Reducing the Number of Emergency Department Visits and Costs Associated With Anxiety: A Randomized Controlled Study

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Extensive use of the emergency department (ED) for psychiatric conditions has been well documented in terms of prevalence and recidivism.[1-4] In a study[2] of more than 2000 patients visiting the ED for psychiatric conditions during a 7-month period, 18% were repeat visitors, accounting for 36% of all ED visits for a psychiatric condition. Assuring proper treatment for individuals with anxiety is particularly important as anxiety disorders have been associated with high costs, comorbid psychiatric conditions, and high utilization rates.[5,6]

Case management services have been shown to promote continuity of care and to reduce reliance on more intensive inpatient services for individuals with psychiatric conditions.[7-10] Application of these services to individuals with psychiatric conditions presenting in the ED has been recommended, yet few investigations have used randomized assignment to demonstrate the potential of case management to reduce the number of returns to the ED and associated costs for individuals presenting with anxiety.[2] Intuitively, providing these patients with case management services is appropriate given that there are excellent outpatient treatments available[3,11,12] and that anxiety is one of the most frequent and costly psychiatric conditions seen in the ED.[3,5]

To address the need to reduce ED utilization associated with an anxiety diagnosis, a large northeastern health maintenance organization (HMO) created a stepped-care case management–based intervention to improve care delivered to members covered commercially or through Medicare or Medicaid who are discharged from the ED with anxiety diagnoses. The objective of our study was to determine the effect of this intervention on ED utilization for psychiatric conditions and associated ED costs during a 6-month period following discharge from the ED with an anxiety diagnosis among members of a health plan. A 6-month follow-up period was used rather than the traditional 12-month follow-up period because members needed to maintain insurance coverage for the entire follow-up period. To avoid a much greater loss of eligible members, particularly members enrolled in Medicaid, the shorter 6-month follow-up period was used. Because this intervention could potentially affect psychiatric outpatient visit utilization, the effect of case management on psychiatric outpatient

Objective: To demonstrate the economic effects of an intervention for members discharged from the emergency department (ED) with anxiety diagnoses.

Study Design: Randomized controlled study.

Methods: Adults with commercial, Medicare, or Medicaid insurance coverage enrolled in a health maintenance organization and discharged from an ED with anxiety diagnoses were randomly assigned to receive usual care (n = 300) or a stepped-care intervention (n = 307). Psychiatric ED and outpatient visit utilization and cost data identified by claims were collected for 6 months following the initial ED visit.

Results: Members assigned to receive the intervention demonstrated significantly fewer ED visits and lower associated facility costs in the 6 months following discharge compared with those assigned to usual care. No significant differences in psychiatric outpatient visit costs were observed. Members receiving usual care made 117 visits to the ED for a psychiatric condition during the follow-up period, for a mean of 0.39 visits per member and a mean facility cost of $118.15 per member, while members receiving case management services made 79 visits to the ED for a psychiatric condition during the follow-up period, for a mean of 0.26 visits per member and a mean facility cost of $70.63 per member. The intervention resulted in a savings of $7.92 in ED costs per member per month for all psychiatric diagnoses during the 6-month study period.

Conclusion: The case management–based intervention effectively reduced psychiatric ED recidivism and costs for members discharged from the ED with an anxiety diagnosis, without significantly affecting psychiatric outpatient visit costs.

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For author information and disclosures, see end of text.

visit utilization and associated costs was also assessed. This study examined whether members randomly assigned to the intervention care (IC) condition differed from members assigned to the usual care (UC) condition in the 6 months following an initial ED visit for anxiety with regard to the following: (1) psychiatric ED visits, (2) psychiatric ED costs, (3) psychiatric outpatient visits, and (4) psychiatric outpatient visit costs. It was hypothesized that members randomly assigned to the IC condition would have fewer psychiatric ED visits and lower associated costs compared with members randomly assigned to the UC condition and that any potential increase in psychiatric outpatient visit costs would be offset by reductions in psychiatric ED costs. To control for demographic effects on ED and psychiatric outpatient visit utilization, we included age, sex, and type of health insurance coverage variables in the testing of all hypotheses. This study was reviewed and approved by an internal institutional review board.

