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Prevalence of Diagnosed Ocular Disease in Veterans with Serious Mental Illness

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Abstract

Objective—To compare the prevalence of diagnosed ocular disease and eye disease treatment between VA patients with and without serious mental illness (SMI).

Methods—Retrospective comparison of diagnosed ocular disease and treatment prevalence among patients with and without diagnosed SMI in fiscal year (FY) 2011 in the VA Capitol Health Care System (VISN 5).

Results—We identified 6,462 VA patients with SMI and 137,933 without SMI. The prevalence of diagnosed ocular disease was 22.7% in SMI patients and 35.4% in non-SMI patients ($P < 0.001$). Those with serious mental illness had a higher prevalence of glaucoma (10.2% vs. 7.1% $P < 0.0001$), cataract (12.6% vs. 9.2% $P < 0.0001$), and dry eye (4.0% vs. 2.7% $P < 0.0001$). 34.3% of SMI subjects had been seen in ophthalmology or optometry vs. 23.0% of controls ($P < 0.0001$).

Conclusion—VA patients with SMI have a greater prevalence of diagnosed ocular disease, particularly cataract, glaucoma, and dry eye. While SMI patients utilize eye care services at a higher rate than the general VA population, the majority of subjects with serious mental illness do

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Disclosures

The authors have no conflicts of interest.

not get recommended annual eye examinations. More consistent annual ocular screening among VA patients with SMI may be indicated.

Keywords

Ocular disease; Epidemiology; Severe Mental Illness; Cataract; Veteran; Glaucoma

1. Introduction

Compared to others of similar age, individuals with serious mental illness (SMI) are at potentially higher risk for ocular disease due to their greater exposure to certain risk factors, including cigarette smoking¹, metabolic syndrome and diabetes², and antipsychotic medications, which predispose them to both cataract³ and dry eye⁴. Indeed, prior research has shown that such individuals have a higher prevalence of visual impairment than the general population⁵, and smaller studies conducted without comparison groups indicate that this population has a high prevalence of ocular disease^{6,7}. For this reason, individuals with schizophrenia are recommended to have eye exams every two years until age forty after which the recommendation is for yearly examinations^{8,9}. To our knowledge, no prior work has evaluated the prevalence of diagnosed ocular diseases in any large and generalizable sample of individuals with SMI. Whereas individuals with SMI are known to have a higher rate of visual impairment, the prevalence of specific diagnosed ocular diseases and receipt of treatment for ocular disease have not been studied in large and generalizable U.S. population samples.

The Veteran's Administration (VA) treats greater than a quarter of a million patients with serious mental illness annually¹⁰. The number of VA patients with SMI has increased steadily in the past ten years and is projected to continue to increase with the influx of Veterans from Operations Enduring Freedom/Operation Iraqi Freedom and continuing operations¹¹. The rate of age-related eye disease is similarly increasing in the VA population.¹² Given the high prevalence of serious mental illness and the extensive diagnostic, procedure, pharmacy, and utilization data available, the VA system is an ideal place to study the diagnosed prevalence of ocular disease and utilization of eye care services in this potentially high risk population. The purpose of this study is to assess the prevalence of diagnosed ocular disease in VA patients with SMI and to assess the utilization of clinic visits, medications, and cataract extractions as compared to the general VA population.

2. Methods

Data for the study were obtained from the VA pharmacy and health care utilization databases for patients in the VA Capitol Health Care Network (VISN 5), the mid-Atlantic service region that encompasses Maryland and Washington DC, northern Virginia, and northeastern West Virginia. These areas are served by four VA hospitals and by a network of freestanding VA hospital-affiliated outpatient medical clinics. This study was approved by the Institutional Review Board of the University of Maryland School of Medicine and the VA Maryland Health Care System (VAMHCS) Research and Development Committee.

2.1 Sample Selection

To ensure that we included veterans that regularly followed up in the VA system, our analysis included all VA patients in the mid-Atlantic service region who had at least two contacts with the VA system in FY 2011. We divided this group between those with and without SMI. Patients with serious mental illness were identified using an algorithm established by the VA Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC).¹⁰ Using the diagnostic codes from inpatient and outpatient encounter data, we identified all VA patients with diagnoses of schizophrenia/schizoaffective disorder (ICD-9 codes 295.0-295.4 or 295.6-9), bipolar disorder (ICD-9 codes 296.0-1 or 296.4-8), or other diagnoses of psychosis (297.0-3, 297.8-9, 298.0-4, or 298.8-9) during fiscal year 2011¹⁰. Patients with SMI were included provided they had at least one qualifying diagnosis in inpatient or outpatient data for FY 2011. Controls were all patients who had at least two contacts with the VA system in FY2011 who were not determined to have SMI using the above criteria.

