POPULATIONS AT RISK

Effectiveness of Screening and Treatment for Depression in Ambulatory Indigent Patients

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OBJECTIVE: **To determine the effectiveness of screening and treatment for depression among ambulatory indigent patients visiting resident physicians.**

DESIGN: **Two-group randomized trial (*N* = 33 intervention, *N* = 28 usual care) with baseline, 6-month, and 12-month outcome measurements.**

SETTING: **Internal Medicine Residency Clinic.**

PATIENTS: **Clinic patients over 18 years of age who screened positive for depression on the PRIME-MD during a visit to their resident physician. Patients were not receiving treatment nor seeking care for any emotional problems. All patients were either enrolled in Medicaid or had income below the poverty line.**

INTERVENTION: **Resident physicians were educated to follow AHCPR (AHRQ; Agency for Healthcare Research and Quality) guidelines for diagnosis and treatment of depression in a primary care setting. For the intervention group patients, a screening nurse advised residents regarding the positive screen, handed them a standardized protocol outline, and attempted to arrange behavioral care. The patients in the usual care group were provided the results of the screen by the screening nurse before their visit with the resident, and advised to seek care for their symptoms.**

MAIN RESULTS: **Results for the primary outcome of depression symptoms measured with the Beck Depression Inventory (BDI) demonstrated that intervention was successful in reducing symptoms relative to usual care (difference = −4.9 BDI points, *P* = .05, 95% confidence interval [CI], −9.8 to −0.005 effect size = −0.41). During the 12-month follow-up, 70% of intervention patients were treated for depression (of these, 91% with antidepressants), while 15% of usual care patients were treated with antidepressants for depression. Another 18% of the usual care group had depression noted, but no treatment was identified. BDI differences between intervention and control groups were similar at the 6- and 12-month measures. Quality of life and costs were also measured, but differences between the groups were not significant in this regard.**

CONCLUSION: **Screening and treatment for depression by resident physicians was successful in reducing symptoms relative to usual care in an indigent population. Almost twice as many intervention patients as usual care controls demonstrated a substantial reduction (10 BDI points) in symptoms related to depression.**

KEY WORDS: **depression treatment; low-income patients; randomized trial.**
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The underdiagnosis of depression and the need for screening in primary care settings can be especially severe among patients with a lower socioeconomic status.[1–5] The high prevalence of depression in internal medicine (IM) clinics, depressed patients' low quality of life (lower than patients with severe physical health problems), and their extensive utilization of health care services (both inpatient and ambulatory) underscores the need for testing the effectiveness of depression screening and management in this setting.[4,6–17] Many recent trials have shown that intervention for depressed patients in primary care settings is usually successful in diminishing morbidity when that screening is coordinated with thorough follow-up and treatment.[1,2,6,18–20]

This randomized trial examined how the combination of simple screening and treatment for major depressive disorder affected indigent IM clinic patients' relief of depression symptoms. For this trial, indigent refers to ambulatory clinic patients who either qualified for Medicaid or had no private insurance and income below the poverty line. In a recent study, income below the poverty line was found to multiply the risk of major depression by a factor of 3.8.[21] This risk ratio was the largest found in this study among two dozen other sociodemographic variables. Previous trials with a focus on screening and treating indigent IM clinic patients have not been published. A trial specifically targeted depressed patients over 60 years of age who had psychosocial stressors, and clear improvements were demonstrated with intervention.[22]

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Because the nature of IM clinics requires efficiency, the treatment protocol adopted was simple. It followed AHCPR (AHRQ; Agency for Healthcare Research and Quality) guidelines for depression diagnosis and treatment in a primary care setting[23] and required minutes of resident physicians' time, on average, during the initial visit. In the general primary care setting, screening has been valuable in overcoming barriers to diagnosis.[1,2] In indigent clinic settings, additional barriers might include patients' lack of awareness of symptoms, somatization, multiple comorbidities, shame/guilt about emotional problems, financial problems and/or physical health used as explanations for depression symptoms, and residents' limited training, knowledge, and attitudes regarding depression intervention.[5] In addition, the lack of continuity in IM clinics, because of resident turnover, might lower the tendency for patients to discuss emotional and behavioral issues.

