

Serious Mental Illness and Risk of New HIV/AIDS Diagnoses: An Analysis of Medicaid Beneficiaries in Eight States

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Objective: A longitudinal analysis was used to explore the relationship between diagnosis of serious mental illness and subsequent new diagnoses of HIV. **Methods:** Logistic regression was used to predict HIV/AIDS diagnoses in 2002–2004 among Medicaid beneficiaries in eight states (N=6,417,676) who were without HIV in 2001. Results for beneficiaries with and without serious mental illness, a substance use disorder, and psychiatric comorbidities in 2001 were compared. **Results:** After controlling for substance abuse or dependence and other factors, the analyses indicated that the odds of new HIV/AIDS diagnoses among beneficiaries with or without serious mental illness did not differ significantly. Compared with beneficiaries without a substance use disorder or serious mental illness, individuals with a substance use disorder but without serious mental illness were 3.1 times (OR=3.13, $p<.001$) more likely, and those with both substance abuse or dependence and serious mental illness were 2.1 times (OR=2.09, $p<.001$) more likely, to receive a new HIV diagnosis in 2002–2004. However, people with serious mental illness but without a substance use disorder in 2001 were 23% less likely (OR=.77, $p<.001$) than people without serious mental illness or a substance use disorder in 2001 to receive a new HIV diagnosis. **Conclusions:** After substance abuse or dependence was controlled for longitudinally, little independent association between serious mental illness and the risk of new HIV diagnoses was found. HIV-prevention services for low-income individuals should be delivered to all persons with serious mental illness, but especially those with comorbid substance use disorders. (*Psychiatric Services* 63:1032–1038, 2012; doi: 10.1176/appi.ps.201100342)

More than one million people in the United States are living with HIV (1). Despite recent increases in the total number of people with HIV, the annual number of new HIV infections (about 56,300 each year) has remained relatively stable,

and there have been calls to focus on the relevance of substance abuse and mental health factors to prevention (2).

The role of substance abuse in relation to these new infections is well documented. Studies have also examined various behaviors by people with

serious mental illness (bipolar disorder, major depressive disorder, or schizophrenia) or substance use disorders that may increase risk of HIV infection (3–7).

Although research has linked substance abuse and HIV infection, the extent to which serious mental illness increases risk of HIV infection is poorly understood. Some evidence suggests that individuals with serious mental illness are more likely than other persons to contract HIV infection, perhaps because of unsafe sexual practices (8–12) or greater likelihood of residence in impoverished communities with higher rates of HIV infection (13–15). An early study using merged Medicaid and New Jersey HIV/AIDS registry information from 1988–1996 found that individuals with HIV and serious mental illness were more likely to be injection drug users and to have substance use disorders (16).

In a national cross-sectional study of HIV infection among veterans with or without serious mental illness that used data from fiscal year 2002, Himelhoch and colleagues (17) introduced three other possibilities related to increased risk of HIV among people with serious mental illness. First, based on their finding that after adjustment for substance abuse and socio-demographic characteristics, persons with bipolar disorder were no more likely than those without serious mental illness to have an HIV diagnosis, they suggested the possibility that

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some forms of serious mental illness may not increase the probability of HIV diagnosis. Second, on the basis of their finding that people with schizophrenia were less likely than those without schizophrenia to have an HIV diagnosis in the absence of co-occurring substance abuse, they suggested the possibility that some forms of serious mental illness may decrease the probability of HIV diagnosis. Third, on the basis of a finding that individuals with both schizophrenia and substance abuse were more likely than those with neither schizophrenia nor substance abuse to have an HIV diagnosis, the authors suggested the possibility that serious mental illness may increase probability of HIV diagnosis only when substance abuse is also present.

In the absence of substance abuse (which is often elevated among those with serious mental illness), does a diagnosis of serious mental illness increase probability of HIV diagnosis among Medicaid beneficiaries? To address this question, we focused on the many low-income persons who rely often on Medicaid-funded services, given that these individuals are more likely than higher-income counterparts to have serious mental illness, HIV, or both (18,19).

