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Changes over Time and Disparities in Schizophrenia Treatment Quality

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Abstract

Background—Schizophrenia medication and psychosocial treatment options have expanded since the Schizophrenia PORT was conducted. However, there also have been considerable changes in the delivery of mental health care in the public sector, as well as increasing state concerns about Medicaid cost containment.

Objectives—To examine trends and patient characteristics associated with differences in schizophrenia medication and visit treatment quality in a Medicaid population.

Research Design—Observational study of claims data from July 1, 1996 to June 30, 2001.

Subjects—Florida Medicaid enrollees diagnosed with schizophrenia (N=23,619).

Measures—We examined the likelihood of meeting any one and all four of the following quality standards: 1) receiving antipsychotic medication, 2) antipsychotic continuity and 3) dosing consistent with PORT recommendations and, 4) mental health visit continuity. Separate models were fit for acute and maintenance phases of treatment.

Results—Approximately 18% of acute and 7% of maintenance phases met all four quality standards. Antipsychotic quality improved (largely driven by an increasingly likelihood of receiving any antipsychotic), while visit continuity declined. The greatest disparities were seen for persons with co-occurring substance use disorders and of Black race. Quality differences were often phase specific and at times in opposite directions across treatment phases.

Conclusions—The improvement in antipsychotic treatment quality is encouraging. However, visit continuity declined. This study highlights the importance of quality measurement that includes focus on different treatment modalities and phases of care, as well as for potentially vulnerable populations (such as persons with co-occurring substance use disorders and minority race/ethnicity).

Introduction

In 1998 the Schizophrenia PORT provided comprehensive recommendations for treating schizophrenia.¹ It also documented considerable shortfalls in treatment adequacy, including racial disparities, between years 1994 and 1996.² Subsequent studies also have found quality differences associated with co-occurring substance use disorders, age and gender, although the directions of these differences have not been consistent.²⁻⁵

Since the original PORT, more evidence-based medication and psychosocial treatments have emerged and were included in a 2003 update.⁶ Also during this period, state Medicaid programs have experienced increasing cost containment pressure, resulting in considerable changes in the organization and delivery of Medicaid mental health care—namely, the widespread use of managed care arrangements. Given this contradictory context of emerging treatment technologies and cost containment pressure, it is important to understand how pharmacologic and psychosocial treatment quality for schizophrenia has been changing.

In this study we examine changes in schizophrenia treatment quality in Florida Medicaid's fee-for-service program between years 1996 and 2001. Florida is a large, ethnically diverse state and its Medicaid program is the third largest in the United States.⁷ We also examine disparities in quality by age, gender, ethnicity or race, and co-occurring substance use disorders, providing separate analysis for acute and maintenance phases.

Methods

Local Context

To combat increasing Medicaid costs, in 1991 Florida began phasing in by region MediPass, a lightly managed, primary care case management program for fee-for-service enrollees. In MediPass, the primary care physicians received a capitation payment for providing gate-keeping and case management services. Otherwise, the program was fee-for-service (although, outpatient Medicaid fees are typically low relative to the market price thereby limiting the supply of services). In 1996 the state implemented in one county (Tampa) a behavioral health carve-out, the impact of which has previously been studied.⁸⁻¹⁰ The carve-out was capitated and financially at risk for inpatient and outpatient utilization, but not medications. Community mental health centers received capitated payments from the carve-out but reported service utilization and were buffered from full loss of cost over-runs. Some enrollees were served by Medicaid HMOs, which managed their mental health services. Most of the non-HMO enrollees with psychiatric illness were served through MediPass program, except for Tampa enrollees whose psychiatric care was managed by the behavioral health carve-out. During the study period, there was no prior authorization policy limiting antipsychotic medication, including the more expensive, second generation agents.

Data Source

The administrative data were obtained from the state and included encounters in the MediPass and carve-out programs. Encounter data quality was the same between the MediPass and carve-out arrangements. Our cohort included enrollees diagnosed with schizophrenia in Florida's Medicaid program between July 1, 1996 and June 30, 2001. The administrative data included enrollment records, information on inpatient hospitalizations, outpatient treatments, diagnoses,

and medications received. Enrollees dually eligible for Medicare and Medicaid were excluded because Medicaid claims would not contain their complete service utilization records. This study was approved by the Harvard Medical School Internal Review Board.

