Published in final edited form as:
Psychiatr Serv. 2014 April 1; 65(4): 454–460. doi:10.1176/appi.ps.201200375.

Medicaid Lapses and Low Income Young Adults' Receipt of Outpatient Mental Health Care after an Inpatient Stay

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Abstract

Objective—This study examines low-income young adults' use of outpatient mental health services following an inpatient mental health stay, with a focus on Medicaid enrollment lapses and public mental health safety net coverage.

Methods—The sample included (N=1174) young adults ages 18 to 26 years who had been discharged from inpatient care in a mid-Atlantic state. All were Medicaid enrolled at the time of discharge and all were eligible for continued public mental health services regardless of Medicaid enrollment. Administrative claims data were used to examine outpatient mental health clinic use, psychotropic medication possession, inpatient readmission, and emergency department admission during the 365-day period following the index discharge. The main independent variable was a lapse in Medicaid enrollment. An instrumental variables regression model was used to minimize estimation bias due to unmeasured confounding between lapses and service use.

Results—Nearly a third (345 or 30%) of the young adults had an enrollment lapse. In instrumental variables analysis, those whose coverage lapsed were less likely to have had at least 2 clinic visits (38% versus 80%) and had a lower average psychotropic medication possession ratio (25% versus 55%) compared with persons who had continuous Medicaid.

Conclusion—Age-related Medicaid enrollment lapses are common and are associated with receipt of less clinical care post-discharge despite continued eligibility for public services. States

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should examine opportunities to assist young adults with serious mental health problems who are aging out of Medicaid enrollment categories for children.

Introduction

Some observers have expressed concern that many public mental health systems are not adequately addressing lapses in Medicaid insurance coverage among low income young adults with serious mental health problems (1, 2). Such lapses often occur when enrollees in Medicaid or the State Children's Health Insurance Program (SCHIP) “age out” of eligibility categories for children and do not immediately transition into an adult Medicaid category (3, 4). Medicaid lapses can result from loss of eligibility due to changes in income, assets, failure to meet the adult Medicaid standard of disability, or other factors. Many Medicaid enrollees fail to reapply at time of re-enrollment, obtain health insurance from another source and consequently drop Medicaid, or have their applications rejected for other administrative reasons (5, 6). Although Medicaid enrollment lapses would be expected to impede low income young adults' access to public mental health care providers, evidence substantiating this concern is scarce.

The transition from child Medicaid eligibility to narrower adult eligibility categories may result in loss of eligibility for many young adults over the age of 18 (3). The perception of an especially high rate of disenrollment in early adulthood is supported by limited evidence. Using data from all states, Czajka found that although 53% of Medicaid enrollees ages 19-64 had at least one enrollment lapse over a 3-year period, 85% of 18-year-old Medicaid enrollees had a lapse (5). Pullmann and colleagues (7), using Medicaid data from one state, examined Medicaid enrollment over a 7-year period for a cohort of Medicaid enrolled 16 year olds with mental health conditions, and found that the empirical survivor function for continued enrollment decreased sharply at ages 18 and 19.

A key concern with Medicaid lapses in this demographic group is that many low income young adults will become uninsured or will transition to private health plans or other public plans, which often include substantial consumer cost sharing for mental health care (8, 9). According to available estimates (3, 10), 64% to 76% of all young adults who lose Medicaid become uninsured. Cost sharing provisions among the minority of young adults who do obtain insurance coverage may deter their use of needed mental health services.

However, state and local “safety net” financing for public mental health care could in many cases offset the impacts of losing Medicaid coverage (11, 12). Many uninsured and even some privately insured low income young adults who meet state or local need criteria can qualify for receipt of public mental health services at minimal out-of-pocket expense. On the other hand, underuse of safety net coverage following a lapse in Medicaid enrollment could be common given young adults' variable attachment to services and providers (13-15). Research suggests few states have the organizational infrastructure needed to help young adults with serious mental health problems navigate age-related transitions in their coverage and care (13).