2.2 Variables/Risk Factors

Demographic and socioeconomic characteristics included age, race, gender, income, marital status, service connection, prescription copay, homelessness, which facility the patient was seen. Patients were classified as diabetic if they had had 2 inpatient or outpatient records with diagnostic codes of 250.0–250.9, 357.2, 362.0, or 366.41, a previously validated methodology.¹³

Ophthalmic diagnoses were abstracted from ICD-9 codes assigned at each eye clinic visit. We specified ophthalmic diagnoses of interest, focusing on cataract, ophthalmic complications of diabetes, and glaucoma. Dry eye syndrome was also examined. Cataract included all forms of cataract specified by the ICD-9 code 366.xx. Ophthalmic complications of diabetes were specified with ICD-9 codes for ophthalmic manifestations of diabetes (250.5x), nonproliferative (362.01, 362.03, 362.04, 362.05, 362.06) and proliferative diabetic retinopathy (362.02), and diabetic macular edema (362.07). Glaucoma included all forms of glaucoma, including glaucoma suspect and the ICD-9 codes included were 365.xx. Dry Eye Syndrome was also determined by ICD-9 codes (370.33, 370.34, 372.53, 375.15, and 710.20). We assessed the diagnosed prevalence of all ophthalmic diagnoses by using ICD-9 codes for all ophthalmic diagnoses (360.xx – 379.xx, 250.5x, 951.0, 951.1, 951.3). Eye care utilization was assessed by frequency of clinic visits to ophthalmology or optometry (VA clinic stop codes 407 and 408), prescription fills, and procedure utilization. Ocular medications were categorized using the VA pharmacy classification system¹⁴ and we specifically assessed if a VA patient had been prescribed at least one prescription fill of glaucoma medications (OP109), eye lubricants for dry eye (OP500), and overall ocular medication use (OPXXX). Frequency of cataract surgeries performed was determined from CPT codes (66850-66984) and ICD-9 procedure codes (13.2x-13.5x). Service connection in the VA system indicates that the diagnosis being treated is connected to the veterans' service and care related to that illness is covered by the VA insurance system. VA patients with greater than 50% service connection do not pay a prescription copay.

2.3 Statistical Analysis

Patients with SMI were compared to controls for all collected variables. For categorical variables, chi squared analysis was used, and for continuous variables independent student t-test was utilized. For ophthalmic diagnoses of interest, we stratified the diagnoses by age in five year intervals. Analysis of the prevalence of ophthalmic complications of diabetes was done for the entire sample as well as limited to patients diagnosed with diabetes. Multivariable analysis was completed for both ophthalmic diagnoses of interest and ophthalmic utilization, controlling for age, race, and presence of diabetes. Glaucoma, cataract, eye clinic utilization, medication utilization, and cataract surgery utilization were dependent variables and age, race, and presence of diabetes were independent variables. Ophthalmic complications of diabetes were assessed separately only among those who had a diagnosis of diabetes with independent variables of age and race.

3. Results

In FY 2011 there were 6,462 Veterans with serious mental illness (4.5 % of all veterans) treated in the VA Capitol Health Care Network and 137,933 Veterans treated who did not have serious mental illness. 2,287 (35.4%) patients with SMI versus 31,324 (22.7%) control patients had diagnosed ocular disease ($P < 0.001$). SMI patients were younger, more likely to be female, more likely to be African American, poorer, less likely to be married, had a high rate of service connection (and therefore lower prescription copay), more likely to be homeless, more likely to be treated in the VAMHCS, and more likely to be diabetic (Table 1).

When ICD-9 code 367.xx, disorders of refraction and accommodation were removed, the prevalence of diagnosed ocular disease in patients with SMI and controls was 28.7% and 19.7% respectively ($P < 0.0001$). Diagnosed glaucoma had a prevalence of 10.2% in the SMI group and 7.1% in the control group ($P < 0.001$) (Table 2). Similarly, diagnosed cataract had a prevalence of 12.6% and 9.2% in the SMI and control groups respectively ($P < 0.001$). 258 (4.0%) VA patients with SMI had dry eye syndrome compared to 3750 (2.7%) in the control group ($P < 0.0001$).