Accurate screening alone, however, has been found insufficient to ensure follow-up intervention in a primary care setting.[1–3,11] A flexible and thorough intervention protocol after screening appears necessary.[20] Because of the high prevalence of major depression in IM clinics, residents can quickly become experienced in managing depression among patients in this context. In addition, the relief from depression might change the status of indigent patients, by removing the third most prevalent barrier to employment (depression is behind transportation problems and lack of a high school education as an employment barrier among welfare recipients), and among those employed, by reducing the high prevalence of severe work limitations (28%) that major depression imposes.[21,24]

DESIGN AND METHODS

Screen

The depression screen of the PRIME-MD[15] was adopted because of its facility in residency clinics. The screen contains 2 questions on depression for the first stage (depressed, loss of interest). A positive response to either question warrants 9 further questions corresponding to the 9 DSM-IV criteria for a major depressive episode.[25] The PRIME-MD's reported sensitivity = 57, and its specificity = 98, yielding a high positive predictive value in clinics with a high prevalence of depression.

Enrollment

Clinic patients over 18 years of age were consecutively eligible for the study if they were currently enrolled in Medicaid or were without private health insurance and had low income (income below the federal poverty line). Patients were enrolled if they: 1) screened positive for a major depressive episode according to the PRIME-MD depression screen; 2) were not receiving intervention for any mental health problem or were not seeking help for depression or other emotional problems at the screen; 3) could read and respond to symptom questions; and 4) gave informed consent. Patients were excluded if they responded "yes" to the suicide ideation question (all suicide ideation patients were treated immediately by their physician). Approvals were obtained from the Northeastern Ohio Universities College of Medicine (NEOUCOM), Canton Hospitals, and Nova Behavioral Health's IRBs.

Intervention

Enrolled patients were randomized (by permuted blocks of 40 using the sealed envelope method; see sample size below) into intervention or usual care protocols. The intervention protocol consisted of a screening nurse advising resident physicians concerning the positive screen results. The screening nurse also provided a protocol outline asking the resident to: 1) explore symptoms with the patient to affirm screen results; 2) attempt to rule out physical conditions, medications, or other primary psychiatric diagnoses that could explain the results; 3) given that the depression diagnosis seemed appropriate, the resident was to: a) educate the patient about depression; b) give the patient educational materials about depression (from AHRQ); c) encourage behavioral therapy through an appointment to the local public mental health agency (Nova Behavioral Health); d) educate the patient about antidepressant treatment and prescribe antidepressants when appropriate and acceptable to the patient; e) reschedule an appointment in 4 weeks; f) ensure that the screening nurse sees the patient as well as provide the nurse with pertinent information that could be helpful to Nova staff; and 4) the nurse then reminds the resident that Nova may contact them. The nurse asked the intervention patients for permission to arrange an appointment with Nova. Like the IM clinic, Nova has a mission to provide services to indigent patients. Nova provided a centralized assessment service including diagnoses and assignments to a behavioral care specialist according to diagnosis. Case management for services from other agencies is also provided when needed. No infrastructure currently exists for care coordination between the IM clinic and Nova. The intent of the intervention was to create opportunities for care communication between IM residents and Nova behavioral care specialists. Nova facilities are approximately 3 miles from the primary care clinic and on the public transportation (bus) route. When patients refused permission to set up an appointment with Nova (often because of inconvenience), instructions on contacting the agency on their own were provided. Patients were referred to behavioral care, because evidence suggests that a combination of antidepressants and limited behavioral care are superior to antidepressants alone and that combined modality management is a key to success.[19,20,26–29] In addition, the necessary social support required by such patients has been difficult to provide within the IM clinic. For the intervention group, information about the patient was faxed to the agency at the time of the appointment or later when requested.