This study examines whether Medicaid enrollment lapses impact young adults' receipt of outpatient public mental health care following discharge from an inpatient mental health stay. The focus on an inpatient discharge sample was chosen because inpatient admission indicates a generally high level of need for outpatient mental health care and because many public mental health systems recognize recent psychiatric hospitalization as a criterion for priority access to public mental health services and medications. The study sample was drawn from Maryland's public mental health system, which is financed mostly by Medicaid with additional state and federal financing provided to county “core service agencies” for persons who are either uninsured or are underinsured (16). Maryland covers outpatient

mental health care following an inpatient psychiatric discharge for all public mental health system clients regardless of their Medicaid status (17). As a result, this study examines whether Medicaid enrollment lapses impacted young adults' receipt of mental health care despite the young adults having been eligible for safety net mental health coverage.

Data and Sample

The study sample included 1,183 persons ages 18 to 26 years old who had completed at least one episode of inpatient mental health care between October 1, 2005 and September 30, 2006 at either a general or a psychiatric hospital in Maryland and who had been enrolled in Medicaid as of the discharge date. Administrative claims data on these young adults' use of mental health care services were obtained from the State of Maryland, Mental Hygiene Administration. These data were merged with administrative data from the Department of Health and Mental Hygiene (i.e., from the state Medicaid agency) on non-mental health service use, medication prescriptions, and Medicaid enrollment. The merged dataset encompassed healthcare use financed by Medicaid plus any state-financed care provided by mental health care providers participating in the public system. Any privately financed service events, such as encounters resulting in claims to private health insurance plans or paid out-of-pocket, and any “free” care provided in federally qualified health centers were not captured. Exclusions were 6 persons who had incomplete Medicaid enrollment information, 1 who was dually enrolled in Medicare, and 2 who had no qualifying mental health diagnosis (International Classification of Disease, Version 9 codes 290 to 319 except 299 for autism spectrum), which left 1,174 in the analyses. The study was declared exempt from Institutional Review Board review by the Maryland Department of Health and Mental Hygiene and the [AUTHOR'S UNIVERSITY]

Methods

Empirical Model

The study period included the 180 days prior to the individual's index hospital discharge date and 365 days afterwards. The primary dependent variable was outpatient clinic use during the 365 post-discharge period. Outpatient clinics are staffed by licensed mental health clinicians, and generally provide medication management, counseling, and individual and group psychotherapy. The number of outpatient clinic visits was divided into three categories representing degrees of engagement and participation: 0 to 1 visits, 2 to 9 visits, and 10 or more visits. Completion of at least 2 visits was interpreted as a measure of engagement, while completion of 10 visits was considered a measure of sustained treatment participation. Results from empirical “dose-response” studies suggest that approximately 10 encounters are needed in order to achieve a clinically significant response among at least half of all clients (18). It has also been found that 70% of all premature treatment drop-out occurs after the first or second outpatient clinic visit (19). Additional dependent measures of mental health care use during the 365-day period post-discharge were a psychotropic medication possession ratio, an indicator of any inpatient mental health re-hospitalization, and an indicator of any psychiatric emergency department visits. The psychotropic medication possession ratio was calculated as the number of days of antipsychotics, antidepressants, mood stabilizers, and stimulants received divided by 365 days minus the number of days spent in inpatient hospital care. Ratio values exceeding 1.0 were assigned a value of 1.

The primary independent variable in the analysis was whether the young adult's Medicaid coverage lapsed (i.e., a transition from Medicaid enrolled to not enrolled) during the 365 days after discharge, operationalized as a 14-day or longer period not enrolled. A 14-day lapse was considered meaningful, as mental health clinic appointments after inpatient

discharge normally are at least bi-weekly. A sensitivity analysis was conducted using a more stringent definition of 30 days not enrolled.

Covariates

Covariates were chosen to represent predisposing, enabling, and need factors (20-22), both for continued Medicaid enrollment and for mental health services. Predisposing characteristics included patient age, sex, and race-ethnicity (23-26). Enabling factors included residence in an urban area (operationalized as Rural-Urban Commuting Area code 1, see (27)) and receipt of prenatal care (women only) during the180-day period prior to the index discharge date. Receipt of prenatal care was based on state vital statistics data.

In relation to need for continued Medicaid and mental health services, International Classification of Disease, Version 9 (ICD-9) diagnoses for mental health conditions during the 180-day pre-index period were used to code schizophrenia (295.x); bipolar disorder (296.0, 296.4–296.9); psychotic disorder NOS (297.1, 298.9); depression or dysthymia (296.2, 296.3, 300.4); mood disorder NOS (296.9, 311); and all other mental health codes (290.x-319.x except 299).

