Collaborative Depression Care Management and Disparities in Depression Treatment and Outcomes

Yuhua Bao, PhD; George S. Alexopoulos, MD; Lawrence P. Casalino, MD, PhD; Thomas R. Ten Have, PhD; Julie M. Donohue, PhD; Edward P. Post, MD, PhD; Bruce R. Schackman, PhD; Martha L. Bruce, PhD, MPH

Context: Collaborative depression care management (DCM), by addressing barriers disproportionately affecting patients of racial/ethnic minority and low education, may reduce disparities in depression treatment and outcomes.

Objective: To examine the effects of DCM on treatment disparities by education and race/ethnicity in older depressed primary care patients.

Design: Analysis of data from the randomized controlled trial Prevention of Suicide in Primary Care Elderly: Collaborative Trial (PROSPECT).

Setting: Twenty primary care practices.

Participants: A total of 396 individuals 60 years or older with major depression. We conducted model-based analysis to estimate potentially differential intervention effects by education, independent of those by race/ethnicity (and vice versa).

Intervention: Algorithm-based recommendations to physicians and care management by care managers.

Main Outcome Measures: Antidepressant use, depressive symptoms, and intensity of DCM over 2 years.

Results: The PROSPECT intervention had a larger and more lasting effect in less-educated patients. At month 12, the intervention increased the rate of adequate antidepressant use by 14.2 percentage points (95% confidence interval [CI], 1.7 to 26.4 pps) in the no-college group compared with a null effect in the college-educated group (−9.2 pps [95% CI, −25.0 to 2.7 pps]); at month 24, the intervention reduced depressive symptoms by 2.6 pps on the Hamilton Depression Rating Scale (95% CI, −4.6 to −0.4 pps) in no-college patients, 3.8 pps (95% CI, −6.8 to −0.4) more than in the college group. The intervention benefitted non-Hispanic white patients more than minority patients. Intensity of DCM received by minorities was 60% to 70% of that received by white patients after the initial phase but did not differ by education.

Conclusions: The PROSPECT intervention substantially reduced disparities by patient education but did not mitigate racial/ethnic disparities in depression treatment and outcomes. Incorporation of culturally tailored strategies in DCM models may be needed to extend their benefits to minorities.

Trial Registration: clinicaltrials.gov Identifier for PROSPECT: NCT00279682

Arch Gen Psychiatry. 2011;68(6):627-636
The PROSPECT intervention used depression treatment guidelines tailored to the elderly and lasted for 2 years. We analyzed the research interview data and intervention documentation of the PROSPECT over 24 months to examine (1) potentially differential intervention effects, by patient education and race/ethnicity, on use and dose adequacy of antidepressant therapy and depressive symptoms and (2) differences in the intensity of DCM received.

SETTING AND PARTICIPANTS

The PROSPECT trial recruited 20 primary care practices from greater New York City, Philadelphia, and Pittsburgh. Between May 1, 1999, and August 31, 2001, the study sampled 79% of patients 60 years or older with upcoming appointments to participate in the study. Initial eligibility criteria included the ability to give informed consent, a Mini-Mental State Examination score of 18 or higher, and the ability to communicate in English. Eligible patients were screened for depression using the Centers for Epidemiologic Studies Depression Scale (CES-D). The study invited all patients with a CES-D score higher than 20 and a 5% random sample of patients with lower scores (to reduce the bias associated with false negatives) to enroll in the study. To increase screen sensitivity, patients with a CES-D score of 20 or less who were not selected were invited if they responded positively to supplemental questions regarding previous episodes or treatment of depression. Of the 1226 patients who were enrolled and completed the baseline research interview, 396 were determined to meet the clinical criteria for major depression and 203 for minor depression. The remaining patients (n=627) did not meet the clinical criteria for minor or major depression and were not the target of the intervention.

Previous studies examining overall PROSPECT intervention effects found consistent effects on process and clinical outcomes (including those considered in this analysis) in patients with major depression at baseline but no advantage in patients with minor depression. We, thus, focused on patients with baseline major depression in this study. We also report findings of a parallel analysis of the patient sample with minor depression to determine whether null effects were, in fact, masking important intergroup differences.

METHODS

The PROSPECT intervention used depression treatment guidelines tailored to the elderly and lasted for 2 years. We analyzed the research interview data and intervention documentation of the PROSPECT over 24 months to examine (1) potentially differential intervention effects, by patient education and race/ethnicity, on use and dose adequacy of antidepressant therapy and depressive symptoms and (2) differences in the intensity of DCM received.