In the usual care group, resident physicians were not informed by the screening nurse about the results of the

screen. Before their visit with the resident, usual care patients were told by the screening nurse that they may have a problem with depression and that treatment is effective for depression. The patients then had the opportunity to discuss their depression symptoms with their resident at the visit. Resident physicians were aware of the trial design, so that they continued their usual approach in identifying, and treating or referring depression problems in their patients.

Prior to the trial, all residents were trained to follow the AHRQ guidelines (Depression Guideline Panel, 1993) for diagnosing and treating depression in primary care settings and received presentations and summary readings on major depression and the use of antidepressants.[30–32] Presentations at noon conferences were provided by 2 of the authors (EB and GR). The AHRQ guidelines have been revisited, but the recommendations remain, for the most part, consistent with new evidence.[1,2,6,33,34] Postguideline evidence suggests that frequent initial visits are better than the 1-month return visit in this study's protocol, and also that collaborative management models produce superior outcomes through better adherence and more accurate dosing.[19,21,29,34] The initial frequency of visits to the clinic could not be increased because each resident has only one half-day per week for clinic visits. Residents were taught to educate the intervention group patients about their depression, to convince patients about the benefits of behavioral health care, and advised patients to make appointments at the local public mental health agency. To avoid problems with medication compliance due to financial barriers, antidepressant medications were provided to patients in both groups who would otherwise have to pay for them.

Measurements. At 6 months and 1 year, patients were contacted by phone by 1 of the investigators (DK) who was blinded to group assignments. At these 2 time points, the Beck Depression Inventory-II (BDI) was administered to all patients along with the SF-36 quality of life measure (QOL).[35–38] At the 1-year telephone interview, the PRIME-MD depression screen was again administered at the end of the phone interview. When patients continued to screen positive for depression at this interview, they were asked to come back to the clinic (intervention protocol for controls, further treatment for intervention group). Internal medicine clinic records, hospital billing records, and behavioral health care billing records were surveyed for each of the study patients. Abstracted information from these records ascertained utilization of medical and behavioral care services, standard costs by quarter for all services, and whether patients were enrolled in Medicaid at the time of each recorded service. Again, information was obtained after blinding to group membership. All patients were also interviewed about the behavioral care they received and their hospital admissions to verify results found in databases. Behavioral care specialists at Nova and any patients that sought care from Nova during the study period were also surveyed concerning the coordination of services. At enrollment and prior to randomization, the BDI was administered in order to index the severity of depression and to add precision to the statistical analyses. The SF-36 was also administered at baseline. The following was abstracted from the clinic charts for all patients: diagnoses, comorbidities, demographics, and the status of Medicaid enrollment. Patients who obtained behavioral care during the follow-up period were identified through two databases and through telephone interviews. From information collected, behavioral care specialists were identified and a survey was mailed to obtain information about patient interventions.

Statistical Analyses. Depression symptoms in the intervention group were compared to the usual care group using repeated-measures linear mixed-model analyses with a double-sided test at $\alpha = 0.05$.[39] A summary measure approach was used across the 6- and 12-month measures to estimate the intervention effect on depression symptoms.[40] The baseline measures were used to add precision to comparisons between the two groups (adjust for baseline differences and reduce error variance). The mixed model method employed produces maximum likelihood estimates of the intervention effect under normality.[41–43] For the secondary hypotheses regarding QOL and costs, mixed-model analyses with baseline measures of QOL and costs (prior 6 months) were also used with double-sided testing at $\alpha = 0.05$. For QOL, a slope effect was estimated because of an expectation that QOL would improve gradually over the year of follow-up. For costs, 0 to 6 month and 6 to 12 month costs were separately compared. To handle missing values as well as to explore variance components and model fit, SAS's Proc Mixed program (SAS Institute Inc., Cary, NC) was used.[43] Sensitivity analyses included the addition of covariates to the models, namely: gender, age, number of comorbidities, and Medicaid status.