Medicaid claims data were used to identify for the 180-day pre-index period the five most frequent primary diagnoses in physical illness categories. These diagnoses were assigned to major condition categories using the Clinical Classifications Software (CCS) (28), which maps ICD-9 codes into 231 separate condition categories. An index, range from 0 to 5, was then created for the total number of unique CCS conditions for each person. A separate indicator was created for any alcohol or illicit substance use disorder diagnosis (ICD-9 304.x and 305.x excluding 305.1).

Measures of mental health utilization during the 180-day pre-index period were number of inpatient mental health bed days, number of outpatient mental health clinic days (based on Current Procedural Terminology codes 908XX), and receipt of a psychotropic medication prescription (i.e., any antipsychotic, mood stabilizer, antidepressant, or stimulant). Greater mental health utilization prior to the index inpatient discharge might indicate greater need for Medicaid and mental health care post-discharge.

The number of days a patient was enrolled in Medicaid during the pre-index period and the category of Medicaid enrollment as of the index discharge date were used as indicators of attachment to Medicaid. For the enrollment variable, Medicaid coverage groups were collapsed into three categories based on how a person qualified for Medicaid: disabled/foster care (included Supplemental Security Income, institutional care, and foster care enrollment categories), medically needy (included spend down and related enrollment categories for persons with chronic health care needs who did not meet income and asset tests for Medicaid disability categories), or low income families (included Temporary Assistance to Needy Families, Medicaid expansion categories for low income children and pregnant women, the State Children's Health Insurance Program, and other Medicaid state plan categories for low-income persons).

Estimation Approach

Outpatient clinic service use (0 or 1 visit, 2 to 9 visits, 10 or more visits) was estimated using two separate probability models. The first model was used to estimate the probability of 2 or more visits versus 0 or 1 visit. The second model was used to estimate the conditional probability of 10 or more visits conditional on having had 2 or more visits. The probit model form was used because dependent variables were binary-valued. Predictive margins were estimated for the adjusted probabilities of service use within each category when the Medicaid enrollment lapse indicator is either 0 (no lapse) or 1 (lapse), holding the

values of other covariates constant (29). “Marginal effects,” defined as the difference in these predictive margins (30), are also reported.

An instrumental variables regression approach (31-34) was used to protect against estimation bias due to unmeasured confounding between the likelihood of an enrollment lapse and mental health service use post-discharge. The key instrumental variable was a binary indicator for whether the young adult was either 18 or 20 years old as of the index discharge date. In Maryland, 19th and 21st birthdays are two important child-adult Medicaid transition dates. Young adults in households receiving income through the Temporary Assistance to Needy Families program, qualifying young adults with chronic health care needs who live with a low income parent, and children enrolled in foster care are generally covered by Medicaid until their 19th birthday or until their 21st birthday if their family incomes remain below statutory limits. Children who are disabled and receiving Supplemental Security Income generally are covered until two months past their 19th birthday, at which time some transition to adult Medicaid.

Results

Three-hundred fifty-six (30%) of the 1174 persons in the sample had an enrollment lapse during the 365 days after the index inpatient discharge. The mean number of days from discharge to the initial enrollment lapse was 183 days and the mean (±sd) number of days without Medicaid was 177±102 (median=185 days; inter-quartile range=83 to 256 days). Eight-one of the 356 whose enrollment lapsed (23%) re-enrolled in Medicaid during the 365-day post-discharge period. In this sub-group, the mean number of days not enrolled was 97 days.

Table 1 shows that compared with other young adults, those with an enrollment lapse were slightly younger (21.3±2.3 years versus 21.7±2.3 years; p=.008), were less likely to have received a schizophrenia diagnosis (21% versus 31%; p<.001), were more likely to have received a depression diagnosis (26% versus 20%; p=.026) or a mood disorder NOS diagnosis (15% versus 9%; p=.015), and had fewer physical illness diagnoses (2.0±1.9 versus 2.5±2.0; p<.001). They also used less mental health care across all categories, had fewer Medicaid enrollment days prior to discharge (122.0±71.8 days versus 151.3±56.7 days; p<.001), and were less likely to be enrolled at discharge in a Medicaid category for persons with disabilities or foster care (12% versus 54%; p<.001).