RANDOMIZATION AND INTERVENTION

The PROSPECT study adopted a practice randomization design: practices paired by urban vs rural or suburban location, academic affiliation, size, and racial/ethnic composition of the patient population were randomly assigned to intervention or usual care within pairs. The PROSPECT depression care managers offered targeted and timed recommendations to primary care physicians based on a treatment algorithm. The algorithm recommended a first-line trial of a selective serotonin reuptake inhibitor (citalopram), but physicians could prescribe other medications if clinically indicated; when a patient declined medication therapy, the physician could recommend interpersonal psychotherapy provided by the care manager. Practice-based care managers collaborated with physicians and supervising psychiatrists in recognizing depression; providing guideline-based treatment recommendations; monitoring patient clinical status, medication adverse effects, and adherence; and providing psychotherapy. Care managers interacted with patients in person or by telephone at scheduled intervals or when clinically necessary. Physicians of practices randomized to the usual care group received videotaped and printed information on late-life depression and were informed by letter if a patient met the criteria for a depression diagnosis.

MEASURES

Outcome 1: Antidepressant Use

Patients were asked to bring all the medications they were currently taking to each follow-up assessment. The interviewers recorded the name, dosage, and prescribed frequency of administration for each medication. The intensity of antidepressant treatment was classified based on the modified composite antidepressant score. In this analysis, we generated dichotomous measures of engagement in antidepressant therapy (composite antidepressant score >0 vs 0) and antidepressant treatment with adequate dosage (composite antidepressant score ≥3 vs <3) at each assessment point in the first year. Clinical appropriateness of continued treatment beyond the first year may depend on whether patients responded to medication in the earlier phase of treatment and on whether patients were experiencing recurrent depression and, therefore, may or may not indicate favorable clinical outcomes.

Outcome 2: Depressive Symptoms

Severity of depression was assessed at each follow-up research interview using the 24-item Hamilton Depression Rating Scale...
The outcome of DCM intensity applies only to intervention patients. We quantified the intensity of DCM received using (1) the number of care manager contacts with the patient, the patient's primary care physician, and the patient's family members and (2) care manager time spent on patient assessment, medication management, and care coordination. We derived this information based on the PROSPECT intervention checklist forms that care managers completed periodically to document intervention activities. Care managers recorded the date when a form was filled out but not the dates when patient contacts and other collaborative activities occurred. We, therefore, aggregated measures of DCM intensity by intervals consistent with the follow-up research interviews, that is, 1 to 4, 5 to 8, 9 to 12, 13 to 18, and 19 to 24 months.

MAIN INDEPENDENT VARIABLES: EDUCATION AND RACE/ETHNICITY

Patient education and race/ethnicity were based on response to baseline research interviews. We defined the 2 education groups (no college vs some college) based on self-reported years of education (≤12 vs >12 years). We categorized patients into “minority” versus non-Hispanic white (“white”; n = 262). Minorities included patients who considered themselves “Hispanic descendants” (n = 17) and those who reported their racial identity as non-Hispanic African American (n = 111), Asian or Pacific Islander (n = 2), or other (n = 4). The small sample size of minority groups other than African American did not allow us to consider them separately. We, however, conducted a sensitivity analysis by excluding non–African American minorities and, thus, performing an African American vs white comparison.

Table 1. Baseline Patient Characteristics by Education and Race/Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>No College</th>
<th>College</th>
<th>Minority</th>
<th>Non-Hispanic White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics, No. (%)</td>
<td>Int (n=141)</td>
<td>UC (n=182)</td>
<td>P</td>
<td>Int (n=73)</td>
</tr>
<tr>
<td>Age &gt;65 y</td>
<td>46 (32.6)</td>
<td>24 (22.2)</td>
<td>.07</td>
<td>21 (28.8)</td>
</tr>
<tr>
<td>Women</td>
<td>106 (75.2)</td>
<td>88 (81.5)</td>
<td>.24</td>
<td>43 (58.9)</td>
</tr>
<tr>
<td>Married</td>
<td>52 (36.9)</td>
<td>36 (33.3)</td>
<td>.57</td>
<td>25 (34.2)</td>
</tr>
<tr>
<td>Living alone</td>
<td>61 (43.3)</td>
<td>50 (46.3)</td>
<td>.63</td>
<td>39 (53.4)</td>
</tr>
<tr>
<td>Racial/ethnic minority</td>
<td>49 (34.8)</td>
<td>52 (48.1)</td>
<td>.03</td>
<td>14 (19.2)</td>
</tr>
<tr>
<td>Depression and other clinical conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDRS score, mean (SD)</td>
<td>21.2 (5.3)</td>
<td>20.0 (5.6)</td>
<td>.08</td>
<td>20.1 (5.3)</td>
</tr>
<tr>
<td>Suicidal ideation, No. (%)</td>
<td>57 (40.4)</td>
<td>24 (22.2)</td>
<td>&lt;.01</td>
<td>22 (30.1)</td>
</tr>
<tr>
<td>Charlson comorbidity score, mean (SD)</td>
<td>3.5 (2.5)</td>
<td>3.4 (2.3)</td>
<td>.87</td>
<td>3.2 (2.3)</td>
</tr>
<tr>
<td>AD use, No. (%)</td>
<td>Any AD use</td>
<td>55 (44.0)</td>
<td>.49</td>
<td>29 (45.0)</td>
</tr>
<tr>
<td></td>
<td>Any AD with adequate dose</td>
<td>46 (37.0)</td>
<td>.59</td>
<td>22 (34.0)</td>
</tr>
</tbody>
</table>