Sample Size. After a 1-year enrollment period, 61 patients were randomized (33 intervention and 28 usual care). Blocks of 40 were utilized in the randomization scheme, since the expectation was to enroll 80 patients within 6 months. However, budgetary constraints limited the length of the enrollment period. Compensation for the reduction in sample size included methods that reduced the number of enrollees who would otherwise be lost to follow-up. The initial expectation of enrollment was based on a pilot, but after the pilot phase of the study, more IM clinic patients were being treated for depression than were discovered during the pilot (see below). Although a 25% loss to follow-up in this population was anticipated, methods reduced this number to 10% (see below). Sixty-one patients provided 80% power to detect a .75 baseline-standard deviation difference between the 2 randomized groups on the main outcome of BDI scores. This effect size represents a 34% greater reduction in symptom scores.

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Table 1. Patient Characteristics at Enrollment by Group

	Usual Care (*N* = 28)	Intervention (*N* = 33)	95% CI on Difference (Usual-Intervention)
Age, y	46 (2)*	45 (2)	–3.8 to 5.8
range	28 to 67	24 to 63	
Gender, % female	61 (9)	76 (8)	–39 to 9
Heart disease, %†	22 (8)	13 (6)	–11 to 29
Diabetes, %†	22 (8)	25 (7)	–25 to 19
Medicaid, %	36 (9)	58 (9)	–47 to 3
Baseline BDI-II	23 (2)	28 (2)	–11 to 1

* *Numbers in parentheses adjacent to statistics are their standard errors.*
† *Based on 1 fewer patient in each group because of missing charts.*
CI, confidence interval.

RESULTS

Of the 1,095 patients screened, 497 (45%) screened positive for a major depressive episode. Of these patients, 396 (80%) were already being treated for depression at the time of the screen and so were not eligible for the trial. Other exclusions were accounted for by 24 patients with suicidal ideation who were not being treated at the screen, and 16 who refused to participate (mainly because of reluctance to be treated for depression), leaving 61 patients for randomization.

Early difficulties were encountered in completing follow-up phone interviews. Many patients (36%) were difficult to contact by phone, even with the use of a second phone number obtained at screening. For those who were not successfully contacted, responses to the SF-36 and the BDI were obtained by mailing forms with a small payment ($2) and a promise of 8 more dollars upon return of the forms. A few patients were followed by contacting them during return visits to the clinic. Only 6 (10%) patients were lost to follow-up.

Table 1 demonstrates baseline characteristics of the randomized groups. No significant differences were found between groups at baseline (all 95% confidence intervals included zero), although the intervention group was slightly more depressed than the usual care group. According to the BDI scores at baseline, 76% of the intervention group and 57% of the usual care group were moderately to severely depressed.[34] Note that across the 2 groups, 49% of patients were enrolled in Medicaid, so that 51% had income below the poverty line and no health insurance.

Results for Primary Hypothesis. Table 2 provides the intervention effect on depression symptoms (BDI scores) over the 6- and 12-month follow-ups. The intervention reduced depression symptoms relative to usual care. The effect of –4.9 points was significant ($P = .05$). The confidence interval suggests the true difference in depression symptom scores is in the range of –9.8 to –0.005 points on the BDI scale. The decrease of –4.9 points translates to an effect size of –0.41 standard deviations. This effect size is consistent with the average effect size (–0.40) found from recent depression trials.[44] An effect size of –0.41 indicates a shift in the distribution of intervention patients' depression symptom scores so that about half as many intervention patients scored above the 75th percentile defined by the depression score distribution of usual care patients. To better understand the implication of these estimates, results were obtained for percent change and absolute change. Comparing the 2 groups on percentage change

Table 2. Intervention Effect Estimates for BDI and the Secondary Outcomes of QOL and Costs