METHODS

Eligibility for Randomization

Potentially eligible members were identified using administrative claims data. All members maintained HMO insurance coverage throughout the study period. The 3 mutually exclusive possible types of insurance coverage were commercial, Medicare, and Medicaid. All members had mental health benefits to receive at least 20 psychiatric outpatient visits that could be used without a referral. Depending on coverage type, a copayment ($\leq$$25) may have been required for outpatient mental health services. Members 18 years and older discharged from an ED visit (without inpatient admission) for a primary anxiety disorder diagnosis between January 1, 2004, and December 31, 2004, were eligible for the study. An anxiety disorder was defined as 1 of the following diagnoses identified by *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD*-CM) codes: panic disorder with or without agoraphobia (codes 300.01, 300.21), agoraphobia without a history of panic disorder (code 300.22), anxiety not otherwise specified (code 300.00), generalized anxiety disorder (code 300.02), obsessive-compulsive disorder (code 300.3), acute stress disorder (code 308.3), posttraumatic stress disorder (code 309.81), social phobia (code 300.23), and specific phobia (code 300.29). These members were identified using monthly reports of ED claims. Because of the delay between discharge and receipt of facility claims by the HMO, there was typically a 1-month to 2-month delay between an ED visit for an anxiety disorder and its appearance on a monthly report. At the end of each month, all members with ED visits with a primary *ICD*-CM anxiety disorder diagnostic code were identified. The initial ED visit for an anxiety disorder during the study period was considered the index ED visit. On identification, the members were randomly assigned to receive UC or IC.

Usual Care

Members assigned to the UC condition were eligible to receive care at any of the HMO's mental health centers or from its extensive network of behavioral health providers and could access mental healthcare directly without referral by calling a toll-free telephone number located on their insurance identification card. Although referrals were not required for members to access care directly, it is expected that EDs refer members to an outpatient mental health provider following any psychiatric ED visit as part of routine care.

Intervention Care

As with the UC condition, members assigned to the IC condition were eligible to receive care at any of the HMO's mental health centers or from its network of behavioral health providers and could access mental healthcare directly without referral by calling a toll-free telephone number. It is expected that EDs refer members to an outpatient mental health provider following any psychiatric ED visit. In addition to these services available to all members regardless of assignment, members randomly assigned to the IC condition received a stepped-care intervention. On identification of the index ED visit, these members were sent a letter containing general information about anxiety and about available outpatient treatment options. This letter highlighted the availability of high-quality treatment and emphasized that anxiety is common, can affect anyone, and may take different forms. The letter provided telephone numbers for the member to use to access conveniently located treatment and encouraged members to discuss their diagnosis with their primary care physician. Emergency department utilization was monitored, and any IC group member returning to the ED for a psychiatric condition within 6 months of the index visit received an outreach telephone call from a case manager with a bachelor of arts degree in a health-related field and a minimum of 4 years' work experience. During the outreach telephone call, the case manager conducted a brief needs assessment, discussed treatment options, and worked to connect the member with outpatient care if the member was not already engaged in treatment. Follow-up telephone calls from the case manager were provided as needed throughout the 6-month follow-up period to assess the member's needs and progress and to determine if additional psychiatric services were needed.

Measures

Emergency department and psychiatric outpatient visit utilization for psychiatric conditions and associated costs for each member in the study were assessed for a 6-month period following the member's index ED visit. Hereafter, this is referred to as the postindex period.

Number of Postindex ED Visits. The number of ED visits for any primary psychiatric diagnosis in the 6 months following the index ED visit for an anxiety disorder diagnosis was measured for all members of the study. A *psychiatric diagnosis* was defined as a claim with a primary *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnostic code between 290.00 and 319.00.

Total Postindex ED Cost. This measure refers to the total amount paid to an ED facility by the HMO for all ED visits for a primary psychiatric diagnosis in the postindex period.

Postindex ED Cost per Member per Month. This represents the mean monthly amount per member paid by the HMO to ED facilities in the study for all ED visits for a primary psychiatric diagnosis in the postindex period. This measure yields the mean psychiatric ED cost per member per month (PMPM) during the 6-month follow-up period.