Abbreviations: AD, antidepressant; HDRS, Hamilton Depression Rating Scale; Int, intervention; UC, usual care.

The study sample consists of patients with major depressive disorder at baseline based on the Structured Clinical Interview for DSM-IV. Values pertain to tests of statistically significant differences between the Int and UC arms in each education and race/ethnicity group.

©2011 American Medical Association. All rights reserved.

For the analysis of antidepressant use and depressive symptoms, we grouped patients by the random assignment status of the practice (DCM intervention vs usual care) and their educational level and race/ethnicity. We generated descriptive statistics by these patient groups over time. We further conducted a model-based analysis to estimate potentially differential intervention effects by education, independent of those by race/ethnicity (and vice versa). In this sample, although patients with a lower educational level were disproportionately of ethnic minority (and vice versa), there is still substantial variation in race/ethnicity in each education group (and variation in educational achievement in each racial/ethnic group) (Table 1). Such variation allowed us to estimate ethnic (educational) differences in outcomes of interest while holding constant patient education (race/ethnicity).

We estimated longitudinal mixed-effects logistic models for antidepressant use and linear models for HDRS scores. Each model included the main effects of and 2- and 3-way interactions between the following dichotomous variables: intervention (vs usual care) status, time or follow-up assessment points (4, 8, 12, 18, and 24 months), and education (no-college vs college) and race/ethnicity (minority vs white) indicators. This specification allowed us to estimate the intent-to-treat effect of the PROSPECT intervention by education and race/ethnicity throughout the 2-year follow-up. To correct for any imbalances in baseline sociodemographic and clinical characteristics between patient groups, we adjusted for patient sex, baseline age, marital status (married vs not), living arrangement (living alone vs with someone), HDRS score, indicator of suicidal ideation, and Charlson comorbidity score. In addition, we controlled for the dependent variable measured at baseline in each model (eg, an indicator of adequate antidepressant use at baseline in the longitudinal model of adequate antidepressant use). This adjustment served, in part, to mitigate differences in the baseline outcome between educa-
tion and ethnic groups and between intervention and usual care patients in each patient group.

All these mixed-effects models included a random intercept at the patient level to account for correlations between longitudinal outcomes of the same patient. Consistent with findings of previous analyses of the PROSPECT data and approaches adopted in other DCM studies, such as Partners in Care (PIC), clustering by practice was negligible and was not specified in the final models. With the maximum likelihood estimation of these models, group differences in dropout and missing data were accounted for under the missing-at-random assumption. We derived estimates of intervention effects (in terms of changes in the probability of antidepressant use and in HDRS score) by education and race/ethnicity at each follow-up assessment. We derived empirical standard errors of all estimates using a bootstrap method that resampled clusters of observations by patient.

The analysis of DCM intensity used data from intervention patients only. Given the overdispersed (ie, variance exceeds the mean) count data nature of the measures, we conducted a negative binomial regression of each measure using a panel data set containing 5 intervals for each individual. We derived incident rate ratios (IRRs) for no-college vs college and minorities vs whites. We included in each model dichotomous indicators of PROSPECT sites to control for any intersite differences in the practice of DCM and DCM documentation. Each model also controlled for the patient's HDRS score at the beginning of each study period (ie, 1-4 months, 5-8 months, etc). Because the DCM protocol calls for varying intensity of care management for patients with different needs, with this adjustment, we derived between-group differences in DCM intensity conditional on severity of depression. Robust standard errors of the IRRs were derived by specifying clusters at the patient level.