Table 2 contrasts the means of the study outcome variables over the 365-day post-discharge period, by enrollment lapse. Young adults with an enrollment lapse were more likely to have had either no clinic visits or only one visit compared to those with no enrollment lapse (49% versus 24%; F=70.0, df=1,1173, p<.001), and they were less likely to have completed 10 or more visits (21% versus 45%; F=74.2; df=1,1173; p<.001). They also had a lower average medication possession ratio (.2±.3 versus .6±.4; F=240.3, df=1,1173, p<.001) and were less likely to have been admitted to inpatient mental health (13% versus 31%; F=54.0, df=1,1173, p<.001) and to have been seen in psychiatric emergency department care (15% versus 32%; F=45.9, df=1,1173, p<.001).

Table 3 shows the regression estimates. Being age 18 or 20 at discharge was positively related to the likelihood of an enrollment lapse (F=26.2, df=1,1173, p<.001). In instrumental variables analyses, enrollment lapses were associated with a lower probability of completing at least 2 outpatient clinic visits (β=-1.3; z=-5.02, p<.001, CI=-1.9 to -.8) and with a lower average medication possession ratio (β=-.3; z=-2.45, p=.014, CI=-.5 to -.1). Enrollment lapses were not significantly associated with completing at least 10 outpatient clinic visits given at least 2 were completed (z=.65; p=.516), inpatient admission (z=-1.55, p=.121), or

emergency department admission (z=-.45, p=.652). By contrast, standard probit estimates indicated significant negative associations between enrollment lapses and service use for all outcomes. A sensitivity analysis, in which a lapse was defined as not enrolled at least 30 days (Table 4, lower section), yielded results similar to the main results.

The predictive margins listed on the right-hand side of Table 3 are useful for interpreting the regression coefficients. Persons with a Medicaid lapse had a predicted 38% chance of completing at least 2 outpatient mental health clinic visits compared with an 80% chance for persons with no lapse, a 42 percentage point difference. Similarly, the predicted medication possession ratio was 25% of days post-discharge for persons with a Medicaid lapse versus 55% of days post-discharge for persons with no lapse, a 30 percentage point difference.

Discussion

Thirty percent of low income young adults who had been hospitalized for a mental health condition experienced a lapse in Medicaid enrollment within a year of being discharged from the hospital. Having a Medicaid enrollment lapse was associated with a lower probability of completing at least 2 outpatient mental health clinic visits (38% versus 80%) and with a lower rate of psychotropic medication possession (25% of days versus 55% of days) during the first 365 days post-discharge from psychiatric inpatient care, compared with having continuous Medicaid enrollment.

Although the findings that leaving Medicaid is related to less use of outpatient mental health clinic services and a lower psychotropic medication possession ratio may not be surprising, this sample is unusual in that all of these young adults were eligible to receive outpatient public mental health services and psychotropic medication following their discharge regardless of their eligibility for Medicaid. This suggests that inability to pay was not the predominant reason why young adults who left Medicaid received less care.

Most of these young adults, all of whom had had a mental health hospitalization, presumably needed outpatient mental health care during the year following discharge. Young adults with enrollment lapses might have on average differed from other young adults in relation to their propensity to engage with the mental health treatment system. Previous research indicates that failure to engage in outpatient mental health care is not consistently related to lower service need (15, 35), but is consistently associated with having substance use problems, psychiatric comorbidity, and difficulties forming a treatment alliance with a provider (15, 18, 35). Moreover, data from national epidemiological surveys indicate that young adults with serious mental illness are, in general, less likely to use services compared to adults in other age groups (36) and commonly do not participate in any treatment for months or years after illness symptoms begin (37).

Various incidental factors could also have influenced decisions not to use mental health services among those whose Medicaid enrollment lapsed. Some might not have known they were eligible for public mental health services. The loss of child Medicaid benefits could also have coincided with other life transitions (38), which may have further complicated continuation of outpatient care. Evidence from qualitative research (39) also suggests that even the modest requirement to contact a provider and complete an application for public coverage could have deterred some young adults from seeking care. There may

Mental health service use that occurred outside the public mental health system, which was not measured, could also partially or fully account for the negative association found between enrollment lapses and mental health services utilization. Some young adults could have obtained mental health care for free or on a sliding scale from federally qualified

healthcare centers or other public clinics, some may have obtained private insurance coverage, and some may have moved to another state.