	Intervention Effect*	95% Confidence Interval	*P* Value	Effect Size*
BDI	–4.9	–9.8 to –.005	.05	–0.41
QOL				
Total SF-36[37,38] with slope model	3.6	–2.8 to 10	.27	0.34
Health care costs in dollars				
Total costs				
0 to 6 months	322	–1153 to 1797	.26†	0.08
6 to 12 months	–617	–2092 to 858	.93†	–0.16
Outpatient				
0 to 6 months	39	–379 to 457	.87†	0.04
6 to 12 months	–128	–546 to 290	.28†	–0.12

* *Maximum likelihood estimates obtained using linear mixed models that take into account baseline measurements. Intervention effect estimates represent the difference between intervention and usual care group responses. The effect size is the intervention effect divided by baseline standard deviation.*
† *Nonparametric test based on ranks.*
BDI, beck depression inventory; QOL, quality of life.

(averaging 6- and 12-month BDI responses) relative to baseline, 39% of intervention patients demonstrated a 33% or greater decrease in BDI scores, while only 21% of usual care participants demonstrated this level of decrease. In other words, approximately half as many usual care patients as intervention patients showed this level of improvement. Similarly, a substantial decrease (over 6- and 12-month measurements) of 10 points from baseline on the BDI scale (.83 standard deviations) was achieved by 32% of the intervention patients while only 17% of controls had a similar decline.

Six- and 12-Month Change. When the 6-month simple change from baseline was compared across the 2 groups, a difference of –7.6 (95% CI, –15 to –.44) was found in favor of the intervention group. Comparison of the 2 groups on the 12-month simple change from baseline was similar at –6.5 points (95% CI, –14 to 1.2). This simple change comparison of the groups was also significantly in favor of the intervention group ($P = .03$).

Secondary Analysis. Table 2 also provides estimates of the intervention effect on QOL and costs. The intervention demonstrated a positive (superior) effect on the overall QOL of 3.6 points better over a year (overall score was the average of the Physical and Mental subscales[45]), but this was not significant. For each of the Physical and Mental subscales of the SF-36, results were similar. As expected, costs in the first 6 months were slightly higher, but lower from 6 to 12 months. These differences were not significant, and the confidence intervals around cost statistics during the second 6 months suggested a wide range of possibilities, from the intervention costing more to a substantial cost reduction.

In the intervention group, 14 of the 33 patients (44%) were prescribed antidepressants at the initial visit. During the course of the follow-up year, 7 (22%) additional patients were subsequently prescribed antidepressants. Two other patients were not prescribed antidepressants, but visited Nova. This means that a total of 23 intervention patients (70%) were treated for depression during the follow-up period. Eight of 33 of the intervention patients had at least 1 visit to Nova. Among the 8 patients who visited Nova, 7 had more than 1 initial diagnostic visit. Among these 8, the average number of Nova visits was 5.75, and most patients kept all scheduled visits. In the usual care group, only 4 of the 28 patients (15%) were prescribed antidepressants anytime during the study period. Eighteen percent had notes discussing depression in the charts, but no treatment was identified. This means that depression was not identified in the charts of 67% of the usual care patients. No usual care patients received behavioral care from Nova during the study period. Subjects with the most improvement in BDI scores were those prescribed antidepressants at baseline visit. Because of the small numbers, as well as the fact that these results were inside the randomization, antidepressant use at baseline versus nonuse or later use was not compared.

No interaction was found between baseline depression severity (BDI at baseline) and intervention benefit (BDI at 6 and 12 months). Patients with Medicaid did not appear to benefit more or less than those without. Covariance adjustment for gender, age, Medicaid status, number of comorbidities, and phone versus mail responses, in addition to baseline BDI, did not change the estimate of the intervention effect. Similar covariance adjustments added to the QOL and cost data did not change their effect estimates.

Because of the financial problems facing our sample, it was of interest to determine whether the intervention had a diminished impact on specific items on the BDI (#2, 3, 7, 8, and 14). These items asked about pessimism regarding the future, past failures, self-criticism, self-dislike, and feelings of worthlessness. The intervention's impact on these items had the same effect size as for the other items (–0.36 for these, –0.33 for others). In particular, the intervention effect size for the pessimism about the future question was one of the largest found at –0.42.