All the analyses were conducted using a commercially available software program (STATA, version 10; StataCorp LP, College Station, Texas).

The PROSPECT protocol received full review and approval from the institutional review boards of all 3 institutions involved. Written informed consent was obtained from all the participants.

---

RESULTS

Sociodemographic and clinical characteristics were largely balanced between intervention and usual care patients in the overall PROSPECT sample. The present investigation focused on the 396 patients with major depression at baseline (214 in the intervention group and 182 in the usual care group) (Figure 1). An examination of patient characteristics in each education and ethnic group considered revealed some differences by intervention status (Table 1). In particular, in minority patients, the rate of adequate antidepressant use was much higher in the intervention group (37%) than in the usual care group (22%) at baseline. Although all the analyses controlled for the outcome of interest at baseline, results pertaining to minority patients should be interpreted with caution because of the relatively small sample size of this group.

GROUP DIFFERENCES IN INTERVENTION EFFECTS

Antidepressant Use

We present herein results pertaining to adequate antidepressant use. Results regarding any antidepressant use were qualitatively similar. Descriptive results indicate a strong intervention effect that increased adequate antidepressant use in all patient groups; patients with no college education saw more sustained benefits in later months compared with college-educated patients (Figure 2A); minority intervention patients lagged behind white patients in the early months, achieved a comparable rate at 12 months, but dropped off thereafter (Figure 2B).

For comparison by education, adjusted results indicated a consistent and more definitive pattern than was suggested by descriptive results (Table 2). At months 4 and 8, intervention effects on adequate antidepressant use were slightly stronger in no-college than college-educated patients, but differences in the intervention effects did not attain statistical significance. At month 12, however, the intervention increased the rate of adequate antidepressant use by 14.2 percentage points (pps) (95% confidence interval [CI], 1.7 to 26.4 pps) in the no-college group but had no statistically significant effect in the college-educated group (−9.2 pps [95% CI, −25.0 to 7.7 pps]). Differences in the 2 intervention effects indicate that the intervention increased adequate antidepressant use in no-college patients by 23.4 pps (95% CI, 5.5 to 43.7 pps) more than it did in college-educated patients (Table 2). Differences in the intervention effects between the 2 education groups did not achieve statistical significance at months 18 and 24.

For race/ethnicity comparisons, adjusted results suggest a different pattern than is indicated by the descriptive analysis. At month 4, the intervention raised the rate of adequate antidepressant use to a similar extent in minority patients (10.6 pps [95% CI, −2.2 to 25.1 pps]) and white patients (12.6 pps [95% CI, 3.3 to 21.9 pps]), although the effect was not statistically significant in minorities. Starting at month 8, the intervention effect became null in minority patients, whereas it remained strong in white patients, leading to a minority-white difference in intervention effects of −17.4 pps (95% CI, −41.1 to 2.7 pps) at month 12 and −19.3 pps (95% CI, −40.6 to 3.3 pps) at month 24.

Depressive Symptoms

Descriptive results of the HDRS over 24 months indicate overall declines in depression symptoms in all patient groups (Figure 2C and D). Under usual care, patients with no college education demonstrated progressively smaller declines than did college-educated patients; under intervention, however, no-college patients displayed a somewhat more rapid decline in symptoms overall and a particularly large decline in the last 6 months compared with college-educated patients (Figure 2C). Although minority patients under usual care experienced a similar course of depression as did white patients, under intervention, minorities saw a slower decline in the first 4 months and an unstable trajectory thereafter, leading to a widened gap in HDRS scores between racial/ethnic groups at month 24 (Figure 2D).

Adjusted results were largely consistent with descriptive comparisons (Table 2). The DCM intervention had a larger and more lasting effect on the HDRS score in the no-college group than in college-educated patients. For example, at month 24, the intervention reduced HDRS
scores in no-college patients by 3.8 pps (95% CI, −6.8 to −0.4 pps) more than it did in the college-educated group. The intervention had comparable effects between minority and white patients in the early phase; by month 18, however, it had ceased to benefit minority patients, whereas for white patients, the intervention effect still amounted to a 2.3-pps reduction in HDRS score at month 24 (95% CI, −4.0 to −0.1 pps).