However, we think that the bias introduced by measurement error is unlikely to threaten the validity of our findings. Former Medicaid enrollees and young adults are among the least likely groups to obtain private health insurance coverage (3, 8, 40). Moreover, among low income young adults, research indicates that private health insurance coverage may not improve receipt of specialty mental health care compared to being uninsured (14), perhaps because private insurance usually only partially covers mental health care costs (9, 10).

Young adults with a Medicaid enrollment lapse were found to have a lower rate of inpatient readmission, used fewer outpatient clinic services, and received fewer medications within the first year after the index hospital discharge compared to young adults with no enrollment lapse (Table 2). These differences do not by themselves indicate quality-of-care differences in the services provided to the two groups. Moreover, an examination of mental health service use over time intervals less than or greater than the one-year interval used in this study may have had different implications for service use and quality of care. Rather, the differences in service use suggest that the enrollment-lapse group is distinct and consequently may have distinct needs for post-hospitalization guidance and support services.

This study used an instrumental variables regression approach to minimize self-selection bias. In contrast to standard regression, the instrumental variables approach sets up a contrast of persons with higher versus lower probabilities of a Medicaid enrollment lapse, where the probability of a lapse is proportional to the young adult's age at inpatient discharge. Young adults whose age at discharge was age 18 or 20 were more likely to have had a enrollment lapse during the subsequent 365 days than persons whose age at discharge was 19 or 21 to 26 but may have been similar to other young adults in relation to other determinants of service use. Differences between the instrumental variables estimates and the standard regression estimates (Table 3) suggests that standard regression estimates were sensitive to selection bias, and may have resulted in either overestimation or underestimation of the impact of continuous Medicaid enrollment, depending on the study outcome variable.

Conclusion

Medicaid coverage commonly lapses as young adults with serious mental health problems cross age thresholds associated with transitions from child to adult Medicaid eligibility. Discontinuities in Medicaid coverage may impede these young adults' engagement in outpatient mental health programs and receipt of psychotropic medications, even among young adults who have recently been discharged from a hospital and are eligible for continued public mental health “safety net” services. This raises the additional prospect of logistical challenges for health care planners once mandatory insurance coverage provisions of the 2010 Affordable Care Act are implemented. Seriously ill young adults who transition onto and off of Medicaid and health insurance exchange plans may experience service disruptions and require formal supports to help them negotiate such transitions. This study's results suggest states should examine opportunities to bolster care coordination supports for acutely ill young adults during periods of heightened Medicaid and service transition.

References

1. Davis, M.; Green, M.; Hoffman, C. The service system obstacle course for transition-age youth and young adults. In: Clark, HB.; Unruh, D., editors. Transition of Youth and Young Adults with Emotional Or Behavioral Difficulties: An Evidence-Based Handbook. Baltimore, MD: Paul H. Brookes Co.; 2009.