Prior research on HIV infection among persons with serious mental illness has primarily been cross-sectional. This longitudinal analysis extended our earlier work by using data from the Medicaid Analytic Extract (MAX) data set for 2001–2004 from eight states. To determine whether individuals with a mental illness were more likely to develop HIV/AIDS, even after inclusion of control variables such as substance abuse, we examined rates of HIV diagnoses in 2002–2004 among beneficiaries with or without serious mental illness (schizophrenia, bipolar disorder, and major depressive disorder) and no HIV diagnosis in 2001.

Methods

We utilized MAX data (20) for all Medicaid beneficiaries in eight states (California, Florida, Georgia, Illinois, New Jersey, New York, Ohio, and Texas) over four years (2001–2004) (N=6,417,676). The eight states were

chosen for their size and their representation of the geography of the United States more generally (the East and West Coasts, the South, and the Midwest) and because they are areas of high prevalence for HIV/AIDS. The data set is maintained by the Centers for Medicare and Medicaid Services. Our analyses were limited to persons receiving care on a fee-for-service basis, given that data on medical encounters financed through managed-care plans are possibly incomplete. To focus on non-elderly, community-living adults with uninterrupted public health insurance, we selected only adults (ages 18–64 years) without long-term-care stays and with full-year Medicaid coverage (N=4,533,401).

Measures

Individuals' diagnoses were categorized on the basis of diagnoses assigned by service providers and recorded on claims with codes from the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* (Table 1). Only beneficiaries with at least one inpatient diagnosis of a serious mental illness or two outpatient diagnoses of the same serious mental illness in 2001 were identified as having a serious mental illness. This approach helped eliminate from analyses beneficiaries who may have been diagnosed erroneously or hastily as having a serious mental illness (for example, during a single, brief encounter or because of a coding error) by one outpatient service provider. If persons received a diagnosis of more than one type of serious mental

illness, we relied on a commonly used hierarchy. Beneficiaries with a schizophrenia diagnosis and a bipolar disorder or a major depressive disorder diagnosis were included in the schizophrenia category. Beneficiaries without schizophrenia who had diagnoses of bipolar disorder and major depressive disorder were included in the bipolar disorder category.

We also assessed psychiatric comorbidities, including substance use disorders, anxiety disorders, depression not classified as major depressive disorder (for example, dysthymia), and sexually transmitted disease other than HIV, because of their well-documented and common co-occurrence with serious mental illness. Anxiety was included as a comorbid illness instead of a serious mental illness because of its frequent co-occurrence with schizophrenia and mood disorder. The same requirement that beneficiaries be given one inpatient or two outpatient diagnoses also applied to diagnosis of co-occurring disorders, in 2001, and HIV, in 2002–2004. Data on demographic characteristics of beneficiaries were also taken from the MAX.

Analyses

Logistic regression was used to examine the bivariate associations between presence of serious mental illness in 2001 and the dependent variable, presence versus absence of HIV/AIDS in 2002–2004 among persons without HIV/AIDS in 2001.

We reported unadjusted odds ratios to describe the bivariate associations. Three models were estimated. The first model controlled for a binary

Table 1

ICD-9-CM codes of psychiatric and medical conditions found in claims submitted to Medicaid

Condition	<i>ICD-9-CM</i> code
Depressive disorders	
Major	296.2–296.3
Other	298.0, 300.4, 309.0, 309.1, 311
Bipolar disorders	296.0–296.1, 296.4–296.8, 301.13
Schizophrenia	295
Anxiety-related disorders	300
Alcohol-related disorders	291, 303
Drug-related disorders	292, 304, 305
HIV/AIDS	042–044, V08
Sexually transmitted disease	091–099, 614.0

variable indicating presence of serious mental illness. The second model controlled for the variable indicating presence of serious mental illness with or without a substance use disorder. The third model controlled for type of serious mental illness (schizophrenia, bipolar disorder, major depressive disorder, or none) with or without substance abuse or dependence (resulting in eight possible categories). In addition to using these models, we fit separate equations for presence of anxiety, presence of depression other than major depressive disorder, and presence of substance abuse or dependence to obtain unadjusted odds ratios.

Finally, we estimated three multivariate models that controlled for gender, age, ethnicity, dual eligibility with Medicare, presence of anxiety, and presence of depression other than major depressive disorder. The first model controlled for presence or absence of serious mental illness and substance use disorder. The second model controlled for their interaction, and the third model controlled for type of serious mental illness (schizophrenia, bipolar disorder, major depressive disorder, or none) and its interaction with substance abuse.

