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Article

Correlation between mental health co-morbidity screening scores and clinical response in collaborative care treatment for depression

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ABSTRACT

The hypothesis for this paper is that adult patients who have higher screening scores for mental health co-morbidities and depression have a greater likelihood of not responding to treatment with collaborative care management (CCM) for their depression within six months.

For the 334 patients in this study, the primary endpoints were if the patient was in remission at six months (PHQ-9 score <5) or if they were non-responsive (NR) (PHQ-9 >50% of baseline score). Initial evaluation included screening for alcoholism (AUDIT), anxiety (GAD-7) and bipolar disorders (MDQ).

The differences in marital status, percentage of minority patients, gender, initial PHQ-9 and AUDIT scores were not statistically significant. Mood Disorders Questionnaire (MDQ) screening was more likely to be negative for the group in remission (96.2% vs 90.0%, *P*=0.049) and positive for the NR group (8.0% vs 2.1%, *P*=0.026). GAD-7 screening was significantly lower in the remission group (9.85) than in the NR group (11.53, *P*=0.009).

Results of multiple logistic regression analysis demonstrated that age, gender, race, marital status, PHQ-9 score and AUDIT score were not related to the odds of being NR. A one-point higher GAD-7 score was associated with approximately 6% higher adjusted odds of being NR. Patients with a positive MDQ were associated with elevated odds of non-response (adjusted OR=3.4714, *P*=0.044) when controlling for all other variables.

A higher initial screening score for anxiety or bipolar disorder is associated with a statistically significant increase in the relative risk of patients in CCM not responding to current treatments for depression within six months.

Keywords: collaborative care management, co-morbidity, depression

Introduction

Collaborative care management (CCM) for depression involves the primary care provider working with a specifically trained care manager and in liaison with psychiatry colleagues to improve clinical outcomes for the patient. Elements of CCM include a disease registry, treatment guidelines, appropriate clinical monitoring, coordination by care managers, weekly psychiatry oversight and relapse prevention consultation. The IMPACT and other studies[1–4] have shown a significant improvement in clinical out-

comes for depression management utilising CCM compared with usual care (UC). We have shown in a prior study a significant improvement in clinical response (73.5% vs 15.1%, $P<0.001$) and increased likelihood of remission (PHQ-9 score of <5) of their depression (59.4% vs 10.9%, $P<0.001$)[5] after six months among patients in CCM, while Star*D trials have suggested a remission rate of between 23% and 33% among patients with depression in general practice with UC.[6]

Unitzer *et al* demonstrated a significant decrease in healthcare costs for patients in CCM over a four-year period with, however, a noted increase in healthcare utilisation for the first two years.[7] In smaller implementation studies we have shown that there is a significant increase in healthcare utilisation of patients in CCM compared to UC. This increase in utilisation has been shown with regard to early outpatient clinic follow-up appointments[8] and a modest increase in six-month costs measures.[5] Further analysis has shown that a significant component of these changes in cost measures were related to those patients who did not respond clinically by six months.[9] However, this study was limited as it did not evaluate the mental health co-morbidities of the patients upon admission to the programme.

Anxiety has been shown to be associated with approximately 45% of patients diagnosed with depression[10,11] and with an increased duration of treatment as well as difficulty in obtaining remission.[12] The purpose of the study reported here was to assess the association between mental health co-morbidities and clinical response to CCM. The hypothesis is that depressed patients who have higher screening scores for mental health co-morbidities at the time of diagnosis have a greater likelihood of their depression not responding to treatment within the first six months while managed in CCM.

Methods

Adult patients who were seen by a physician or mid-level provider at one of two primary care clinics (total patient population 41 000) in Rochester, Minnesota and diagnosed with depression or dysthymia, who also had a PHQ-9 score of ten or greater were eligible to be enrolled in CCM. The providers were from the Division of Primary Care Internal Medicine and the Department of Family Medicine at Mayo Clinic, Rochester. The patient population is community based and approximately 50% are employees or dependents of the Mayo Clinic.