Schizophrenia Cohort

Previous studies have found substantial agreement between Medicaid claims-based diagnoses of schizophrenia and clinical interviews (A.F. Lehman, unpublished data, 2002) and chart reviews.¹¹ Thus, using Medicaid administrative claims to develop a schizophrenia cohort has demonstrated validity. The diagnostic algorithm used to define the cohort has been previously described.⁸ In brief, enrollees with at least two schizophrenia diagnoses (inpatient and/or outpatient treatment, ICD-9 codes 295.0-295.9) were included. Enrollees with only one schizophrenia claim were also included if the claim represented: 1) an inpatient discharge diagnosis, or, 2) at least 50% of their entire outpatient mental health claims (i.e., one out of two mental health claims had a schizophrenia diagnosis). Among those who met our above diagnostic criteria, we then selected enrollees age 18 through 64 who were continuously enrolled in Florida's non-HMO Medicaid program for at least 6 months in a given fiscal year.

Treatment Phase

Since recommendations for first-generation antipsychotic dosages vary for acute versus maintenance phase treatment, we conducted separate analyses by treatment phase. Phases that spanned fiscal years were counted toward the fiscal year that included the majority of the treatment phase.

Acute phase treatment was defined as starting on Day 1 of an inpatient psychiatric hospitalization and lasted 12 weeks thereafter. If rehospitalization occurred within those 12 weeks, then the acute phase was extended to 12 weeks after Day 1 of the last hospitalization. We implemented a correction that accounted for the varying number of outpatient days within an acute phase. Essentially, inpatient days were removed from the denominator of "eligible days in a phase" when calculating the visit intensity and pharmacotherapy dose and duration. Maintenance phase was defined as beginning the 1st day after an acute phase ended, or, if there was no hospitalization in a given fiscal year, then the entire year was considered to be maintenance phase.

Quality Standards

We examined pharmacotherapy and psychosocial quality standards that are consistent with recommendations from the updated Schizophrenia PORT and whose elements are observable in claims data.

The pharmacotherapy quality standards were: 1) receiving an antipsychotic medication, 2) conditional on receiving an antipsychotic, the continuity of days supplied, and 3) dosing not in excess of the PORT recommendations. We did not examine dose in treatment phases that included decanoate antipsychotic medication (~10% of phases) because decanoate dosing information is unavailable in claims data.

We defined antipsychotic continuity as having no break in pill days supplied >30 days, or, for decanoate injections, having refills/repeat injections within at least 8 weeks from the last prescription. These intervals were selected due to concerns that shorter intervals between prescriptions might reflect lowering of medication dosages, rather than discontinuity.

Although the PORT distinguished between low, appropriate and high antipsychotic dosing, subsequent PORT analyses found that low doses were associated with fewer side effects and better functioning.¹² Therefore, we defined dose appropriateness dichotomously. All first-

generation antipsychotics were converted to chlorpromazine equivalents. Excessive dose was defined as ≥ 1000 chlorpromazine equivalents in acute phase and ≥ 600 equivalents in maintenance phase.

The average daily dose per phase was calculated by the daily prescription dosages, weighted by the days supply. If more than one antipsychotic was prescribed at once and all could not be translated into chlorpromazine equivalents due to some being second generation, then the antipsychotic dosage was considered excessive if ANY one was an excessive dose.

We planned to have a broader set of psychosocial quality standards, such as the frequency of individual or group psychotherapy, or family therapy. However, fewer than 1% of persons receive any family therapy,⁸ and examination of the data for this analysis revealed only approximately 7-26% of the treatment phases included any psychotherapy. Further, claims for Assertive Community Treatment were not identifiable in these data during the study years. Therefore, we chose treatment continuity as an indicator of psychosocial care. This variable was defined liberally: no break in mental health visits >60 days. Mental health visits were defined as diagnostic assessments, medication management visits, or psychotherapy (individual, group or family).

We sought to combine the three medication measures into one composite medication quality standard. Dose is an important part of quality but unknown for treatment phases that included decanoate medication. Therefore, in order to include dose, but also provide an estimate of overall medication quality for all treatment phases, we created two composite medication quality indicators. One consisted of receiving all three individual medication standards—an antipsychotic, in continuous supply and doses consistent with PORT recommendations. This was calculated for person-phases without decanoate antipsychotics. The second consisted of receiving any antipsychotic and a continuous supply, but not dosing. This more limited medication quality standard was applied to the entire schizophrenia sample. Finally, to create overall measures of visit and medication quality, we combined visit continuity with each composite medication quality standard.