2. Davis, M.; Koroloff, N. The great divide: How public mental health policy fails young adults. In: Fisher, WH., editor. Research on Community-Based Mental Health Services for Children and Adolescents (Research in Community and Mental Health, Volume 14). Bingley, UK: Emerald Group Publishing; 2006.
3. Schwartz, K.; Damico, A. Aging Out of Medicaid: What is the Risk of Becoming Uninsured?. Washington, DC: Kaiser Commission on Medicaid and the Uninsured, The Henry J. Kaiser Family Foundation; 2010.
4. Fishman E. Aging out of coverage: young adults with special health needs. Health Affairs. 2001; 20:254–266. [PubMed: 11816666]
5. Czajka, JL. Final Report. Washington, DC: Mathematica Policy Research; 2012. Medicaid Enrollment Gaps, 2005 to 2007.
6. Hill, I. Occasional Paper Number 67. Washington, DC: Urban Institute; 2003. Is there a hole in the bucket? Understanding SCHIP retention.
7. Pullmann MD, Heflinger CA, Mayberry LS. Patterns of Medicaid disenrollment for youth with mental health problems. Medical Care Research and Review. 2010; 67:657–675. [PubMed: 20555015]
8. Goldman HH, Frank RG, Burnam MA, et al. Behavioral health insurance parity for federal employees. New England Journal of Medicine. 2006; 354:1378–1386. [PubMed: 16571881]
9. Zuvekas SH. Trends in mental health services use and spending, 1987-1996. Health Affairs (Project Hope). 2001; 20:214–224. [PubMed: 11260946]
10. Sommers BD. Loss of health insurance among non-elderly adults in Medicaid. Journal of General Internal Medicine. 2009; 24:1–7. [PubMed: 18810555]
11. Hogan MF. The public sector and mental health parity: time for inclusion. The Journal of Mental Health Policy and Economics. 1998; 1:189–198. [PubMed: 11967396]
12. Goldman HH, Grob GN. Defining ‘mental illness’ in mental health policy. Health Affairs. 2006; 25:737–749. [PubMed: 16684739]
13. Davis M, Geller J, Hunt B. Within-state availability of transition-to-adulthood services for youths with serious mental health conditions. Psychiatric Services. 2006; 57:1594–1599. [PubMed: 17085607]
14. Ringeisen H, Casanueva C, Urato M, et al. Mental health service use during the transition to adulthood for adolescents reported to the child welfare system. Psychiatric Services. 2009; 60:1084–1091. [PubMed: 19648196]
15. O'Brien A, Fahmy R, Singh SP. Disengagement from mental health services. Social Psychiatry and Psychiatric Epidemiology. 2009; 44:558–568. [PubMed: 19037573]
16. Hepburn B. Update on Maryland's Public Mental Health System. Maryland Psychiatrist. 2003; 29(2):12–14.
17. [accessed 12, 2012] Value Options: Maryland's Public Mental Health System Provider Manual, Ch. 3. maryland.valueoptions.com
18. Hansen NB, Lambert MJ, Forman EM. The Psychotherapy Dose-Response Effect and Its Implications for Treatment Delivery Services. Clinical Psychology: Science and Practice. 2002; 9:329–343.
19. Olfson M, Mojtabai R, Sampson NA, et al. Dropout from outpatient mental health care in the United States. Psychiatric Services. 2009; 60:898–907. [PubMed: 19564219]
20. Aday LA, Andersen R. A framework for the study of access to medical care. Health Services Research. 1974; 9:208–220. [PubMed: 4436074]
21. Agency for Healthcare Research and Quality. Medical Expenditure Panel Survey Household Component Data, 2003. MEPSnet/HC. 2006
22. Gelberg L, Andersen RM, Leake BD. The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. Health Services Research. 2000; 34:1273–1302. [PubMed: 10654830]
23. Bartels SJ, Clark RE, Peacock WJ, et al. Medicare and Medicaid costs for schizophrenia patients by age cohort compared with costs for depression, dementia, and medically ill patients. American Journal of Geriatric Psychiatry. 2003; 11:648–657. [PubMed: 14609805]

