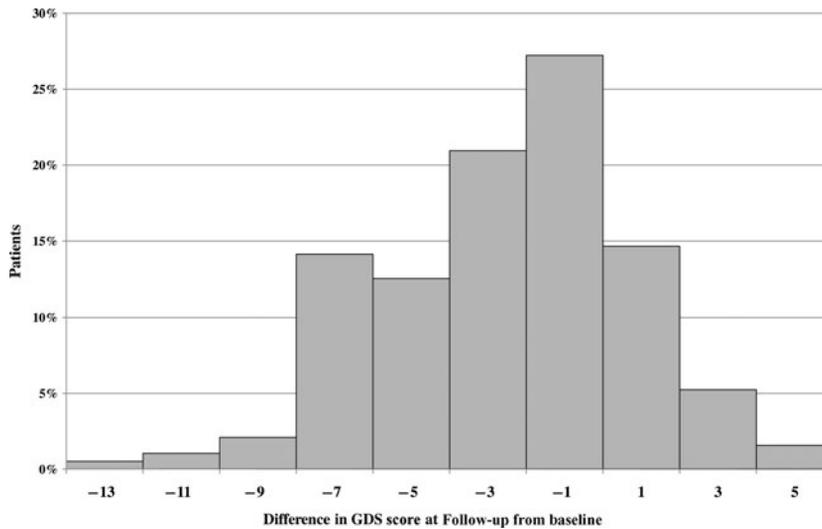
Figure. Distribution of change in Geriatric Depression Scale (GDS) score from baseline to posttreatment.

intervention without interruption. Patients who experienced interruptions such as hospitalizations or refused to complete the intervention were excluded. Of the 220 patients, 100% had a pretreatment GDS score and 87% had a posttreatment GDS score noted in the clinical record. The second *implementation* fidelity measure was CBT care plan activation for the sample. The compliance rate for activation noted in the EMR clinical record was 90%. In the 10% of cases for which the CBT care plan was not activated, 21 records had free text documentation of CBT interventions in the clinical notes. Therefore, documented CBT interventions were present in 99% of the sample cases. The final *implementation* measure was psychiatric nursing visit compliance with the clinical visit guidelines. The number of average psychiatric nursing visits per episode was 8.3 during the study period compared with the DCM target of 8 to 10 visits per episode based on guideline parameters.

Maintenance

The financial sustainability of the DCM included program margin per episode, ability to meet program revenue and budget targets, and the number of payer denials, and these were used to evaluate the ability to maintain the program. During the study period, program results were as follows: (1) the average margin per episode was positive, (2) the net contribution margin for the program was 17%, (3) program revenue exceeded budget targets by 8%, and (4) there were no reported payer denials.

DISCUSSION

The program evaluation indicated that a clinically effective, operationally feasible, and financially sustainable evidence-based DCM for homebound elderly patients could be implemented in a home care agency. The DCM program increased patient access to services when there was a previous unmet need, and depression severity was reduced or eliminated by the DCM program's specific interventions. In comparison, Raue and colleagues[9] found depression persistence after 1 month of usual standard home care. Program evaluation also showed that model adoption and implementation fidelity gradually improved over time, with monitoring and incremental adjustments to systems, communications, processes, workflows, and EMR integration. These incremental change

methods are necessary for successful diffusion of innovation and consistent with methods espoused by Greenhlaugh and colleagues[27] needed to sustain successful evidence-based practices. Program margin depended largely on fidelity to the DCM to ensure quality, efficiencies, and cost-effectiveness.

Financial and operational results substantiate the sustainability of this program as a Medicare-covered service with an overall product margin for the program. Furthermore, this program evaluation provides data for program expansion to other psychiatric illnesses and a framework for evaluation of the impact on these psychiatric conditions. Thus, creation of this BH program for patients with depression has proven to be a new opportunity for the organization. The program evaluation has shown that DCM interventions are clinically effective in measurably reducing patients' depression scores while also being reimbursable and having a program margin. Measures to support ongoing monitoring of fidelity to the model have been integrated to assess future team compliance.

Other methods planned to sustain the model included diffusion of this model into all regions and teams within the organization. Sustainability of the program also depends on continued seamless transfers of patients under care into the program for care coordination and treatment of their BH needs when their medical status has stabilized. In addition, extension of the program to direct external referral sources is another move on the road toward sustainability.

Sustainability also depends on the program's ability to be routinely reimbursed for services, ability to meet revenue targets, and avoidance of denials. Avoidance of denials in this model is achieved through strict adherence to the protocols for risk assessment, medical necessity, evidence of patient response to treatment, protocol and documentation requirements, and psychiatric home care rules and regulations. Continual oversight and monitoring of fidelity to protocols, visit guidelines, and the EMR documentation requirements of the DCM are essential to maintain its sustainability.

The evaluation also generated findings that have implications for future research. Consistent with prior research, depression was found among patients with diagnoses such as heart disease and diabetes and those with multiple comorbidities. There also was a prevalence of depression among patients who lived alone (38%). This is potentially an area that warrants further study. Also, there was a high prevalence of depression among women 75 years or older. Further research on prevalence rates is needed among age cohorts for both males and females.

In terms of fidelity measures, overall CBT care plan activation and completion of post-treatment assessment tools rates improved after the pilot and after full integration of those components into the organization's EMR. This is consistent with other research on the usefulness of embedding tools and protocols into the EMR to foster compliance with evidence-based practice. In addition, EMR integration of the tools and protocols reduces dependence on free text for audits through facilitation of medical record abstraction. Embedding required assessment tools at time points rather than on demand may further influence positive clinician behavior. Program transfer rates also increased as the program became routinized into each region's usual practices. Other patient outcomes were examined in subsequent analyses and showed statistically significant reductions in confusion severity and disruptive behaviors in the sample. Further research should be conducted to determine whether these findings can be replicated.

Limitations to the study include the fact that the program evaluation was done in only 1 large home health agency in an urban setting. This may affect the generalizability of the findings to all certified home health agencies. Furthermore, the sample was a nonrandom sample of all patients who met the inclusion criteria, and there was no control group to make comparative analyses. Finally, the lack

of a posttreatment score for 29 patients in the original sample of 220 patients could potentially bias the results on the clinical intervention's effectiveness.

CONCLUSIONS

The findings derived from this program's implementation experience and program evaluation can inform other home health agencies on how to implement a successful DCM program. The program evaluation serves as a guide to build and implement a sustainable DCM, address potential barriers and challenges, and create a robust evaluation to measure the program's weaknesses and successes. In doing so, certified home health agencies can develop similar programs and increase the home health industry's response to the current yet often overlooked and unmet need for depression care for the homebound elderly. Finally, the ability to demonstrate the successes of innovative home health models such as this DCM underscores the importance of having home health providers and the nursing profession's full engagement in shaping future health policy.

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