Explanatory Variables

Based on prior literature, our primary explanatory patient characteristic variables of interest were age, gender, presence of a co-occurring substance use disorder diagnosis (*International Classification of Diseases, Ninth Edition* codes 291, 292, 303, 304, 305.0, 305.2-305.7, and 305.9) and race/ethnicity. Race/ethnicity was coded by the state as White, Black, Hispanic or Other/Missing. We were also interested in changes in treatment quality over time. Therefore we used dummy variables to control for fiscal-year in the model. Enrollee region of residence (defined by the state) was controlled for as dummy variables, and number of months enrolled in the Medicaid program during the treatment phase as a continuous variable. All remaining covariates were measured as dichotomous variables, except age.

Statistical Analyses

Summary statistics were calculated for the patient demographic and clinical characteristics (Table 1) and for the acute and maintenance phase dependent outcome quality standards (Table 2). We fit logistic regression models, by phase, for the likelihood of meeting quality standards for each of the pharmacotherapy, visit, and composite standards. We constructed 95% confidence intervals for the estimated adjusted odds ratios and used a generalized estimating equation (GEE) approach, clustered by enrollee identification number, to account for autocorrelation and clustering.¹³ Preliminary models indicated robust associations between the quality outcomes and race/ethnicity and substance use disorders. Therefore, we included interaction terms for race/ethnicity and SUD to test if the effect of these characteristics was

uniform. To further examine the impact of statistically significant patient characteristics in the model, we calculated the predicted probabilities of meeting these quality standards for differing values of these key variables. STATA version 9.0 was used for these analyses.

Results

Across the study years, there was little change in the unadjusted treatment quality—and the proportion of treatment phases meeting the overall quality standards was low (acute approximately 18% and maintenance 7-8%, when all three medication quality standards were considered) (Table 2). Overall medication quality was similar in acute and maintenance phases and improved over time. Approximately 49%-59% of all person-phases included both any antipsychotic and prescription continuity; that rate fell to 37%-46% in those for whom antipsychotic dosing was also taken into consideration.

Differing patterns were seen for the unadjusted individual quality standards. Rates of antipsychotic prescribing increased and also were higher in maintenance phase (acute 53%-63%; maintenance 65%-74%). Among patients receiving an antipsychotic in acute phase, over 90% received a continuous supply and approximately 82% received doses consistent with PORT recommendations. These proportions were lower for maintenance phase (approximately three-quarters for continuous supply and dosing). Similar to antipsychotic prescribing, more patients received a mental health visit during maintenance phases. The proportion of treatment phases that included a mental health visit declined from 62% to 56% for acute phase and remained constant at 78%-77% for maintenance phase. However, the visit continuity standard was met in only approximately one-third of acute and one-fifth of maintenance phases. Receiving at least monthly psychotherapy was low to begin with, but also declined: from 26% to 7% for acute phase and from 12% to 9% for maintenance phase, suggesting that regular, ongoing psychotherapy was declining over time.

The logistic regression models revealed several associations between study year, patient characteristics and treatment quality. These associations were not always the same for acute and maintenance phases. Overall treatment or medication quality models that did not include dosing (i.e., full population) typically had similar results as the models that did (i.e., non-decanoate receiving population). Therefore, we report in Tables 3 and 4 the results for overall medication quality that included dose (i.e., the non-decanoate population; 90% of the person-phase sample) for the primary explanatory variables of interest. Full model results are available from the authors by request.

Trends

Overall treatment quality was unchanged over time but there were significant changes in the components of quality. In both treatment phases, the greatest and most consistent changes were a greater likelihood of overall medication quality (largely driven by a greater likelihood of receiving an antipsychotic), and a lower likelihood of visit continuity.

Gender

Quality varied by gender similarly across phases. In medication quality specifically, men fared worse than women in acute phase and marginally better in maintenance. The individual quality standards had mixed results. Compared to women, men were more likely to receive an antipsychotic. Those who received an antipsychotic were less likely to have a continuous supply in maintenance phase but more likely to receive doses consistent with PORT recommendations in both phases. Visit continuity also was less likely for men, in acute phase.

Co-Occurring Substance Use Disorders

Co-occurring substance use disorders were associated with lower overall and medication quality. The lower quality was more pervasive in acute phase. In maintenance phase, lower quality was largely driven by a lower likelihood of receiving an antipsychotic. Despite having worse overall and medication quality, some maintenance phase individual quality components were better for persons with co-occurring substance use disorders (visit continuity and antipsychotic dosing).