The patients who met the enrolment criteria were offered CCM. The initial evaluation by the nurse care manager included use of screening tools for alcoholism (AUDIT),[13] anxiety (GAD-7)[14] and bipolar disorder (MDQ).[15] The CCM process involves weekly oversight by a psychiatrist, with medication or therapeutic changes managed by the primary care provider. Patient contact is dictated by the clinical scenario and PHQ-9 testing; some are contacted weekly, others monthly. The PHQ-9 has been demonstrated to be an effective tool in screening and management of patients with depression.[16] With a maximum score of 27, a score of ten or greater with a positive response in five different areas correlates well with the diagnosis of major depression, with a sensitivity and specificity of 88%.[17] Remission is defined as a score of less than five and clinical response is defined as a decline of 50% or more in the PHQ-9 score from baseline.[18]

The dependent variables in this study were if the patient was in remission of depression at six months or NR to therapy (defined as a six month PHQ-9 score of >50% of baseline). The independent variables were age, initial PHQ-9 score, AUDIT score, GAD-7 score and MDQ score and range. MDQ range 1 was defined as a score of less than 6 and a negative response on questions 2 and 3; range 2 was defined as a score of more than 6 with question 2 or 3 as affirmative, or both affirmative and a score of between 0 and 6; and range 3 was a score of more than 6 with questions 2 and 3 as affirmative.

There were 434 patients who had completed at least six months of enrolment in CCM at the time of this study, and had completed the intake screening tools and a follow up PHQ-9. Patients with an incomplete data set for all the variables were excluded from further study, giving a cohort of 395 for analysis. Mann–Whitney testing was performed for numerical variables that were not in normal distribution. Variables in normal distribution were tested via *t*-test. Categorical variables were tested using chi-square analysis. Multiple logistic regression analysis was used to identify independent predictors of being a non-responder after six months when compared to those in remission. Included in the regression models were age, gender, marital status, race, initial PHQ-9 score, AUDIT score, GAD-7 score and MDQ range. Data was obtained from the database for the CCM project. The study was approved by the institutional review board.

Results

Treatment response of the 395 studied patients who were managed under the CCM model for depression was evaluated after six months. Of this cohort, 234 (59.2%) were in remission at six months (PHQ-9

score <5). Patients considered NR, with a six month PHQ-9 score greater than 50% of their baseline score, totalled 100 or 25.3%. Sixty-one patients (15.4%) demonstrated clinical response, but still had symptoms of their depression (PHQ-9 score of 5 or greater and less than 50% of baseline). Since the 61 patients in this grouping would not provide significant power for analysis and the patients in the remission and NR groups were most likely to clinically have significant differences, these patients who had a clinical response without remission were excluded from further evaluation, giving 334 patients for the study cohort.

The differences in marital status, percentage of minority patients, gender, initial PHQ-9 scores and AUDIT scores of the remission and NR groups were not statistically significant (Table 1). The ages of the two groups was statistically different at 43.75 vs 39.76 years (P=0.035), but not clinically significant. The MDQ range was more likely to be in range 1 for the group in remission (96.2% vs 90.0%, P=0.049) and in range 3 for the NR group (8.0% vs 2.1%, P=0.026). The GAD-7 screening score for the remission group was significantly lower at 9.85 compared with the NR group's score of 11.53 (P=0.009).

Results of multiple logistic regression analysis are shown in Table 2. Age, gender, race, marital status, initial PHQ-9 score and the AUDIT score were not related to the odds of being a non-responder. A one point higher GAD-7 score was associated with approximately 6% higher adjusted odds of being a non-responder. Patients within the highest MDQ range (range 3) were associated with elevated odds of non-response (adjusted OR=3.4714, P = 0.044) when controlling for all other variables.