24. Dickey B, Azeni H. Persons with dual diagnoses of substance abuse and major mental illness: their excess costs of psychiatric care. American Journal of Public Health. 1996; 86:973. [PubMed: 8669521]
25. Goldstein JM, Tsuang MT. Gender and schizophrenia: An introduction and synthesis of findings. Schizophrenia Bulletin. 1990; 16:179–183. [PubMed: 2374879]
26. Cooper LA, Gonzales JJ, Gallo JJ, et al. The acceptability of treatment for depression among African-American, Hispanic, and white primary care patients. Medical Care. 2003; 41:479–489. [PubMed: 12665712]
27. WWAMI Rural Health Research Center. [accessed November 1, 2011] Rural-urban commuting area codes. http://depts.washington.edu/uwruca/index.php
28. Elixhauser A, McCarthy EM. Clinical Classifications for Health Policy Research, Version 2: Hospital Inpatient Statistics, 1995. Healthcare Cost and Utilization Project (HCUP 3). 1996 Resarch Note 1, AHCPR Pub. 96-0017.
29. Graubard BI, Korn EL. Predictive margins with survey data. Biometrics. 2004; 55:652–659. [PubMed: 11318229]
30. Christofides LN, Stengos T, Swidinsky R. On the calculation of marginal effects in the bivariate probit model. Economics Letters. 1997; 54:203–208.
31. Angrist J, Imbens G, Rubin D. Identification of causal effects using instrumental variables. 1996; 91(434):444–455.
32. Hogan JW, Lancaster T. Instrumental variables and inverse probability weighting for causal inference from longitudinal observational studies. Statistical Methods in Medical Research. 2004; 13:17–48. [PubMed: 14746439]
33. Angrist JD, Krueger AB. Instrumental variables and the search for identification: From supply and demand to natural experiments. Journal of Economic Perspectives. 2001; 15:69–85.
34. Heckman JJ. Randomization as an instrumental variable. The Review of Economics and Statistics. 1996; 78:336–341.
35. Kreyenbuhl J, Nossel IR, Dixon LB. Disengagement from mental health treatment among individuals with schizophrenia and strategies for facilitating connections to care: A review of the literature. Schizophrenia Bulletin. 2009; 35:696–703. [PubMed: 19491314]
36. Wang PS, Demler O, Kessler RC. Adequacy of treatment for serious mental illness in the United States. American Journal of Public Health. 2002; 92:92–98. [PubMed: 11772769]
37. Wang PS, Berglund P, Olfson M, et al. Failure and delay in initial treatment contact after first onset of mental disorders in the National Comorbidity Survey Replication. Archives of General Psychiatry. 2005; 62:603–613. [PubMed: 15939838]
38. Davis M, Vander Stoep A. The transition to adulthood for youth who have serious emotional disturbance: developmental transition and young adult outcomes. Journal of mental health administration. 1997; 24:400–427. [PubMed: 9364110]
39. Mitchell AJ, Selmes T. Why don't patients attend their appointments? Maintaining engagement with psychiatric services. Advances in Psychiatric Treatment. 2007; 13:423–434.
40. Cohen RA, Martinez ME. Health insurance coverage: Early release of estimates from the National Health Interview Survey. Jan-Mar;2011

Psychiatr Serv. Author manuscript; available in PMC 2014 October 01.

Table 1

Sample characteristics

Characteristic	Overall N=1174 N	%	No Lapse N=818 N	%	Lapse N=356 N	%	p
Male, %	577	49	398	49	171	50	.954
Age in years, mean±sd	21.6±2.3		21.7±2.3		21.3*±2.3		.008
Race/ethnicity, %							
black, non-Hispanic	546	47	391	48	155	43	.203
white, non-Hispanic	539	46	372	45	167	47	.705
Other	89	8	55	7	34	10	.115
Urban residence, %	972	83	689	84	283	79	.058
Mental health diagnosis, %							
Schizophrenia	326	28	251	31	75	21*	<.001
Bipolar disorder	380	32	273	33	107	30	.431
Psychosis NOS	44	4	26	3	18	5	.154
Depression/dysthymia	251	21	160	20	91	26*	.026
Mood disorder NOS	129	11	77	9	52	15*	.015
Other mental health	44	4	31	4	13	4	.913
Substance use disorder diagnosis, %	116	10	83	10	33	9	.590
Physical illness diagnoses, mean±sd	2.3±2.0		2.5±2.0		2.0*±1.9		<.001
Any prenatal service use pre-discharge, %	135	12	107	13	28	8*	.005
Mental health care use pre-discharge							
Inpatient (acute) bed days, mean±sd	.2±1.9		.2±2.1		.2*±1.3		<.001
Outpatient clinic days, mean±sd	4.9±8.1		5.7±8.7		3.1*±6.3		<.001
≥1 psychotropic prescriptions, %	523	45	437	53	86	24*	<.001
Medicaid enrollment days pre-discharge, mean±sd	142.1±63.0		151.3±56.7		122.0*±71.8		<.001
Medicaid enrollment category at discharge							
Disabled/foster care	485	41	444	54	41	12*	<.001
Low income family	261	22	128	16	133	37*	<.001

Characteristic	Overall N=1174		No Lapse N=818		Lapse N=356		
	N	%	N	%	N	%	p
Medically needy low income	428	36	246	30	182	51*	<.001

*Different from no lapse at p<.05

[a]Proportional and mean differences between lapse and no lapse groups were tested with F, $df_{1,2}$=1,1173

Psychiatr Serv. Author manuscript; available in PMC 2014 October 01.

