Psychiatric Disease and Hypercholesterolemia in an Urban Academic Primary Care Clinic

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Background: There are limited data regarding the quality of cardiovascular risk reduction in primary care settings with a high prevalence of psychiatric disease.

Objective: To determine if there are differences in the rates of testing and treatment for hypercholesterolemia between patients with and without psychiatric disease.

Study Design: Cross-sectional chart review.

Patients: 197 adult patients of a hospital-based, academic primary care clinic.

Method: Medical records were reviewed for demographic information, documented psychiatric disease, cardiovascular risk factors, prescription for cholesterol-lowering medication, and a serum total cholesterol result within 5 years of the most recent clinic visit.

Results: Subjects with (N = 76) and without (N = 121) psychiatric disease had similar clinical and demographic characteristics (all $p > .05$) as well as rates of cholesterol testing (92% vs. 93%, $p = .91$). Neither diagnosis of hypercholesterolemia nor prescription for cholesterol-lowering medication were associated with psychiatric disease ($p = 1.00$ and $p = .34$, respectively). The mean serum total cholesterol was 15 mg/dL higher for patients with psychiatric disease than for those without ($p = .016$).

Conclusion: In this patient population, the presence of psychiatric disease was not associated with differential rates of hypercholesterolemia testing, diagnosis, or treatment. We observed higher mean serum total cholesterol levels in subjects with psychiatric disease. Further study is needed to examine the implications of our findings.

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One goal of Healthy People 2010 is the screening of all adults over age 20 for serum cholesterol levels at least once every 5 years in order to identify those at increased risk of cardiovascular events.[1] People with psychiatric diagnoses have worse cardiovascular outcomes, which may be partially attributable to poor quality of care in the acute setting.[2,3] In contrast, the literature has shown minimal disparities in the receipt of preventive services by this vulnerable population.[4–6] However, no data are available for patients of urban academic primary care clinics, where there is a high prevalence of mental illness.[7] We therefore compared patients with and without mental illness for rates of hypercholesterolemia testing and treatment in an urban academic primary care setting.

METHOD

We conducted a cross-sectional study of patients in the Medical Primary Care Unit (MPCU) of Rhode Island Hospital, an urban teaching hospital–based adult primary care practice with an annual visit volume of 20,000. Eligible subjects were aged 25 years or older and had received care in the MPCU at least once in 1998, once in 2002, and once between 1999 and 2001. All subjects received outpatient care from internal medicine residents or nurse practitioners under the supervision of general internal medicine faculty.

Data Collection

Data acquisition was by chart review. The hospital's Information Services Department generated a list of 450 medical record numbers based on the eligibility criteria described above. We requested 238 randomly selected outpatient medical records from the supplied list until enough records were available to reach adequate power to detect a 10% difference in screening rates between patients with and without a psychiatric diagnosis. A medically trained researcher (R.A.K.) reviewed 197 available charts according to the protocol described below.

We abstracted data from the demographic information, problem list, and the past medical history and medication list in the most recent clinic note in each subject's paper chart. Subjects were classified with psychiatric disease if the problem list or the most recent clinic note documented

a mood disorder, anxiety disorder, or thought disorder according to the diagnostic clusters of the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition.[8] Paper charts were reviewed for documentation of demographic information, cardiovascular disease, traditional cardiovascular risk factors including hypercholesterolemia, shared care with a mental health professional, and current prescriptions for psychotropic or cholesterol-lowering medications. The psychotropic medications that were included in the study were selective serotonin reuptake inhibitors, other antidepressant medications, anxiolytic medications, and typical as well as atypical antipsychotic medications.

We ascertained the receipt of 1 cholesterol test and the most recent serum total cholesterol value by laboratory data in the electronic medical record (EMR) and paper chart review. If a subject had no serum total cholesterol result in the EMR since its inception in July 1999, then we reviewed his or her paper chart from January 1998 to June 1999 for documentation of a cholesterol test and its numeric result.