Results

At baseline (2001), 68.8% (N=3,118,916) of the study population were female, and 31.2% (N=1,414,475) were male; 4% (N=11,626) of women and 1.1% (N=16,079) of men were given diagnoses of HIV/AIDS in 2002–2004. At baseline, the sample was 36.8% (N=1,667,878) Caucasian, 21.2% (N=961,601) African American, 29.6% (N=1,340,453) Hispanic, and 12.4% (N=563,469) other ethnicities. In 2002–2004, .4% (N=6,848) of Caucasians, 1.4% (N=13,094) of African Americans, .3% (N=3,899) of Hispanics, and .7% (N=3,864) of persons of other ethnicities were diagnosed as having HIV.

The findings of the analyses are shown in Table 2. The results of model 1 showed that .6% of Medicaid beneficiaries without serious mental illness and .7% of Medicaid beneficiaries with serious mental illness in 2001 were diagnosed in 2002–2004 as having HIV. The slightly higher

proportion of individuals with HIV diagnoses among the beneficiaries with serious mental illness was not high enough to support the hypothesis of substantially elevated risk among those with serious mental illness, even on an unadjusted basis. Table 2 presents the adjusted odds of a new HIV diagnosis in 2002–2004 among beneficiaries with or without serious mental illness, substance abuse or dependence, anxiety disorder, depression other than major depressive disorder, and sexually transmitted disease in 2001. The analyses also controlled for gender, age, race-ethnicity, and dual eligibility with Medicare (data not shown). Even after inclusion of these control variables, people with diagnoses of serious mental illness in 2001 were 27% less likely than other people to be diagnosed in 2002–2004 as having HIV (OR=.73, $p<.001$).

In contrast, substance abuse or dependence was strongly associated with new HIV diagnoses. In 2002–2004, .52% of Medicaid beneficiaries without a substance use disorder in 2001 were diagnosed as having HIV, compared with 2.1% of those with a substance use disorder in 2001. Even after inclusion of control variables, people with substance abuse or dependence diagnoses were over three times more likely than other people to be diagnosed in 2002–2004 as having HIV (OR=3.06, $p<.001$).

Model 2 presents correlates of new HIV diagnoses in 2002–2004 among four groups of beneficiaries: those without a diagnosis in 2001 of either serious mental illness or substance abuse or dependence; those without serious mental illness but with a substance abuse or dependence diagnosis in 2001; those with serious mental illness but without a substance abuse or dependence diagnosis in 2001; and those with diagnoses of both serious mental illness and substance abuse or dependence in 2001. A total of .52% of Medicaid beneficiaries without either serious mental illness or a substance use disorder in 2001 were later diagnosed with HIV, compared with 2.3% of people with a substance use disorder only. HIV was diagnosed in 2002–2004 among 1.63% of beneficiaries with both disorders versus .51% of people with serious mental illness only.

After inclusion of control variables (gender, age, ethnicity, dual eligibility for Medicaid and Medicare, and diagnosis in 2001 of sexually transmitted disease, anxiety disorder, or depression other than major depressive disorder), beneficiaries with only substance abuse or dependence were more than three times as likely than beneficiaries with neither disorder to be later diagnosed as having HIV (OR=3.13, $p<.001$). In contrast, people with diagnoses of only serious mental illness in 2001 were 23% less likely to be later diagnosed as having HIV than people without either serious mental illness or substance use diagnoses (OR=.77, $p<.001$). Finally, beneficiaries with both disorders in 2001 were more than twice as likely as people with neither disorder to be later diagnosed as having HIV (OR=2.09, $p<.001$). [A figure depicting these odds ratios and nonoverlapping confidence intervals is available online as a data supplement to this report at ps.psychiatryonline.org.]