Number of Postindex Psychiatric Outpatient Visits. The number of outpatient visits for any primary psychiatric diagnosis in the postindex period was measured for all members.

Total Postindex Psychiatric Outpatient Visit Cost. This measure refers to the total amount paid by the HMO for all outpatient visits with a primary psychiatric diagnosis in the postindex period.

Postindex Psychiatric Outpatient Visit Cost PMPM. This represents the mean monthly amount per member paid by the HMO for all outpatient visits with a primary psychiatric diagnosis in the postindex period. This measure yields the mean psychiatric outpatient visit cost PMPM during the 6-month follow-up period.

Randomization

Six hundred fifty-seven members met the criteria for study eligibility for initial inclusion and were randomized to the UC or IC condition. Of these, 28 UC group members (4.3%) and 22 IC group members (3.3%) did not maintain insurance coverage throughout the postindex period and were removed from all analyses. Excluded members differed from retained members in type of insurance coverage ($\chi^2_2 = 8.29$, $P < .05$). Forty-eight percent of excluded members were enrolled in Medicaid and 2.0% were enrolled in Medicare, while 34.4% of retained members were enrolled in Medicaid and 15.7% were enrolled in Medicare. Retained members were significantly older than excluded members (mean ± SD age, 43.59 ± 16.94 years vs 38.28 ± 14.57 years) ($t_{655} = 2.45$, $P < .05$). There were no other differences between these groups in background variables. Three hundred members were randomized to UC, and 307 members were randomized to IC. The analysis was performed several months following the postindex period to ensure that all claims were received. Denial of payment for ED visits was not an issue as ED claims are not subject to denial.

Statistical Analysis

Differences between the groups in age, percentage of women, type of insurance coverage (commercial, Medicare, or Medicaid), and cost of the initial ED visit were examined using t test for continuous variables and χ^2 analysis for categorical variables. z Test was used to evaluate the difference between the IC and UC groups in the proportion of members returning to the ED. Four regression models were created using the following dependent variables: postindex ED visits, postindex ED cost, postindex psychiatric outpatient visits, and postindex psychiatric outpatient visit cost. For all models, the independent variables consisted of condition (UC vs IC), age, gender, and type of insurance coverage. The age variable was centered by subtracting the mean age of 44 years from each member's age, and dummy variables were created to identify the type of insurance coverage. Commercial insurance coverage was used as the reference category against which Medicare and Medicaid coverage were compared. Poisson distribution regression analysis was used when the dependent variable comprised visits, and linear regression analysis was used when the dependent variable comprised cost. All main effects were entered in the model. Next, all 2-way interactions involving the condition variable were included in the model. If adding the interaction terms improved the fit of the model, they were kept, and all 3-way interactions involving the condition variable were added to the model. These interactions were retained only if their addition improved the fit of the model. For the cost models, main effects and all potential interaction effects were included in each model. Scheffe post hoc test was used to test for differences between interaction variables identified as statistically significant in the regression models. Statistical significance for all tests was established at $\alpha < .05$.

RESULTS

There were no statistically significant differences between the 300 UC group members and the 307 IC group members relative to the following variables: noncentered age (mean ± SD age, 43.9 ± 17.09 years for the UC group vs 43.3 ± 16.81 years for the IC group), type of insurance coverage, and cost of initial ED visit ($340.93 ± $148.5 for the UC group vs

$347.48 ± $133.21 for the IC group). The UC group had a higher percentage of women (76.3% for the UC group vs 68.7% for the IC group, $P < .05$). Descriptive data on gender, type of insurance coverage, and diagnosis at the index ED visit for members are given in **Table 1**. Forty-one (13.4%) of 307 members of the IC group returned to the ED for a psychiatric condition at least once during the postindex period compared with 63 (21.0%) of 300 members of the UC group ($\chi^2_1 = 6.25$, $P < .05$). **Table 2** gives the frequency of ED visits for psychiatric conditions during the 6-month study period for the UC and IC conditions.