The study protocol was approved by the Institutional Review Board (IRB) of Rhode Island Hospital.

Statistical Analyses

All statistical analyses were performed with SAS software, version 8.2 (SAS Institute, Cary, N.C.). We measured the prevalence of psychiatric diagnoses in the study population. Subjects with and without psychiatric disease were compared in univariate analyses using the Student t test for all continuous variables and the χ^2 test for all categorical variables. We also stratified the subjects with respect to treatment with cholesterol-lowering medications, testing for differences in serum total cholesterol both as a linear and dichotomous categorical variable.

In a post hoc sensitivity analysis, we compared subjects with a psychiatric diagnosis (N = 76) to those without a psychiatric diagnosis as well as without a current prescription for psychatric medication or treatment by a mental health professional (N = 114). There were no changes to the overall findings of the study, and the results are not presented here.

We used logistic regression to determine the odds of receiving a cholesterol test, a charted diagnosis of hypercholesterolemia, and prescription for cholesterol-lowering medication associated with psychiatric disease for age and gender. Another logistic regression model adjusted the odds of receiving medication for hypercholesterolemia given a clinical diagnosis of hypercholesterolemia associated with psychiatric disease for serum total cholesterol, age, and gender. Linear regression modeling estimated the difference in mean serum total cholesterol values for subjects with and without psychiatric disease, adjusting for age and gender. Serum total cholesterol values were also adjusted for psychiatric disease, age, gender, and treatment with cholesterol-lowering medication in a linear regression model.

Table 1. Baseline Characteristics of the Study Population

Characteristic	No Psychiatric Diagnosis (N = 121)	Psychiatric Diagnosis (N = 76)	p Value
Demographic			
Age, mean ± SD, y	60 ± 16	56 ± 14	.10
Female, N (%)	71 (59)	54 (71)	.08
Race, N (%)			.09
White	48 (40)	40 (53)	
Black	45 (37)	16 (21)	
Hispanic	23 (19)	18 (24)	
Other	5 (4)	2 (3)	
Primary language, N (%)			.76
English	84 (69)	58 (76)	
Spanish	25 (21)	15 (20)	
Other	7 (6)	3 (4)	
Missing	5 (4)	0 (0)	
Insurance, N (%)			.87
Medicare or Medicaid	103 (85)	64 (84)	
Private	12 (10)	9 (12)	
None	6 (5)	3 (4)	
Cardiac risk factors, N (%)			
Current tobacco use	35 (29)	31 (41)	.09
Hypertension	70 (58)	36 (47)	.15
Diabetes mellitus	36 (30)	18 (24)	.35
History of cardiovascular disease	32 (27)	13 (17)	.13
Mental health treatment, N (%)			
Psychiatric medications	7 (6)	54 (71)	< .001
Treatment by a mental health professional	3 (3)	28 (37)	< .001

RESULTS

Psychiatric disease was documented in 76 (39%) of 197 study subjects, of whom 58 (29%) had a mood disorder, 20 (10%) had an anxiety disorder, and 14 (7%) had a thought disorder. Sixteen subjects (21% of subjects with any psychiatric diagnosis and 8% of the total study population) had psychiatric diagnoses in more than 1 cluster of mental disorder.

No significant differences between the subjects with and without psychiatric disease were observed for demographic characteristics or cardiovascular risk factors (Table 1). As expected, the subjects with psychiatric disease did have a significantly higher prevalence of prescriptions for psychiatric medication and mental health treatment ($p < .001$).