Figure 1. Study flow diagram. CES-D indicates Centers for Epidemiologic Studies Depression Scale.
DCM INTENSITY BY PATIENT GROUPS

For all education and racial/ethnic groups in the intervention arm, DCM was most intensive in the first 4 months, declined markedly in the next 4 months, and assumed a milder downward trend thereafter (Table 3). There were no statistically significant differences in DCM intensity by educational attainment. Minority/white IRRs in DCM intensity were close to 1.0 in the first 4 months but trended below 1.0 thereafter. For example, the minority/white IRR associated with care manager contacts with the patient was 0.8 (P = .23) during months 4 to 8 and 0.6 (P = .02) during months 8 to 12; IRRs associated with care manager time on patient assessment, medication management, and care coordination during several intervals between months 4 and 18 were also statistically significantly below 1.0. In contrast, care managers had 3 to 4 times as many contacts with family members of minority patients in year 2 as they did with families of white patients (P ≤ .03).

The sensitivity analysis excluding non–African American minorities (n = 23) (and, thus, performing an African American vs non-Hispanic white comparison) generated findings similar to those of the main analysis. For example, for depression symptoms at 24 months, the intervention reduced the mean HDRS score by 4.1 pps more in the no-college group compared with in the college-educated group (95% CI, −7.3 to −0.7 pps) but by 4.0 pps less in African American patients compared with in non-Hispanic white patients (95% CI, 0.2 to 7.4 pps).

In the secondary analysis focusing on patients with minor depression at baseline, we did not find statistically significant effects of the intervention in most cases considered. The exceptions were with the adequate antidepressant use outcome at month 12, where the no-college group achieved an intervention effect of 43.0 pps (95% CI, 13.2 to 67.3 pps), leading to a no-college—college difference in intervention effects of 38.1 pps (95% CI, 3.4 to 67.6 pps); for the same outcome at month 12, non-Hispanic white patients achieved an intervention effect of 33.3 pps (95%
CI, 8.8 to 48.5 pps), but the racial/ethnic difference in intervention effects did not achieve statistical significance. Given that these findings were consistent with what we found in the main analysis, we focus the following discussion on results pertaining to patients with major depression at baseline.

### Table 2. Adjusted Intervention Effects on Adequate AD Use and HDRS Scores by Patient Education and Race/Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>No College</th>
<th>Some College</th>
<th>Difference</th>
<th>Minority</th>
<th>Non-Hispanic White</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD with adequate dose, mo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>12.3 (2.9 to 21.2)</td>
<td>11.1 (0.3 to 23.7)</td>
<td>1.2 (0.3 to 23.7)</td>
<td>10.6 (-2.2 to 25.1)</td>
<td>12.6 (3.3 to 21.9)</td>
<td>-2.1 (-15.7 to 15.9)</td>
</tr>
<tr>
<td>8</td>
<td>12.7 (3.0 to 24.5)</td>
<td>9.2 (-1.4 to 23.2)</td>
<td>3.5 (-12.4 to 20.5)</td>
<td>0.4 (-12.2 to 16.5)</td>
<td>16.3 (5.0 to 25.3)</td>
<td>-15.9 (-29.9 to 5.1)</td>
</tr>
<tr>
<td>12</td>
<td>14.2 (1.7 to 26.4)</td>
<td>-9.2 (-25.0 to 2.7)</td>
<td>23.4 (5.5 to 43.7)</td>
<td>-6.8 (-28.2 to 8.5)</td>
<td>10.6 (-1.6 to 21.0)</td>
<td>-17.4 (-41.1 to 2.7)</td>
</tr>
<tr>
<td>18</td>
<td>16.8 (4.3 to 28.3)</td>
<td>6.9 (-4.8 to 23.1)</td>
<td>9.9 (-9.3 to 25.8)</td>
<td>9.1 (-6.9 to 28.1)</td>
<td>15.3 (3.5 to 26.6)</td>
<td>-6.2 (-24.3 to 16.7)</td>
</tr>
<tr>
<td>24</td>
<td>15.3 (2.9 to 29.6)</td>
<td>-2.5 (-16.0 to 13.1)</td>
<td>17.8 (-2.6 to 38.0)</td>
<td>-5.5 (-22.5 to 12.2)</td>
<td>13.8 (1.8 to 28.0)</td>
<td>-19.3 (-40.6 to 3.3)</td>
</tr>
<tr>
<td>HDRS score, mo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-4.3 (-6.1 to -2.4)</td>
<td>-3.5 (-5.7 to -1.3)</td>
<td>-0.8 (-3.5 to 2.1)</td>
<td>-3.1 (-5.7 to -0.7)</td>
<td>-4.5 (-6.3 to -2.6)</td>
<td>1.4 (-1.8 to 4.4)</td>
</tr>
<tr>
<td>8</td>
<td>-2.2 (-4.0 to -0.3)</td>
<td>-1.0 (-3.3 to 0.9)</td>
<td>-1.2 (-3.9 to 1.9)</td>
<td>-0.3 (-2.7 to 2.5)</td>
<td>-2.5 (-4.4 to -0.7)</td>
<td>2.3 (-0.9 to 5.4)</td>
</tr>
<tr>
<td>12</td>
<td>-1.7 (-3.6 to 0.5)</td>
<td>-0.8 (-3.1 to 1.7)</td>
<td>-0.9 (-4.0 to 2.2)</td>
<td>-1.0 (-3.6 to 1.8)</td>
<td>-1.5 (-3.4 to 0.6)</td>
<td>0.5 (-3.0 to 3.8)</td>
</tr>
<tr>
<td>18</td>
<td>-1.1 (-3.0 to 1.2)</td>
<td>-0.8 (-3.2 to 1.6)</td>
<td>-0.4 (-3.6 to 3.1)</td>
<td>0.9 (-1.9 to 3.6)</td>
<td>-2.1 (-3.9 to -0.0)</td>
<td>3.1 (-0.5 to 6.3)</td>
</tr>
<tr>
<td>24</td>
<td>-2.6 (-4.6 to -0.4)</td>
<td>1.2 (-1.1 to 3.6)</td>
<td>-3.8 (-6.8 to -0.4)</td>
<td>1.2 (-1.4 to 4.2)</td>
<td>-2.3 (-4.0 to -0.1)</td>
<td>3.5 (-0.1 to 6.9)</td>
</tr>
</tbody>
</table>