Effects of the Intervention on the Number of Postindex ED Visits

The 300 UC group members made 117 postindex ED visits, for a mean ± SD of 0.39 ± 1.02 visits per member. The number of postindex ED visits for the UC group ranged from 0 to 8. The 307 IC group members made 79 postindex ED visits, for a mean ± SD of 0.26 ± 0.90 visits per member. The number of postindex ED visits for the IC group ranged from 0 to 9. Members assigned to the UC condition were significantly more likely to have a postindex ED visit than members assigned to the IC condition ($z606 = 2.39$, $P < .05$). Among 104 members returning to the ED, the frequency distribution of time between the index ED visit and the first ED visit in the postindex period was 60 (57.7%) within the first month, 19 (18.3%) within the second month, 8 (7.7%) within the third month, 3 (2.9%) within the fourth month, 7 (6.7%) within the fifth month, and 7 (6.7%) within the sixth month.

The Poisson distribution regression main-effects model yielded the following 3 significant variables: condition ($\chi^2_1 = 12.16$, $P < .01$), Medicaid enrolled ($\chi^2_1 = 25.92$, $P < .01$), and gender ($\chi^2_1 = 20.34$, $P < .01$). The Pearson product moment correlation χ^2_{601} for this model was 1547.24, resulting in a Pearson product moment correlation χ^2/df of 2.57. All 2-way interactions involving the condition variable were then added to the model. As summarized in **Table 3**, this model yielded the following 7 significant main effects or interactions: condition, Medicare enrolled, Medicaid enrolled, gender, condition-×-centered age, condition-×-Medicare enrolled, and condition-×-Medicaid enrolled. The Pearson product moment correlation χ^2_{592} for this model was 1315.18, resulting in a Pearson product moment correlation χ^2/df of 2.22, suggesting that the addition of the 2-way interaction improved the fit of the model. A third model was created that included all 3-way interaction terms involving the condition variable; adding these variables did not improve the fit of the model ($\chi^2_{589} = 1309.19$, resulting in a Pearson product moment correlation χ^2/df of 2.22).

Effects of the Intervention on the Total Postindex ED Cost

A linear regression model was created that included all main effects and all possible interactions. As summarized in **Table 4**, this model contained the following 5 significant variables: condition, Medicaid enrolled, gender-×-Medicaid enrolled, condition-×-Medicaid enrolled, and condition-×-Medicaid enrolled-×-gender. **Figures 1**, **2**, and **3** show that women assigned to the IC condition had lower postindex ED costs than women assigned to the UC condition regardless of insurance status, whereas men assigned to the IC condition had lower postindex ED costs than men assigned to the UC condition only among members who were not enrolled in Medicaid.

The 300 UC group members had a total postindex ED cost of

■ **Table 1.** Demographic Information of Members*

Demographic Variable	Usual Care (n = 300)	Intervention Care (n = 307)
Gender		
Male	71 (23.7)	96 (31.3)
Female	229 (76.3)	211 (68.7)
Type of insurance coverage		
Commercial	153 (51.0)	150 (48.9)
Medicare	48 (16.0)	47 (15.3)
Medicaid	99 (33.0)	110 (35.8)
Diagnosis at the index ED visit		
Anxiety NOS	250 (83.3)	251 (81.8)
Panic disorder	44 (14.7)	45 (14.7)
PTSD or acute stress disorder	5 (1.7)	7 (2.3)
Generalized anxiety disorder	0	2 (0.7)
Obsessive-compulsive disorder	0	2 (0.7)
Specific phobia	1 (0.3)	0

*Data are given as frequency (percentage). ED indicates emergency department; NOS, not otherwise specified; PTSD, posttraumatic stress disorder.

$35 445.81, with a range of $0 to $2553.28 and a mean ± SD facility cost of $118.15 ± $326.67 per member. The 307 IC group members had a total postindex ED cost of $21 682.74, with a range of $0 to $2548.83 and a mean ± SD facility cost of $70.63 ± $246.50 per member. Members assigned to the UC condition had a cost PMPM of $19.69 during the 6-month postindex period, while members assigned to the IC condition had a cost PMPM of $11.77, resulting in a $7.92 ED cost savings PMPM for members assigned to the IC condition during the 6-month postindex period.