In model 3, the risk of new HIV diagnosis in 2002–2004 among people in eight diagnostic subgroups in 2001 (schizophrenia, bipolar disorder, major depressive disorder, and absence of serious mental illness with or without a substance use disorder) is shown. The results indicated that a diagnosis of substance abuse or dependence was consistently associated with a higher rate of new HIV/AIDS diagnoses independent of a diagnosis of serious mental illness; however, bivariate comparisons found that rates of new HIV/AIDS diagnosis among beneficiaries with or without each serious mental illness were similar if a substance abuse or dependence disorder was not present. The rate of subsequent HIV/AIDS diagnosis was 1.4% among beneficiaries with bipolar disorder and substance abuse; 1.5% among beneficiaries with schizophrenia and substance abuse; and 1.9% among beneficiaries with major depressive disorder and substance abuse. In contrast, the rate of subsequent HIV/AIDS diagnosis was below .60% among beneficiaries with any serious mental illness but no diagnosis of substance abuse or dependence.

A similar pattern was apparent in the multivariate analysis—substance

Table 2

Predictors of HIV/AIDS diagnosis in 2002–2004 among 4,533,401 Medicaid beneficiaries without HIV/AIDS in 2001^a

Predictor ^c	All beneficiaries		Beneficiaries with AIDS/HIV in 2002–2004 ^b		OR	95% CI	AOR	95% CI
	N ^d	%	N ^d	%				
Model 1								
Serious mental illness								
Yes	443,994	9.8	3,098	.7	1.16***	1.18–1.21	.73***	.70–.76
No (reference)	4,089,407	90.2	24,607	.6				
Substance abuse								
Yes	249,437	5.5	5,328	2.1	4.16***	4.03–4.28	3.06***	2.96–3.16
No (reference)	4,283,964	94.5	22,377	.5				
Sexually transmitted disease								
Yes	43,899	1.0	332	.8	1.24***	1.11–1.39	1.34***	1.20–1.50
No (reference)	4,489,502	99.0	27,373	.6				
Anxiety disorder								
Yes	195,672	4.3	1,409	.7	1.19***	1.13–1.26	.99	.93–1.05
No (reference)	4,337,729	95.7	26,296	.6				
Depression other than major depressive disorder								
Yes	206,467	4.6	1,773	.9	1.44***	1.37–1.51	1.17***	1.11–1.24
No (reference)	4,326,934	95.4	25,932	.6				
Model 2								
No serious mental illness								
No substance abuse (reference)	3,912,722	86.3	20,466	.5				
Substance abuse	176,685	3.9	4,141	2.3	4.56***	4.41–4.72	3.13***	3.03–3.25
Serious mental illness								
No substance abuse	371,242	8.2	1,911	.5	.98	.94–1.03	.77***	.73–.80
Substance abuse	72,752	1.6	1,187	2	3.15***	2.97–3.35	2.09***	1.96–2.22
Model 3								
Major depressive disorder								
Without substance abuse	130,788	2.9	738	.6	1.08*	1.00–1.16	1.12**	1.04–1.21
With substance abuse	21,921	.5	422	1.9	3.73***	3.39–4.12	3.04***	2.75–3.36
Bipolar disorder								
Without substance abuse	55,582	1.0	320	.6	1.10	.99–1.23	1.08	.97–1.21
With substance abuse	14,686	.3	205	1.4	2.69***	2.34–3.09	2.45***	2.13–2.82
Schizophrenia								
Without substance abuse	184,872	4.1	853	.5	.88***	.82–.94	.56***	.52–.60
With substance abuse	36,145	.8	560	1.5	2.99***	2.75–3.26	1.63***	1.50–1.78

^a Results of bivariate analyses (odds ratios [ORs]) and multivariate analyses (adjusted odds ratios [AORs]) are reported for each model. Model 1 controlled for serious mental illness and substance use disorder; model 2 controlled for the interaction of serious mental illness and substance use disorder, and model 3 controlled for type of serious mental illness and its interaction with substance use disorder. The analyses also controlled for gender, age, race-ethnicity, and dual eligibility versus Medicaid eligibility only. Results relating to sexually transmitted disease, anxiety disorder, and depression other than major depressive disorder are not shown for models 2 and 3 because they were similar to results for model 1. The first two rows of data in model 3, not shown, are identical to the first two rows of data in model 2. Both models have the same reference group. Beneficiaries with schizophrenia and bipolar disorder or major depressive disorder were included in the schizophrenia category, and those with bipolar disorder and major depressive disorder were included in the bipolar disorder category.

^b A total of 27,705 (.61%) received a diagnosis of HIV/AIDS in 2002–2004.

^c All predictors were assessed in 2001.

^d Ns vary due to missing data.