When cataract, glaucoma, and ophthalmic complications of diabetes were stratified by age (Table 3), patients with SMI had a higher prevalence of cataract and glaucoma in nearly every age category as compared to controls (Table 4). There was no significant difference in the two samples in any age group for ophthalmic complications of diabetes. When restricting this analysis of ophthalmic complications of diabetes to patients with diabetes, 135 (2.1%) diabetic patients with serious mental illness had ophthalmic complications of diabetes as compared to 2,773 (2.0%) of diabetic controls ($P = 0.660$).

Patients with SMI utilized eye care clinics more than those without SMI; 34.3% were seen in either optometry or ophthalmology clinics compared with 23.0% of those without SMI ($P < 0.0001$). Among subjects greater than 40 years of age, 37.6% were seen in eye clinic in FY2011 compared to 25.3% of those without SMI ($P < 0.0001$). On average, SMI patients had 0.6 +/- 1.4 visits to ophthalmology or optometry clinics in FY 2011 compared to 0.5+/- 1.3 for controls ($P < 0.0001$). Overall, 55 (0.9%) patients with SMI underwent cataract

extraction in FY2011 compared to 934 (0.7%) controls ($P = 0.097$). Conversely, patients with SMI had higher utilization of ophthalmic medications; 16.1% versus 9.9% of Controls ($P < 0.0001$). On average SMI patients had 1.0 \pm 4.1 ocular prescription fills in the study period compared to 0.6 \pm 3.0 for controls ($P < 0.0001$). Patients with SMI had higher utilization for glaucoma medications, lubricants, and all ophthalmic medications (Table 4).

In a multivariable regression analysis that controlled for age, race, and diabetic status, SMI was associated with a higher odds of having a diagnosis of both cataract (OR: 1.30, 95% CI 1.19, 1.42, $P < 0.0001$) and glaucoma (OR: 1.38, 95% CI 1.27, 1.49, $P < 0.0001$). Among patients with diabetes, patients with SMI had lower odds of being diagnosed with ophthalmic complications of diabetes (OR: 0.73, 95% CI 0.61, 0.88, $P < 0.0001$). Using multivariable regression, controlling for age, race, and diabetes, SMI was associated with a higher odds of eye clinic utilization (OR: 1.45, 95% CI 1.37, 1.54, $p < 0.0001$), medication utilization (OR: 1.61, 95% CI 1.5, 1.73, $p < 0.0001$), but not cataract surgery (OR: 1.14, 95% CI 0.86, 1.5, $p = 0.36$).

4. Discussion

This is the first study to examine the prevalence of diagnosed ocular conditions using administrative data in a sample of individuals with serious mental illness. VA patients with SMI have a higher prevalence of diagnosed ocular disease and have higher utilization of clinical eye care and ocular medications but do not have higher utilization of cataract surgery. Whether increased diagnosis is due to increased utilization since SMI patients may be more likely to be referred for ocular examination or due to increased prevalence of eye disease in this population due to environmental factors cannot be determined in the present study.

In a large, population-based sample in Finland, Viertio et al found that individuals with schizophrenia had five-fold higher odds of having visual impairment at distance and six-fold higher odds of having decreased near vision. They further found that those with schizophrenia were significantly less likely to have had their vision examined in the prior 5 years, and recommended regular ocular evaluations as part of physical monitoring for patients with psychotic disorders⁵. This is consistent with the recommendations of the expert panel at the Mount Sinai Conference in 2002. This group of experts in schizophrenia, obesity, diabetes, cardiology, endocrinology, and ophthalmology met at the Mount Sinai School of Medicine in New York in 2002 to develop recommendations for the systemic monitoring of patients with schizophrenia. They noted that “a reasonable frequency for visual (including slit lamp) monitoring is yearly for all patients with schizophrenia older than age 40 and every 2 years for younger patients⁹.” SMI patients have similar risk factors for ocular disease as those with psychosis. Given that the vast majority of our patients were older than 40, our study supports this recommendation for annual screening.

Our study found a high prevalence of cataract and glaucoma in severely mentally ill patients confirming findings of previous, smaller studies. In a study of 23 inpatients with schizophrenia, Smith et al found that nearly 70% had untreated visual problems. 5 patients (21.7%) had lens opacities or cataracts and 1 (4.3%) had glaucoma⁶. Maino et al.

retrospectively reviewed records of 48 patients with mental illness and found the prevalence of cataract and glaucoma to be 8.7% and 10.8% respectively⁷. The present study relied on coding and this may explain why rates were generally lower in the previous studies. Also, the age distributions were not the same, as our sample was generally older than these prior studies.