Table 2

Mental health services use during the first 365 days after the index discharge

	Overall N=1174		No Lapse N=818		Lapse N=356		F	
Dependent variable	**N**	**%**	**N**	**%**	**N**	**%**	**df=1,1173**	**p**
Outpatient clinic visits								
0 or 1 visits	372	32	196	24	176	49*	70.0	<.001
2 to 9	359	31	254	31	105	29	.3	.593
10 or more	443	38	368	45	75	21*	74.2	<.001
Medication possession ratio, mean±sd	.5±.4		.6±.4		.2*±.3		240.3	<.001
Inpatient admission	296	25	250	31	46	13*	54.0	<.001
Emergency department admission	313	27	260	32	53	15*	45.9	<.001

*Different from no lapse at p<.05

Table 3

Regression estimates of service use, first 365 days after the index discharge, N=1174 [a]

					Predictive Margin		
Model/Dependent variable	**β**	**z**	**p**	**95% CI**	**No Lapse**	**Lapse**	**M.E. %** [b]
Enrollment lapse ≥14 days							
Instrumental variables probit [c]							
Outpatient clinic visits ≥2					80	38	-42
reference: 0 or 1 visit	-1.3**	-5.02	<.001	-1.9 to -.8			
Outpatient clinic visits ≥10,							
reference: 2 to 9 visits [d]	.4	.65	.516	-.9 to .6	48	64	16
Medication possession ratio	-.3*	-2.45	.014	-.5 to -.1	55	25	-30
Inpatient admission	-.8	-1.55	.121	-1.8 to -.2	32	12	-20
Emergency department admission	-.3	-.45	.652	-1.5 to .9	29	21	-8
Standard probit [e]							
Outpatient clinic visits ≥2					74	56	-18
reference: 0 or 1 visit	-.6**	-6.05	<.001	-.8 to -.4			
Outpatient clinic visits ≥10,							
reference: 2 to 9 visits [d]	-.4**	-3.29	.001	-.6 to -.2	55	51	-4
Medication possession ratio	-.2**	-10.61	<.001	-.3 to -.2	53	30	-23
Inpatient admission	-.4**	-3.63	<.001	-.6 to -.2	28	17	-11
Emergency department admission	-.4**	-3.34	.001	-.6 to -.1	29	19	-10
Enrollment lapse ≥30 days							
Instrumental variables probit [c]							
Outpatient clinic visits ≥2					80	35	-45
reference: 0 or 1 visit	-1.4**	-5.55	<.001	-1.9 to -.9			
Outpatient clinic visits ≥10,							
reference: 2 to 9 visits [d]	.5	.68	.497	-.9 to 1.9	47	64	17
Medication possession ratio	-.3*	-2.43	.015	-.5 to -.1	54	25	-29
Inpatient admission	-.8	-1.61	.108	-1.8 to -.2	32	11	-21

					Predictive Margin		
Model/Dependent variable	**β**	**z**	**p**	**95% CI**	**No Lapse**	**Lapse**	**M.E. %[b]**
Emergency department admission	-.1	-.23	.817	-1.4 to -1.1	28	23	-5
Standard probit [e]							
Outpatient clinic visits ≥2					74	55	-19
reference: 0 or 1 visit	-.6**	-6.18	<.001	-.8 to -.4			
Outpatient clinic visits ≥10,							
reference: 2 to 9 visits [d]	-.5**	-4.59	<.001	-.7 to -.3	69	53	-16
Medication possession ratio	-.2**	-10.03	<.001	-.3 to -.2	52	30	-22
Inpatient admission	-.4**	-3.35	.001	-.6 to -.2	28	18	-10
Emergency department admission	-.3**	-3.03	.002	-.5 to -.1	29	20	-9

[a] Analyses were also adjusted for all covariates: gender, age, race/ethnicity, mental health diagnoses, substance use disorder diagnosis, physical illness diagnoses, prenatal care use, urban residence, prior inpatient mental health days, prior outpatient mental health clinic days, prior receipt of psychotropic medications, prior Medicaid enrollment days, and Medicaid enrollment category at discharge.

[b] M.E. is the "marginal effect," equal to the difference in predicted margins for no-lapse and lapse.

[c] Instrumental variable was age 18 or 20. Test of no effect on enrollment lapse was F=26.2, df=1, 1173, p<.001.

[d] Includes N=802 persons who had at least 2 outpatient clinic visits.

[e] Standard probit (no instrumental variables)

* p<.05

** p<.01