Effects of the Intervention on the Number of Postindex Psychiatric Outpatient Visits

The 300 UC group members had 801 postindex psychiatric outpatient visits, for a mean ± SD of 2.67 ± 6.07 visits per member. The number of postindex psychiatric outpatient visits for the UC group ranged from 0 to 45. The 307 IC group members had 798 postindex psychiatric outpatient visits, for a mean ± SD of 2.60 ± 5.50 visits per member. The number of postindex psychiatric outpatient visits for the IC group ranged from 0 to 32. One hundred seven UC group members and 104 IC group members attended at least 1 postindex psychiatric outpatient appointment. This difference was not statistically significant (z = .38).

The Poisson distribution regression main-effects model yielded the following 3 significant variables: centered age, Medicaid enrolled, and gender. The Pearson product moment correlation χ^2_{601} for this model was 7493.36, resulting in a Pearson product moment correlation χ^2/df of 12.46. All 2-way interactions involving the condition variable were then added to the model. As summarized in **Table 5**, this model yielded the following 10 significant variables: centered age, condition, Medicaid enrolled, gender, condition-x-centered age, condition-x-Medicaid enrolled, condition-x-gender, centered age-x-Medicare enrolled, Medicare enrolled-x-gender, and Medicaid enrolled-x-gender. The Pearson product moment correlation χ^2_{592} for this model was 7090.41, resulting in a Pearson product moment correlation χ^2/df of 11.98, suggesting that the addition of the 2-way interaction improved the fit of the model. A third model was created that included all 3-way interaction terms involving the condition variable; adding

■ **Table 2.** Frequency of ED Visits for Psychiatric Conditions Following the Index ED Visit for Anxiety*

No. of ED Visits	Usual Care	Intervention Care
1	37 (58.7)	24 (58.5)
2	16 (25.4)	9 (22.0)
3	4 (6.3)	4 (9.8)
4	0	1 (2.4)
5	2 (3.2)	1 (2.4)
6	3 (4.8)	0
7	0	1 (2.4)
8	1 (1.6)	0
9	0	1 (2.4)
Total	**63** (100.0)	**41** (100.0)

*Data are given as frequency (percentage).
ED indicates emergency department.

■ **Table 3.** Poisson Distribution Regression Main-effects Analysis Results for the Number of ED Visits During the 6 Months Following the Initial ED Visit for Anxiety

| Variable	Estimate (SE)	χ^2_1 Value	P
Condition	1.35 (0.39)	12.28	<.001
Medicare enrolled	1.50 (0.68)	4.88	.03
Medicaid enrolled	1.62 (0.38)	17.98	<.001
Gender	−0.95 (0.38)	6.21	.01
Condition-x-centered age	0.04 (0.01)	9.77	.001
Condition-x-Medicare enrolled	−2.38 (0.67)	12.71	<.001
Condition-x-Medicaid enrolled	−1.20 (0.40)	9.13	.003

ED indicates emergency department.

■ **Table 4.** Linear Regression Analysis Results for the Cost of ED Visits During the 6 Months Following the Initial ED Visit for Anxiety

Variable	Estimate (SE)	χ^2_1 Value	P
Condition	155.65 (63.58)	5.99	.01
Medicaid enrolled	216.76 (74.41)	8.48	.004
Gender-x-Medicaid enrolled	203.53 (88.43)	5.30	.02
Condition-x-Medicaid enrolled	258.84 (107.95)	5.75	.02
Condition-x-Medicaid enrolled-x-gender	298.60 (128.44)	5.40	.02

ED indicates emergency department.