DISCUSSION

This randomized trial demonstrated that indigent IM outpatients who screened positive for depression, but who were not receiving or seeking care for depression, benefited from intervention by resident physicians who were trained with AHRQ depression guidelines.[23] Successful treatment of depression in primary care settings appears to require more than guideline education.[20] The trial intervention reported here used an education component with a simple screening process, then combined both with a basic protocol, as well as screening nurse assistance to patients for behavioral care. The combination proved superior to screening patients and then allowing them to apprise residents concerning depression during their visit. The improvement demonstrated included depression symptoms as well as the nature and extent of treatment. Intervention group patients' depression symptoms were significantly lower than usual care patients over the follow-up. Benefits were consistent across different depression symptoms, including those that can reflect the poor financial status of the study patients. Significant differences were not found between the 2 groups on QOL or health care costs, but results were in the direction of higher QOL and lower overall costs. Prior randomized trials regarding depression treatment also did not provide convincing evidence of a cost reduction.[19,34,46,47]

The attempt to increase communication between the IM clinic and local mental health agency was not successful. Although the screening nurse tried to facilitate access to the agency for the intervention group, only 8 of 33 patients made at least one visit to the agency. For these 8 patients, the majority kept their appointments. Beyond referral and fax to the agency, no further communication was identified between personnel at the clinic and agency. Whether the lack of success was related to distance, cost,

inconvenience, or reluctance of patients to seek behavioral care is not known.

Among our sample of depressed clinic patients, many had chronic health problems that resulted in a high hospitalization rate (23%) over the follow-up. More than half of the sample had cardiovascular disease and/or diabetes. The abundance of literature on the association of depression and chronic long-term disease outcomes such as mortality and other complications supports comprehensive depression management in IM clinics.[44,48–50] Although the Enhancing Recovery in Coronary Heart Disease (ENRICHD) randomized trial failed to find a significant impact overall on survival with depression treatment, subgroup analysis suggested that SSRIs increase survival.[48]

Of the IM clinic patients screened, 45% were positive for depression. In this clinic, 80% of the positive screen patients were already being treated for depression. Other comparable clinics may not have as high a percentage of diagnosed or treated patients with depression. Educating residents in depression guidelines might have made the percentage already treated higher than was found in the pilot to this study (50% of positives were being treated), and therefore the yield of screening might be higher in other clinics. The high prevalence, the disease burden of depressed patients, and the successful trial clearly justified screening and treatment. The experience suggested, however, that behavioral care should be better integrated into IM care for the indigent. This model with a limited attempt to better integrate the internal medicine clinic and local public mental health agency, both serving the indigent, was unsuccessful. System change might be required. Meaningful change might be accomplished by setting up a mental health and social support on-site clinic with local public mental health agency providers immediately available. Another possibility would be instituting a collaborative management model with greater hospital resource provisions. The financial pressures on Medicaid and academic medical centers makes this possibility remote at the present time.

This study has limitations. Explicit referral to the mental health agency in the intervention group may have been compromised by the distance between the clinic and agency and the difficulties of transportation in the population studied. Furthermore, the lack of formal coordination between the IM clinic and agency may have made successful referral and follow-up difficult. The initial pilot study increased the number of patients screened and treated for depression, thereby decreasing the number of potential enrollees from the IM clinic. In this regard, the number lost to follow-up was low. Because of the large variability of costs and the small estimated effect size, this study had low power to detect differences in costs. It also had insufficient power to find a significant impact on QOL, but the effect size was larger here. Finally, the study does not allow separation of the effects of the main components of the intervention, especially because the screening, nurse assistance, and the standardized protocol were tightly linked. The number of "usual" patients who told their resident about a positive depression screen was not available, but it was likely very low given the low prevalence of depression treatment in the usual care controls. It appears that follow-up with behavioral therapy will require more personnel and financial support than is presently available.

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