**Abbreviations:** AD, antidepressant; CI, confidence interval; HDRS, Hamilton Depression Rating Scale.

a Estimated intervention effects were based on mixed-effects logistic (AD) and linear (HDRS) models with random intercepts at the patient level.

b Differences in intervention effects are shown between groups, ie, minority−white and no college−some college. The model for AD use was adjusted for AD with adequate dose at baseline in addition.

### Table 3. Care Manager Contacts and Time Over 24 Months by Patient Education and Race/Ethnicity

<table>
<thead>
<tr>
<th>Variable</th>
<th>AD with adequate dose, no.</th>
<th>Care Manager Time, min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>PCP</td>
<td>Family Members</td>
</tr>
<tr>
<td>1-4</td>
<td>12.8</td>
<td>0.9</td>
</tr>
<tr>
<td>5-8</td>
<td>7.9</td>
<td>1.0</td>
</tr>
<tr>
<td>9-12</td>
<td>5.6</td>
<td>1.2</td>
</tr>
<tr>
<td>13-18</td>
<td>5.9</td>
<td>1.2</td>
</tr>
<tr>
<td>19-24</td>
<td>4.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

**Abbreviations:** IRR, incident rate ratio; PCP, primary care physician.

a Mean predicted depression care management intensity for the reference patient group, ie, some college for the education comparison and non-Hispanic white for the ethnic comparison.

b The IRR measures the relative frequency of contacts and care manager time between an index group and its reference group. Results are based on longitudinal negative binomial regressions. Robust standard errors were based on clustering at the patient level.

The PROSPECT intervention was effective in improving care process and clinical outcomes in the general patient population with late-life depression and in each patient group considered in this analysis. Our results suggest that in patients of a given race/ethnicity (minority or white), the intervention had a larger and more lasting effect in less-educated patients compared with patients with a college education. Meanwhile, in patients of the same educational level, the intervention did not benefit racial/ethnic minority patients nearly as much as it did non-Hispanic white patients. As a result, the intervention narrowed or closed the gap between education groups in antidepressant use and depressive symptoms seen...
in usual care but did not mitigate ethnic disparities in either outcome.

To our knowledge, this is the first investigation to demonstrate that the impact of a collaborative DCM program in reducing disparities associated with patient education differs from the program’s effect on disparities associated with race/ethnicity. The present findings indicate that the PROSPECT intervention, and, in particular, the longitudinal care management and coordination by a care manager based on a clinical protocol, effectively addressed barriers pertaining to patient self-management and treatment adherence, which disproportionately affected patients with lower education regardless of race/ethnicity. In addition, low education was found to be associated with a less proactive and assertive care-seeking style and a perceived lack of interest and ability to adhere to medical advice by physicians.45 Given their experience with compromised physician-patient communication, patients with lower education in PROSPECT may have responded more to the personal attention provided by the depression care manager and the ensuing therapeutic alliance. This is consistent with the present findings of comparable intensity of DCM between the 2 education groups but more beneficial effect of the intervention in the less educated.