■ **Figure 1.** Effect of the Condition-×-Gender Interaction on the Cost of Postindex ED Visits
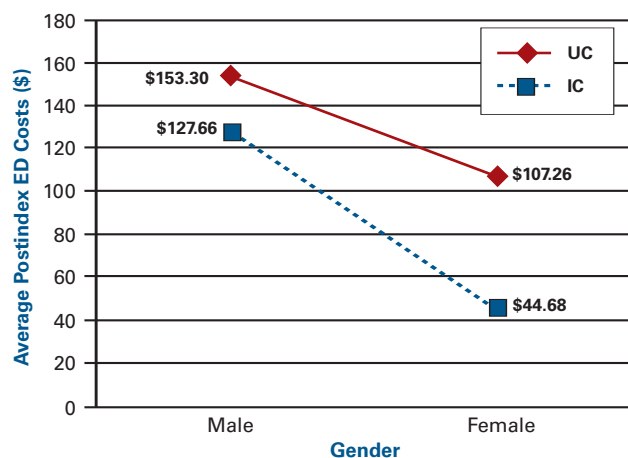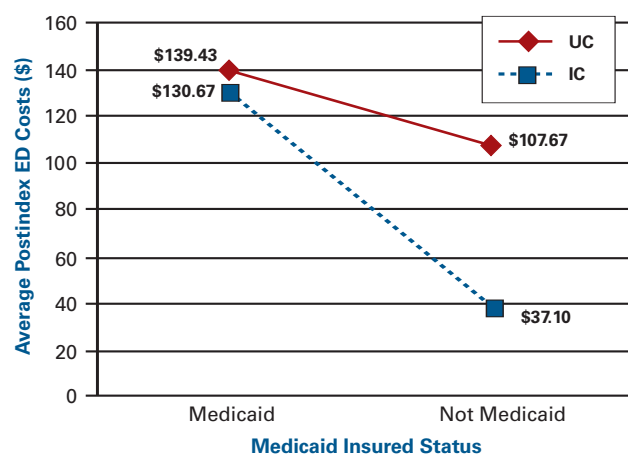

ED indicates emergency department; UC, usual care; IC, intervention care.

these variables did not improve the fit of the model (χ^2_{589} = 7075.59, resulting in a Pearson product moment correlation χ^2/df of 12.01).

Effects of the Intervention on the Total Postindex Psychiatric Outpatient Visits Cost

A linear regression model was created that included all main effects and all possible interactions. This model did not yield any significant predictors of the total cost of psychiatric outpatient visits. The 300 members assigned to the UC condition had a total postindex psychiatric outpatient visit cost of

■ **Figure 2.** Effect of the Condition-×-Medicaid Enrolled Interaction on the Cost of Postindex ED Visits

ED indicates emergency department; UC, usual care; IC, intervention care.

$62 773, with a range of $0 to $3560.00 and a mean ± SD psychiatric outpatient visit cost of $209.25 ± $474.56 per member. The 307 members assigned to the IC condition had a total postindex psychiatric outpatient visit cost of $65 928.75, with a range of $0 to $3368.90 and a mean ± SD psychiatric outpatient visit cost of $214.75 ± $460.99 per member. Members assigned to the UC condition had a cost PMPM of $34.88 during the 6-month postindex period, while members assigned to the IC condition had a cost PMPM of $35.79, resulting in a $0.91 higher psychiatric outpatient visit cost PMPM for members assigned to the IC condition during the 6-month postindex period.

DISCUSSION

This study demonstrated the economic effects of a stepped-care case management–based intervention for health plan members discharged from the ED with an anxiety diagnosis. Members assigned to the IC condition had significantly fewer ED visits and significantly lower ED costs for psychiatric conditions. Members assigned to the IC condition had slightly higher psychiatric outpatient visit costs, but this difference was not statistically significant. Despite the fact that the difference in psychiatric outpatient visit costs may have been due to chance, the psychiatric outpatient visit costs were factored into the overall cost analysis to obtain a conservative estimate of the cost savings associated with this intervention. The $0.91 higher cost PMPM for psychiatric outpatient visits was offset by the $7.92 in ED cost savings PMPM for the 6 months during which each member was enrolled in the program. Therefore, providing this intervention to all 607 members would result in a $7.01 cost savings PMPM and a total savings in ED and psychiatric outpatient visit costs for the 6-month study period of $25 530.42.