*p<.05

**p<.01

***p<.001

abuse or dependence was consistently associated with new HIV diagnoses in 2002–2004 (Table 2). Among people with major depressive disorder, those with substance abuse or dependence diagnoses were three times as likely (p<.001) as people without substance abuse or dependence to be diagnosed

as having HIV. Among people with bipolar disorder, those with substance use disorders were 2.5 times as likely (p<.001) as those without substance use disorders to be diagnosed as having HIV. Among people with schizophrenia, those with substance use disorders were 1.6 times as likely (p<.001) as

those without substance use disorders to be diagnosed as having HIV. In the absence of substance abuse or dependence, only major depressive disorder was associated with an increased risk of a new HIV diagnosis, but the increase (OR=1.12, p<.01) was relatively small.

People with schizophrenia and no substance abuse or dependence diagnosis had lower odds of receiving an HIV/AIDS diagnosis than people with neither serious mental illness nor substance abuse or dependence (OR=.56, $p<.001$). Among beneficiaries who had a substance use disorder, estimates of the odds of receiving an HIV/AIDS diagnosis among those who had major depressive disorder (OR=3.04, $p<.001$) and those without any serious mental illness (OR=3.13, $p<.001$) were found to overlap. The odds of receiving a new HIV/AIDS diagnosis (OR=1.63, $p<.001$) were lower among people with substance abuse or dependence and schizophrenia than among those with substance abuse or dependence but without serious mental illness (OR=2.09, $p<.001$); confidence intervals were nonoverlapping. A similar pattern was found for bipolar disorder; the odds of receiving a new HIV/AIDS diagnosis were lower among beneficiaries with bipolar disorder and a substance use disorder (OR=2.45, $p<.001$) than among beneficiaries with a substance use disorder and no serious mental illness (OR=3.13, $p<.001$); confidence intervals were nonoverlapping. [A figure depicting these odds ratios and confidence intervals is available online as a data supplement to this report at ps.psychiatryonline.org.]

These results indicated that after accounting for their higher rate of substance abuse, beneficiaries with major depressive disorder were at a slightly higher (12%) risk and those with schizophrenia were at a somewhat lower risk (23%) than those without serious mental illness of receiving an HIV/AIDS diagnosis. After adjustment for substance abuse, the analyses indicated that the risk of HIV/AIDS diagnosis among people with bipolar disorder and people without serious mental illness did not appear to differ.

Discussion

The findings underscored the link (21) between substance abuse and probability of HIV diagnosis, which was found even after adjustment for the presence of psychiatric diagnoses, sexually transmitted disease, demographic characteristics, and dual eligibility with

Medicare. However, in contrast to what might be anticipated on the basis of reports of associations between serious mental illness and HIV risk (22–25), we did not find serious mental illness diagnosis in the absence of substance abuse to be associated with increased risk of HIV/AIDS. In fact, only major depressive disorder seemed to confer such risk (12% increase). After adjustment for substance abuse or dependence diagnosis and demographic and selected other characteristics, the presence of bipolar disorder was not associated with higher odds of new HIV/AIDS diagnoses, and the presence of schizophrenia was associated with lower odds of new HIV/AIDS diagnoses.

It remains unclear whether behavioral factors associated with serious mental illness, other than those captured by a substance abuse or dependence diagnosis, also increase the risk of HIV/AIDS diagnoses. For example, evidence relating to whether people with serious mental illness have differing numbers or types of sex partners than other people is limited and contradictory (26,27), and our data contained no measures of sexual behavior. Although more research is needed, our study results merit consideration in developing, planning, and implementing HIV prevention services to low-income individuals with serious mental illness. Although interventions should be offered to all persons with serious mental illness (28), special attention should be paid to those with substance use disorders.

Consistent with the finding by Himelhoch and colleagues (17) in relation to U.S. Department of Veterans Affairs (VA) patients, Medicaid beneficiaries with schizophrenia and without a substance use disorder actually had reduced probability of having a diagnosis of HIV during a subsequent observation year compared with beneficiaries without serious mental illness or substance abuse or dependence. In addition, after control of substance abuse or dependence and other factors, our study, like the VA study, failed to find a difference in HIV rates of persons with bipolar disorder and those without serious mental illness.