The higher rate of diagnosed cataract and glaucoma in patients with SMI exists despite the fact that these patients are younger overall than controls. When the data are age-stratified, patients with SMI had a higher prevalence of glaucoma and cataract in all age categories. One cannot conclude from these data whether or not the prevalence of these conditions is truly higher in the SMI population, however. Those with serious mental illness have a *higher* utilization of eye care clinic services as well as ocular medications in the VA system. This is consistent with national VA data that shows that SMI patients had more medical outpatient clinic visits and overall outpatient clinic visits than the general VA population per year^{10,15}

The higher rate of glaucoma could in part be explained by the higher propensity of those with SMI to have metabolic syndrome^{16,17}, as diabetes has been described as a potential risk factor for glaucoma¹⁸. However, the higher risk of glaucoma associated with diabetes is small and unlikely to fully explain the differences seen. Long term medication use may also play a role. Interestingly, recent evidence has shown that non-diabetic patients with schizophrenia have thinner nerve fiber layer than age-matched controls^{19, 20}. This may predispose patients to glaucoma or may make it appear as though these patients have glaucoma; both require further study. The higher rate of diagnosed cataract in patients with SMI may be due to increased eye service utilization in this population, higher rate of diabetes,^{16,17} exposure to cataractogenic antipsychotic medications³, or a combination of these factors. In a case-control study, McCarty et al found that the prevalence of anterior subcapsular cataract in patients with schizophrenia was 26%³. While Quetiapine has been implicated in cataract formation, this association is controversial²¹⁻²³.

While the prevalence of Type 2 diabetes in individuals with SMI is two to three times higher than in the general population,²⁴ we found SMI to be protective of ophthalmic complications of diabetes in our sample. This is consistent with prior work showing that individuals with both psychosis and diabetes have a lower risk for diabetic complications.²⁵ Though not completely understood, this may be because individuals with SMI have both better adherence to medication to treat diabetes as well as better glycemic control.²⁶⁻²⁹ Indeed, improving diabetes care for all VA patients would likely result in lower rates of diabetic retinopathy.

Patients with SMI were also found to have a higher rate of dry eye syndrome (4.0%) than controls (2.7%). This is consistent with the finding that VA patients on psychiatric medications have a higher risk for dry eye syndrome, second only to antihistamines⁴, and may be due to their anticholinergic effect. This would also explain why 9.5% of affected VA patients used medications from the category Eye Wash/Lubricants, which are dispensed through the VA pharmacy.

We also found that although patients with serious mental illness had a higher prevalence of cataract and higher utilization of clinic services as well as medications, they had an equal rate of utilization of cataract surgery, the most common ophthalmic surgery. This may be due to the higher utilization of eye care services among SMI patients creating a lead-time bias, where cataract is diagnosed earlier as compared to controls, prior to the need for surgical intervention. It may also be due to physician reluctance to do procedures on SMI patients. Such bias has been shown in surveys of physicians³⁰ and may play a role in disparities of care in this population.³¹⁻³² One can hypothesize that ophthalmologists may perceive that patients with SMI present a higher surgical risk due to potential hygiene issues or eye rubbing, despite that fact that there is no published evidence to support such perceptions.

Patients with SMI had a higher utilization of eye care, which reflects the VA's commitment to health care for this population. Greater than 90% of patients with SMI in our study were "Service connected" indicating that their care was in part or completely covered by the VA system. Furthermore, a significant number of them did not pay a prescription copay. This indicates that these patients have greater access to care than the overall VA population and may explain the higher utilization. Still, only 37.6 % of patients with SMI greater than 40 had been seen in optometry or ophthalmology in FY 2011. This rate is quite low given the recommendation that individuals with schizophrenia over 40 should have yearly eye exams. While this may be due to a general problem in VA service delivery it points to the need for greater awareness among treatment healthcare professionals about this recommendation. The limitations of this study are its retrospective design and focus on one region of the country. While it is possible that there is regional variation, our sample was ethnically diverse and included urban, suburban, and rural areas. The study relied solely on ICD-9 diagnosis codes to determine prevalence of ocular disease, so there may have been errors in diagnosis, reporting, or coding. Prior studies have shown that VA outpatient data, specifically for ophthalmology clinical data has a high level of agreement with the medical record³³. Our estimates of the increased risk of eye conditions among SMI subjects may be lower than one would find if comparison were made to non-veteran populations as control patients in this study likely included patients who did not have SMI as defined here but may have had other mental illnesses and may have had exposure to similar risk factors placing them at higher risk of ocular disease. Associations between diagnosis and utilization may be confounded by unrecognized illness or outcome-related factors associated with VA service utilization. Differences in symptom reporting between patients with SMI and those without SMI may affect utilization of services, but would not affect the rate of screening, which is noted to be relatively low.