Based on the case manager's estimate of a mean of 12 minutes spent working on each case, the cost of the case manager delivering the intervention was estimated at $1805.16, or $0.98 PMPM. In addition, the cost of mailing letters to the 307 members was $113.59, or $0.06 PMPM. A conservative estimate of the cost savings associated with this intervention is $5.97 PMPM ($7.92 in ED cost savings minus $0.91 higher cost for psychiatric outpatient visits minus $0.98 case manager cost minus $0.06 mailing cost). Therefore, providing the intervention to all 607 members would result in a total net cost savings of $21 742.74.

The finding that the number of psychiatric ED visits was significantly decreased without significant increases in psychiatric outpatient visit costs may suggest that case management has an effect beyond simply connecting members with outpa-

tient care. Providing members with information on how to access care may have given them a sense of having better control over accessing care, reducing the need to rely on the ED for psychiatric care. Encouraging members to discuss ED utilization with providers may also have led to more effective care, possibly reducing the need for additional psychiatric outpatient visits.

This study is limited in scope insofar as the intervention was targeted toward members discharged from the ED with anxiety diagnoses. Therefore, benefits of the program may not generalize to other psychiatric conditions seen in the ED. Furthermore, members in this study were only followed up for 6 months. Therefore, it is unknown whether the group differences continue past 6 months. Further research is needed to establish the benefits of this or similar stepped-care case management–based programs for other psychiatric diagnoses and during longer periods. Medical and inpatient psychiatric utilization and costs were not included in this study as it was believed that the intervention did not have sufficient power to meaningfully affect these variables. Future strategies may consider interventions aimed at reducing medical and inpatient psychiatric costs as well.

The intervention contained an important limitation, namely, the timeliness of identification. Members were identified in monthly reports based on claims. Therefore, there was a delay between member discharge from the ED and the intervention. Despite the significant reduction in the number of ED visits and costs, a timelier intervention may have yielded markedly better results, especially given that 57.6% of all members in this study with 2 or more ED visits had a second ED visit within 1 month of the index ED visit. The ability to identify ED visits for anxiety disorders in real time, rather than relying on monthly reports based on claims, may yield even greater reductions in the number of ED visits and costs.

Despite randomization, the 2 groups differed in the percentage of women, with 76.3% of the UC group comprising women compared with 68.7% of the IC group. This gender difference may have resulted from the low percentage (27.5%) of men visiting the ED for anxiety. Future studies could benefit by

■ **Figure 3.** Effect of the Condition-x-Medicaid Enrolled-x-Gender Interaction on the Cost of Postindex ED Visits for Men (**A**) and Women (**B**)
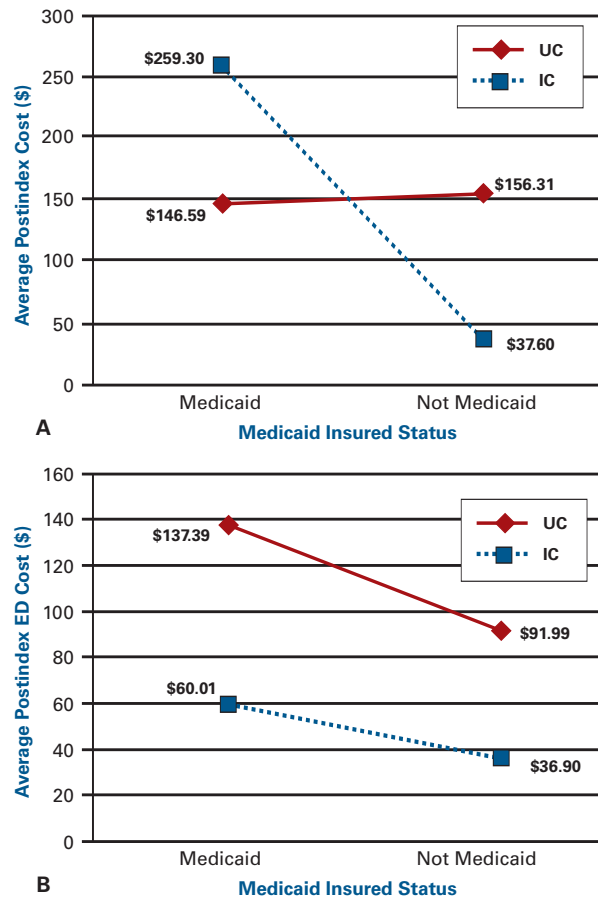
ED indicates emergency department; UC, usual care; IC, intervention care.