The lack of additional benefits to minority patients (compared with white patients) may reflect the lack of culture-specific strategies to maximize the potential of the intervention to minority patients. We found a substantially lower intensity of DCM received by minority patients after the initial intervention period. This observation offers 1 explanation for the less favorable intervention effects in minorities and speaks to the inadequacy of a generic DCM program in retaining minority patients so that they can take full advantage of DCM. We found that family members of minority patients had greater involvement in DCM compared with those of white patients. This is consistent with previous findings46,47 that family values regarding togetherness and interdependence are endorsed more in Hispanic and African American individuals than in white individuals. The lack of explicit consideration of family involvement in the PROSPECT protocol (eg, specifying circumstances where it is most critical or effective to engage family members) may partly explain the lack of additional benefits to minority patients.

Similar to most other DCM interventions, the PROSPECT protocol did not explicitly use a participatory shared decision-making style that attends to the patients’ culture and related beliefs. Previous studies46,48 have found that Hispanic and African American individuals tend to attribute depression to difficulty in life circumstances and stressors, deemphasizing medical etiology. Insufficient attention to such differences and a lack of strategies to help patients articulate and subsequently adjust their beliefs may have rendered DCM unable to realize its full potential for minority patients.

Previous studies have examined whether the DCM interventions tested in the PIC study49 and in the Improving Mood-Promoting Access to Collaborative Treatment (IMPACT) study49 improved care across ethnic groups50-53 and reduced outcome disparities compared with usual care.51-53 The DCM program in PIC featured accommodations for minority patients, including culture-sensitive study materials, translation (for Spanish-speaking patients), and bilingual and culturally trained clinicians.51,52 Studies51-53 using data from PIC found minorities (but not white patients) to benefit markedly from the intervention in self-reported depression outcomes, leading to reduced disparities. In addition, the disparity-mitigating effects found in PIC were largely attributable to the quality improvement program that specifically supported psychotherapy, a treatment modality preferred by minority patients.51,54,55

The DCM intervention in the IMPACT study did not have explicit cultural accommodations other than reference of elderly from different ethnic backgrounds in the educational video and written materials.50 One study50 based on the IMPACT data found significant intervention effects on rates of depression care, depression severity, and health-related functional impairments in ethnic minority participants that were similar to those observed in white participants. Another study56 found that low-income patients in the IMPACT trial experienced similar benefits as patients with higher incomes. Although the IMPACT and PROSPECT interventions were designed to ensure access to high-quality depression care, they differed regarding a few specific features. PROSPECT offered citalopram, psychoeducation, and adherence enhancement sessions as first-line treatment. Interpersonal therapy was offered to patients who declined medication therapy, although many patients who initially declined medication therapy initiated antidepressant therapy later in the study, suggesting that the intervention was somewhat effective in changing patient preference and choice over time. Other types of pharmacotherapy were available to those who did not tolerate or respond to citalopram and were selected by study psychiatrists on the basis of a guideline tailored to the individual’s history of response and stage of depression.57 IMPACT offered behavioral activation to all participants and a choice between medication management and problem-solving therapy. The selection of medication was based on physician judgment and was not limited to 1 class of medication. Although the different effects by race/ethnicity for PROSPECT vs IMPACT may be attributable to multiple domains across which the 2 interventions differed, 1 possible area for future investigation is whether problem-solving therapy, as adopted in IMPACT, better helps older patients cope with life circumstances and stressors and, therefore, is especially relevant to minority patients, who tend to attribute depression more to social and environmental, rather than medical, factors.

All published PIC and IMPACT analyses examined intervention effects along 1 dimension (race/ethnicity or income) at a time; none examined DCM intervention effects by patient income or education independent of those by race/ethnicity. Because minority patients disproportionately have a lower income or education, ethnic differences in intervention effects (or lack thereof) reported in these studies reflected the net impact of race/ethnicity and income or education on the intervention effects. Therefore, findings from these studies may have overstated the impact of the intervention on depression care and outcomes in ethnic minority patients and are not necessarily at odds with the present findings. Put another way, the seeming conflict between the present findings and those

©2011 American Medical Association. All rights reserved.
from previous studies may, in part, be real, resulting from the fact that specific designs of the PIC and IMPACT interventions have resulted in more culturally sensitive processes of care compared with PROSPECT and may, in part, be illusory, resulting from the confounding of education and minority status in the IMPACT and PIC studies.