VA patients with a SMI have a higher prevalence of diagnosed ocular disease, particularly cataract, glaucoma, and dry eye, than patients without a psychotic disorder. They also have greater utilization of eye care services, on average. Nevertheless, the majority of VA patients with serious mental illness do not receive yearly eye screenings. Further study is required to determine the effect of increased utilization of eye care services on estimated disease prevalence. These results indicate a potential need for more consistent annual ocular screening of veterans and other individuals with SMI.

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Highlights

VA patients with serious mental illness have a significantly higher rate of diagnosed ocular disease than those without SMI.

VA patients with SMI have a higher prevalence of diagnosed glaucoma, cataract, and dry eye as compared to those without serious mental illness.

VA patients with SMI utilize eye care services at a higher rate than the those without SMI, the majority do not get recommended annual eye examinations.

Table 1

Demographics of Veterans With and Without SMI

Variable		SMI (N=6,462)	Control (N=137,933)
Age *		54.7 ± 13.8	60.0 ± 17.0
Gender *	Male	5,573(86.4%)	121,674(88.2%)
Race *	White	2,938(48.9%)	15,939(53.4%)
	African American	2,994(49.8%)	13,404(44.9%)
	Other	78(1.3%)	527(1.8%)
Income *	Mean	18,727.0 ± 37,077.0	32,696.1 ± 59,154.1
Marital Status *	Married	1,752(28.7%)	66,287(56.0%)
Service Connection *		5,885(91.9%)	93,043(73.2%)
Exempt from Prescription Copay *		2,458(38.4%)	27,697(21.8%)
Homelessness *		1,192(18.4%)	4,589(3.3%)
VISN 5 facility *	Washington DC & W. Virginia	3,769(58.8%)	89,964(66.3%)
	Maryland	2,644(41.2%)	45,651(33.7%)
Diabetes *	Yes	1,597(24.7%)	26,067(18.9%)
Any Ophthalmic diagnosis *	Yes	2,287(35.4%)	31,324(22.7%)

* Statistically significant difference $P < 0.01$

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Table 2

Select ocular diagnoses among Veterans with and without SMI

Disease Category	ICD-9 Code	SMI (N=6,462)	Control (N=137,933)
Glaucoma *	365.xx	658(10.2%)	9,773(7.1%)
Ophthalmic Complications of Diabetes	250.5x, 362.01, 362.02, 362.03, 362.04, 362.05, 362.06, 362.07,	135(2.1%)	2,773(2.0%)
Cataract *	366.xx	817(12.6%)	12,712(9.2%)

* Statistically significant difference $P < 0.01$

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Table 3

Age stratified ocular diagnoses among veterans with and without SMI

Age Range	Total	Cataract			Glaucoma			Ophthalmic complications of Diabetes		
		SMI (817)	Control (12,712)	P	SMI (658)	Control (9,773)	P	SMI (135)	Control (2,773)	P
<=40	20,762(14.4%)	5(0.5%)	30(0.2%)	0.021	15(1.6%)	156(0.8%)	0.009	1(0.1%)	26(0.1%)	1.0
40-55	33,497(23.2%)	196(8.2%)	1,278(4.1%)	<0.0001	207(8.7%)	1,523(4.9%)	<0.0001	35(1.5%)	338(1.1%)	0.083
55-65	38,067(26.4%)	391(18.8%)	4,666(13.0%)	<0.0001	276(13.3%)	3,243(9.0%)	<0.0001	62(3.0%)	1,126(3.1%)	0.714
>65	52,257(36.0%)	225(21.6%)	6,738(13.2%)	<0.0001	165(15.8%)	4,908(9.6%)	<0.0001	37(3.5%)	1,283(2.5%)	0.036

Table 4

Ophthalmic medication utilization among veterans with and without SMI

Label	SMI (N=6,462)	Controls (N=137,933)
Antiglaucoma *	283(4.4%)	4,905(3.6%)
Eye Washes/Lubricants *	616(9.5%)	6,764(4.9%)
Any Ophthalmic Medication *	1,040(16.1%)	13,687(9.9%)
Mean number of Ophthalmic medication fills *	1.0 ± 4.1	0.6 ± 3.0

* Statistically significant difference $P < 0.01$

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