■ **Table 5.** Poisson Distribution Regression Main-effects Analysis Results for the Number of Psychiatric Outpatient Visits During the 6 Months Following the Initial ED Visit for Anxiety

Variable	Estimate (SE)	$\chi^2{}_1$ Value	P
Centered age	−0.22 (0.00)	29.14	<.001
Condition	0.37 (0.10)	14.36	<.001
Medicaid enrolled	−0.51 (0.12)	19.01	<.001
Gender	−0.31 (0.93)	10.86	.001
Condition-x-centered age	0.02 (0.00)	22.71	<.001
Condition-x-Medicaid enrolled	0.29 (0.11)	6.63	.01
Condition-x-gender	−0.55 (0.11)	25.43	<.001
Centered age-x-Medicare enrolled	−0.02 (0.01)	10.88	.001
Medicare enrolled-x-gender	0.39 (0.20)	3.96	.05
Medicaid enrolled-x-gender	0.55 (0.12)	21.41	<.001

ED indicates emergency department.

Take-away Points

■ Compared with health plan members assigned to usual care, members assigned to a stepped-care case management–based intervention demonstrated significantly fewer emergency department (ED) visits and lower associated facility costs during the 6 months following discharge from the ED with anxiety diagnoses.

■ The intervention resulted in an ED cost savings of $7.92 per member per month for psychiatric services during the 6-month study period.

■ Providing this intervention to all 607 members would have resulted in a total ED and psychiatric outpatient visit cost savings of $7.01 per member per month, or $25 530.42 during the 6-month study period.

including a larger number of participants to ensure that enough men are captured in the sample. Another limitation was that no proxy for severity of illness was included in the study. Previous utilization could not be used as a proxy because all members did not have equal length of HMO coverage before the index ED visit, making valid comparisons of preindex utilization difficult. Future studies should consider incorporating a severity-of-illness variable whenever possible.

An unexpected finding of this study was the effect of the 3-way condition-×-Medicaid enrolled-×-gender interaction on ED costs. Men enrolled in Medicaid who received the case management services had greater ED costs than men enrolled in Medicaid who did not receive the services. The nonsignificant mean differences between these groups were 0.42 ED visits and $18.79 facility costs PMPM. Women enrolled in Medicaid who received the case management services had significantly lower ED costs compared with men enrolled in Medicaid who received the case management services. The mean differences between these groups were 0.50 ED visits (t_{109} = 2.67, P < .01) and $33.22 facility costs PMPM (t_{109} = 2.87, P < .01). These statistically significant differences suggest that the intervention was more effective for women enrolled in Medicaid than for men enrolled in Medicaid. Women enrolled in Medicaid are perhaps more receptive to working with case management services; alternatively, men enrolled in Medicaid may have more intense mental health, medical, or substance abuse issues than women, requiring a more intense intervention. Although these results may help to identify members who are more likely to benefit from or are more receptive to the intervention, additional research is needed to examine the effects of gender and enrollment in Medicaid on the usefulness of the intervention for members with anxiety, particularly as there were only 110 members enrolled in Medicaid assigned to the IC group.

The overall results of this study demonstrate that a low-intensity and low-cost case management–based intervention can improve clinical and economic outcomes by successfully reducing the number of psychiatric ED visits and associated costs for members discharged from the ED with an anxiety diagnosis, without significantly affecting psychiatric outpatient visit costs. Through this intervention, the HMO was able to promote the efficient delivery of high-quality care by providing members with important healthcare information and improved access to available services. Based on these results, health plans should consider developing similar low-cost interventions for members discharged from the ED with an anxiety diagnosis. The effectiveness of similar interventions for members using the ED for other psychiatric conditions should be tested. In future interventions, investigators should take into account the effect of gender and insurance coverage in the design and operation of such interventions.

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