Differences in the composition of minority patients among the 3 trials warrant caution in directly comparing findings across studies: the minority sample was predominantly African American in PROSPECT in contrast with Latino in PIC and a more balanced mix of African American, Latino, and other ethnicities in IMPACT.

The present study has limitations. In each subgroup examined, not all key characteristics were balanced between the intervention and usual care samples (Table 1). The main strategy used was to control for the outcome of interest at baseline, in addition to baseline characteristics, in all analyses, enabling us to compare (adjusted) intervention effects between groups. Also, the present findings regarding minority patients largely apply to African Americans and not to other racial/ethnic populations; findings regarding racial/ethnic differences may be unstable because of the small sample size of minority patients.

In conclusion, the PROSPECT intervention substantially reduced disparities by patient education but did not mitigate ethnic disparities in antidepressant use and depressive symptoms. Adding culturally tailored strategies to collaborative DCM models may be needed to extend their benefits to minority patients. Possible strategies include, but are not limited to, helping patients articulate culturally specific beliefs and attitudes and engaging patients in treatment planning and adjustment; identifying areas of treatment in which family members may be instrumental and engaging them as collaborators; and incorporating an explicit shared decision-making component whereby patients and physicians exchange information and experiences to arrive at a mutually agreed-on treatment goal and plan.

Accepted for Publication: January 6, 2011.

Author Affiliations: Departments of Public Health (Drs Bao, Casalino, and Schackman) and Psychiatry (Drs Alexopoulos and Bruce), Weill Cornell Medical College, New York, New York; Division of Biostatistics, Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine, Philadelphia (Dr Ten Have); Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, Pennsylvania (Dr Donohue); and Department of Internal Medicine, School of Medicine, University of Michigan, Ann Arbor, and Health Services Research and Development, VA, Ann Arbor (Dr Post).

Correspondence: Yuhua Bao, PhD, Department of Public Health, Weill Cornell Medical College, 402 E 67th St, New York, NY 10065 (yub2003@med.cornell.edu).

Author Contributions: Dr Bao had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Bao, Alexopoulos, and Bruce. Acquisition of data: Alexopoulos, Ten Have, Post, and Bruce. Analysis and interpretation of data: Bao, Alexopoulos, Casalino, Donohue, Post, Schackman, and Bruce. Drafting of the manuscript: Bao. Critical revision of the manuscript for important intellectual content: Bao, Alexopoulos, Casalino, Ten Have, Donohue, Post, Schackman, and Bruce. Statistical analysis: Bao and Ten Have. Obtained funding: Bao, Alexopoulos, and Bruce. Administrative, technical, and material support: Alexopoulos. Study supervision: Bao, Casalino, Donohue, Post, Schackman, and Bruce.

Financial Disclosure: Dr Bao has received research grants from the National Institute of Mental Health (NIMH) and Pfizer. Dr Alexopoulos has received research grants from the NIMH, Cephalon, and Forest Laboratories; has served as a consultant on the scientific advisory boards of Forest Laboratories and sanofi-aventis; holds stock in Johnson & Johnson; and has served on speakers' bureaus for Forest Laboratories, Eli Lilly & Co, Bristol-Meyers Squibb, Pfizer, and Janssen. Drs Ten Have, Donohue, and Post have received research grants from the NIMH. Dr Bruce has received grant funding from the NIMH and is a consultant to Medispin Inc, a medical education company.

Funding/Support: The NIMH funded the PROSPECT study. Dr Bao was supported by the Pfizer Scholar’s Grant in Health Policy, the NIMH Advanced Center for Interventions and Services Research at Weill Cornell Medical College (P30 MH085943), mentored research scientist career development award K01 MH090087 from the NIMH and Drew/UCLA Project Export, National Center on Minority Health and Health Disparities, P20MD000182. Dr Donohue was supported by grant KL2 RR-024154 from the National Center for Research Resources, a component of the National Institutes of Health, the National Institutes of Health Roadmap for Medical Research, and the NIMH (R34 MH082682). Dr Schackman was supported by the Advanced Center for Interventions and Services Research at Weill Cornell. Dr Post was supported by grant K23 MH101879 from the NIMH.

Role of the Sponsors: The National Institutes of Health and Pfizer Inc had no role in the design and conduct of this study; in the collection, management, analysis, and interpretation of the data; or in the preparation, review, and approval of the manuscript.

REFERENCES