Research to increase understanding of the differences in HIV infection

risk among low-income individuals with schizophrenia and mood disorder (major depressive disorder or bipolar disorder) is needed. In the absence of a diagnosis of substance use disorder, people with major depressive disorder and those with bipolar disorder had similarly slight or insignificant elevations in HIV infection risk, relative to individuals without serious mental illness. Thus the findings suggested that beneficiaries with a mood disorder and the general population of Medicaid beneficiaries had comparable HIV risk.

After adjustment for other factors, only people with schizophrenia seemed to differ substantially from the general population in the likelihood of infection (a 23% reduction in risk, relative to individuals without a diagnosis of mental illness or a substance use disorder).

Moreover, our results suggested that when a diagnosis of substance use disorder was present, the additional presence of serious mental illness did not seem to increase the risk of HIV infection. Thus practices, policies, or studies concerned with preventing HIV infection risk should continue to focus on substance abuse, and interdiagnostic differences exist and must be examined among people with both substance abuse and serious mental illness. The nonoverlapping confidence intervals in infection risk among individuals with schizophrenia versus bipolar disorder (greater risk in bipolar disorder) and among individuals with bipolar disorder versus either major depressive disorder or no serious mental illness (greater risk in the latter two) provide evidence for interdiagnostic differences in HIV risk.

It is unclear how to interpret our results. Although our findings are broadly consistent with those of Himelhoch (17), comparisons should be qualified by noting our reliance on a somewhat broader range of substance-related diagnoses, which may capture additional indications of problematic substance use. But all claims-based analyses are inherently limited because they require that a patient's substance-related problems come to the attention of clinician and meet criteria for a diagnosis. No information is available on important contextual

and behavioral information on substance use that may be particularly relevant to HIV risk. We are unable to make direct comparisons to findings based on standardized substance use scales. Nevertheless, the clinical plausibility of linkages between HIV risk and specific symptom profiles found in some patients with serious mental illness suggests further research is needed before any definitive conclusions can be drawn.

A possible role for historical factors should also be taken into account. In contrast to findings that were based on data from the 1990s, these data, like the 2002 Himelhoch (17) data, may reflect the success of prevention and other interventions among people with serious mental illness or may indicate that compared with others, this group as a whole does not have an elevated probability of HIV diagnosis.

Although prior work indicates that diagnostic information in Medicaid claims performs reasonably well in identifying the types of conditions that were the focus of this study (29–31), failure by providers to identify these conditions (false negatives) can result in misclassification. Conditions can also be erroneously identified by providers (false positives), although our use of the criterion of two outpatient diagnoses or one inpatient diagnosis likely reduced the extent of such misclassification. We were unable to confirm our diagnostic information with clinical testing, and we were unable to examine HIV testing rates or the characteristics of individuals who tested negative for HIV. In addition, data on stage and history of illness were unavailable.

Our finding that substance abuse is a major risk factor for HIV infection could be due in part to the increased likelihood of HIV testing found among people with mental illness who have substance abuse problems (32). The states used in our analyses were chosen to represent areas of high prevalence of HIV infection. The patterns found may not generalize to other areas, given that recent work has pointed to considerable geographic variability in associations between HIV and serious mental illness, perhaps reflecting variations in local epidemics of HIV among drug users

(33,34). We were unable to examine specific types of substance abuse (especially intravenous versus other drug use) because practitioners may have used overarching categories of substance abuse or dependence rather than make reliable use of specific diagnostic categories of substance abuse. Nevertheless, most studies on the links between HIV and serious mental illness that do not rely on cross-sectional or small localized samples lack most or all of this information. To our knowledge this is the first multistate study of Medicaid beneficiaries to examine how the presence of serious mental illness diagnosis in one year predicts presence of diagnosed HIV in a subsequent observation year.

Conclusions

Our findings have relevance for health services and policy planning (35). Although our results substantiated previous research linking substance abuse to HIV diagnosis, we found that in a large, geographically diverse population of low-income individuals, a severe mental illness diagnosis in the absence of a substance abuse diagnosis was not highly associated with increased risk of a new HIV/AIDS diagnosis. These results suggest that assessing and addressing substance abuse, and high-risk behaviors that may be associated with such abuse, are key to reducing HIV/AIDS risk among all persons with serious mental illness.

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