In addition, 92% of subjects (70/76) with mental illness had been screened for hypercholesterolemia within 5 years, and 93% of subjects (112/121) without a psychiatric diagnosis had been screened ($p = .91$; Table 2). There were no significant differences in rates of a clinical diagnosis of hypercholesterolemia or prescription of cholesterol-lowering medication between the 2 groups in univariate analyses ($p = 1.00$ and $p = .34$, respectively). Adjustment for age and gender modestly increased the

Table 2. Odds Ratios of Hypercholesterolemia Screening, Diagnosis, and Treatment Comparing Patients With and Without Psychiatric Disease

Outcome	No Psychiatric Diagnosis (N = 121)	Psychiatric Diagnosis (N = 76)	Unadjusted OR (95% CI)	Adjusted OR[a] (95% CI)
Serum cholesterol test performed, N (%)	112 (93)	70 (92)	0.94 (0.32 to 2.75)	1.13 (0.35 to 2.64)
Diagnosis of hypercholesterolemia, N (%)	39 (32)	25 (33)	1.03 (0.56 to 1.90)	1.14 (0.60 to 2.17)
Cholesterol-lowering medication, N (%)	32 (26)	25 (33)	1.36 (0.73 to 2.55)	1.67 (0.86 to 2.65)

[a]Logistic regression model adjusting for age and gender.

Table 3. Association of Psychiatric Disease With Hypercholesterolemia

Outcome	No Psychiatric Diagnosis	Psychiatric Diagnosis	p Value
Total population tested (N = 182)	N = 112	N = 70	
Serum total cholesterol, mean ± SD, mg/dL	183 ± 41	198 ± 36	.016
Serum total cholesterol > 200 mg/dL, N (%)	33 (29)	33 (47)	.011
Serum total cholesterol > 240 mg/dL, N (%)	8 (7)	9 (13)	.20
Treated with cholesterol-lowering medication (N = 57)	N = 32	N = 25	
Serum total cholesterol, mean ± SD, mg/dL	177 ± 41	207 ± 40	.008
Serum total cholesterol > 200 mg/dL, N (%)	9 (28)	14 (56)	.03
Serum total cholesterol > 240 mg/dL, N (%)	2 (6)	6 (24)	.06
Not treated with cholesterol-lowering medication (N = 125)	N = 80	N = 45	
Serum total cholesterol, mean ± SD, mg/dL	186 ± 41	193 ± 33	.32
Serum total cholesterol > 200 mg/dL, N (%)	24 (30)	19 (42)	.13
Serum total cholesterol > 240 mg/dL, N (%)	6 (8)	3 (7)	.86

magnitude of the effect estimates for the odds of cholesterol testing and treatment associated with mental illness. However, the results remained statistically nonsignificant. Adjustment of the odds of treatment with cholesterol-lowering medication for serum total cholesterol, age, and gender also did not substantially change the effect estimate of the association with psychiatric disease (OR = 1.63, 95% CI = 0.83 to 3.20).

The mean ± SD serum total cholesterol value for patients with a psychiatric diagnosis was 198 ± 36 mg/dL and was 183 ± 41 mg/dL for those without a psychiatric diagnosis (p = .016). The unadjusted difference in serum total cholesterol value was 15 mg/dL (95% CI = 5 to 26) comparing those with and without a psychiatric diagnosis; after adjustment for age and gender, the value was 13 mg/dL (95% CI = 1 to 24). Additional adjustment of the serum total cholesterol value for treatment with cholesterol-lowering medications did not change the statistical significance of the association with psychiatric disease (mean difference = 13 mg/dL, 95% CI = 1 to 24).

Of the subjects tested for serum total cholesterol, stratification by cholesterol-lowering treatment status revealed that among subjects taking cholesterol-lowering medications, those with psychiatric disease had a higher serum total cholesterol than those without psychiatric disease (Table 3; p = .008). This difference is seen for mildly elevated cholesterol levels (p = .03) but not for frank hypercholesterolemia (p = .06). Among subjects not treated for hypercholesterolemia, there were no significant differences in serum total cholesterol levels (all p > .05).

DISCUSSION

In the patient population studied, cholesterol testing rates were very high and were not significantly different for patients with and without a documented psychiatric disease. Rates of treatment with cholesterol-lowering medication were also comparable. Serum total cholesterol levels were significantly higher for patients with psychiatric disease compared to those without.