Discussion

In prior studies we have shown that CCM for treatment of depression is more effective than UC.[5] However, there was an associated increase in initial outpatient clinical utilisation and cost measures.[5,8] Recently, we also have shown that those patients who do not clinically respond at six months have a significant impact on the increased costs of implementing CCM, whereas those patients who are in remission at six months are similar in cost measures to UC.[9]

This study demonstrated an increased relative risk of patients becoming NR after six months of CCM among those patients who had an increased GAD-7 score or at least a partially positive MDQ screening at their initial evaluation. This association between presence of co-morbid mental health disorder and treatment outcomes has been observed before.[19] It is interesting to note that the impact of co-morbid psychiatric disorder on treatment response in depression is still observed despite adaptation of a more structured chronic disease model such as

Table 1 Patients in collaborative care model of treatment for depression; those who are in remission at six months vs those who are non-responders to therapy

	Remission PHQ-9 score <5 *n*=234	Non-responders (NR) PHQ-9 score >50% of initial *n*=100	*P*
Age	43.75 (18–87)	39.76 (19–83)	0.035
Marital status (% married)	139 (59.4%)	60 (60.0%)	0.984
Race (% minority)	27 (11.5%)	9 (9.0%)	0.622
Gender (% female)	172 (73.5%)	75 (75.0%)	0.881
Initial PHQ-9 score	14.79 (10–27)	14.82 (10–27)	0.816
MDQ range 1 (negative)	225 (96.2%)	90 (90.0%)	0.049
MDQ range 2 (partially positive)	4 (1.7%)	2 (2.0%)	0.78
MDQ range 3 (positive)	5 (2.1%)	8 (8.0%)	0.026
AUDIT score	3.07 (0–29)	2.89 (0–28)	0.143
GAD-7 score	9.85 (0–21)	11.53 (0–21)	0.009 (*t*-test)

Table 2 Multiple logistic regression of non-responding patients versus those in remission using collaborative care management

	Adjusted odds ratio	CI	*P*
Age	0.9848	0.968–1.002	0.087
Gender (male vs female)	0.9012	0.503–1.615	0.727
Race (white vs non-white)	1.5595	0.685–3.549	0.290
Marital status (single vs married)	0.9171	0.550–1.529	0.740
Initial PHQ-9 score	0.9768	0.912–1.046	0.500
AUDIT score	0.9663	0.907–1.029	0.288
GAD-7 score	1.0571	1.006–1.111	0.029
MDQ range 1	1.0	1.00–1.00	
MDQ range 2	1.0927	0.187–6.387	0.922
MDQ range 3	3.4714	1.034–11.661	0.044

CCM. Since prior evaluations have shown that it is the non-responding patients who have a significant impact on the increase in cost metrics for CCM in the first six months,[9] determining the clinical characteristics and mental health co-morbidities that are predictive of becoming a non-responder at six months would be helpful in altering treatment plans and prioritising care. Results of this study have relevant implications for refining the model.

Future larger studies would be needed to confirm these results, and to prospectively evaluate outcomes using alternative management options with those patients at higher risk of not responding. There is already evidence in the literature that a model of collaborative care between mental health providers and primary care physicians is effective for a heterogeneous group of patients with common mental health disorders other than depression.[20,21]

This study may not be able to be generalised to other clinical sites. Since only 10.8% of the patient population indicated that they were in a minority group, this study was not designed to detect significant racial or ethnic group variations. Although not a variable studied, most patients had adequate healthcare insurance coverage and this study may not apply to those with little or no health insurance coverage. The population was all adults and cannot be generalised to a paediatric population. This study included practitioners in only one community and it may not be able to be generalised to other geographic sites or practitioners.

Conclusions

In patients who are in CCM for treatment of depression, increased initial screening scores for anxiety using GAD-7 or for bipolar disorder using MDQ are associated with a statistically significant increase in the relative risk of that patient not responding to current treatments for depression within six months.

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ETHICAL APPROVAL

This study was reviewed and approved by the Mayo Clinic Institutional Review Board.

CONFLICTS OF INTEREST

None.

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