This study validates and extends the findings of other investigations of health service disparities that affect the mentally ill. The observed rate of psychiatric disease is comparable to that demonstrated by Olfson et al.[7] in a demographically similar population. Prior studies have reported only modest differences across a range of preventive health services.[4–6,9,10] According to data from the Behavioral Risk Factor Surveillance Survey (BRFSS),[11] 71% of the U.S. adult population and 76% of adults in Rhode Island have had cholesterol screening within the past 5 years. Using National Health Interview Survey data, Iezzoni et al.[6] found that cholesterol testing rates in women with and without mental disorders were not significantly different and were comparable to the BRFSS data. The cholesterol testing rates found in the urban academic hospital–based outpatient population were higher than both national and statewide rates.[6,11] To date, there are no population-based studies with which to compare our findings of high rates of medication treatment for diagnosed hypercholesterolemia in people with and without psychiatric disease. Two possible explanations for the

high rates of cholesterol testing and treatment for patients with and without psychiatric disease include a well-developed process of care and the educational environment.

The finding of a statistically significant difference in total serum cholesterol between the 2 groups was consistent with previously described associations between elevated serum cholesterol and several mental disorders[12–14] as well as psychiatric medications.[15,16] Our study was not designed to explore alternative explanations for this difference, such as medication adherence or doses of cholesterol-lowering medication. The clinical significance of this observation is unclear because the mean total serum cholesterol levels of subjects both with and without psychiatric disease were below the 200 mg/dL cut point, above which borderline and overt hypercholesterolemia are defined.

Our study has a number of methodological limitations. One unblinded reviewer performed the data collection, which could introduce information bias. To minimize this possibility, we used a chart review algorithm defined a priori. The small proportion of subjects (4%) without a documented psychiatric diagnosis who were using psychotropic medication or mental health treatment supports our classification of psychiatric disease by chart diagnosis. Not all records requested were available, likely due to concurrent use by the primary care provider. It is unclear how the lack of chart availability would bias the findings of this study. Residual confounding may be a concern, as we were unable to assess health service utilization or the presence of alcohol or substance abuse from the medical records.[5] Differential patterns of health care utilization between those with and without psychiatric disease may be an important mediator for the receipt of cholesterol testing, which was not captured in this analysis. The limited sample size was also underpowered to detect small (< 10%) differences in testing rates between the 2 groups, as well as to do substantial modeling to adjust for differences in cardiovascular risk factors. However, there were no statistically significant univariate associations of psychiatric disease with sociodemographic or cardiovascular risk factors.

Because our study population included only adults seen in an urban academic primary care clinic on a longitudinal basis, our findings may or may not apply to patients who use this or similar clinics less frequently. The study inclusion criteria may have excluded those patients most at risk for inadequate treatment associated with psychiatric disease if the psychiatric illness contributed to a lack of continuous primary care. Although there is a body of literature that has found an association between low serum cholesterol and suicide risk,[17–19] there is little evidence that lowering serum cholesterol through pharmacologic treatment increases suicide risk.[20,21] It is also unlikely that the health care providers in this study were affected by the suicidality literature, given the high rates of cholesterol testing and cholesterol-lowering treatment found. Finally, because this was a cross-sectional study, we cannot assess the temporal relationship between psychiatric disease and testing rates or changes in serum total cholesterol.

In summary, in an urban academic primary care clinic population, there were no differences in cholesterol screening rates or treatment for hypercholesterolemia associated with a psychiatric diagnosis. The findings of this study suggest several avenues for future research. The high quality of care seen for most patients in the academic urban clinic regardless of psychiatric comorbidity is encouraging, and quality of care should be investigated in other settings. Preventive measures other than cardiovascular risk reduction could also be studied to determine the impact of health care delivery processes and mental illness on screening behaviors. Future studies may also determine the reproducibility and clinical significance of the statistically significant elevations in serum total cholesterol among subjects with psychiatric disease.

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