Race/Ethnicity

In general, Blacks received worse quality, relative to Whites; the results for Hispanics were more mixed. Also, fewer differences were seen in acute compared to maintenance phase. Blacks fared worse relative to Whites in overall and medication quality. In maintenance phase, Hispanics fared worse in overall treatment quality, but were marginally more likely than Whites to meet overall medication quality standards. Examining the individual quality standards, in acute phase, compared to Whites, Blacks were marginally less likely to receive an antipsychotic but Hispanics in both phases were more likely to receive dosing consistent with the PORT recommendations. In maintenance phase, Blacks and Hispanics were less likely to receive continuity in antipsychotic supply and visits.

We found significant interactions with race/ethnicity and co-occurring substance use disorders. In acute phase, the interaction of Hispanic ethnicity and a substance use disorder diagnosis was associated with overall better treatment quality (largely driven by better visit continuity). However, the interaction of Black race and substance use disorder was associated with similar overall quality despite a lower likelihood of visit continuity. In maintenance phase, there was no significant interaction between Hispanic ethnicity and substance use disorder; Blacks with a substance use disorder had a lower likelihood of receiving an antipsychotic but greater likelihood of antipsychotic and visit continuity.

Age

The association between age and individual components of quality was mixed but older age was associated with significantly worse overall treatment quality in maintenance phase. It was associated with better overall medication quality in both phases but worse visit continuity in acute phase, and a trend of worse visit continuity in maintenance phase. In both treatment phases, older age was associated with a greater likelihood of receiving antipsychotic doses consistent with PORT recommendations. In maintenance phase it was also associated with a greater likelihood of receiving an antipsychotic.

Predicted Probabilities

To better quantify the effect size of these statistically significant differences, and summarize our results, Table 5 describes the adjusted predicted probabilities of receiving overall medication quality or visit continuity. Among the patient characteristics examined, co-occurring substance use disorders were associated with one of the larger disparities in treatment quality. The exception was maintenance phase visit continuity, in which they were associated with a significantly greater probability of visit continuity. However, the one percentage point difference is of little policy significance as an indicator of better continuity. Race/ethnicity also played a considerable role in quality differences, with Blacks typically faring worse and Hispanics better than Whites. Thus the greatest quality disparity seen was between Blacks and Hispanics. Visit continuity in maintenance phase was an exception: Hispanics fared worse than Blacks and Whites.

Conclusions

We observed changes over time in schizophrenia treatment quality. Independent of these changes, quality was low. Also, there were phase-specific differences. Cross-sectional measures (i.e., receiving any antipsychotic or mental health visit) were higher in maintenance phase, likely reflecting its longer time window (up to 365 days vs. 12 weeks for acute phase). Longitudinal measures (i.e., continuity of treatment,) were lower in maintenance phase, likely reflecting the challenges of either adherence and/or barriers to care over time.

While overall treatment quality remained the same, there were changes in the likelihood of receiving components of quality. Overall medication quality improved, driven by a higher percentage of patients receiving an antipsychotic. However, the likelihood of receiving continuous outpatient visits declined, as did the likelihood of receiving a continuous supply of antipsychotic medications in acute phase. These results likely reflect increasing pressure for Medicaid cost containment. For example, during the study period the inflation adjusted Florida Medicaid fees for psychosocial treatments declined.¹⁴ Further, our observation that patients were more likely to receive antipsychotics, but less likely to receive psychosocial treatments is consistent with other research examining trends in mental health treatment utilization.¹⁵⁻²¹

The PORT examined quality at the person level, whereas we do so at the treatment phase level. Still, finding some reasonable comparison between the studies would be useful. Ninety percent of the patients with a maintenance phase in our study had only one per year, which provides an opportunity for some approximate comparison with PORT results. A lower proportion of maintenance phases in our sample included an antipsychotic (65.4-73.7% vs. 92% of PORT respondents in maintenance phase). However, there was higher excessive dosing in the PORT (31% vs. approximately 22%). Approximately 65% of PORT respondents reported receiving help with at least one life problem and 45% of the treatment plans indicated the patients were receiving psychotherapy. We found that 74.5-77.8% of maintenance phases included at least one mental health visit, but much lower rates of at least monthly psychotherapy (11.9%-7.3%).

There are other ways in which our data are not directly comparable to the PORT. We rely upon administrative data and the PORT utilized a combination of chart review and patient interview. Also, the PORT measured the proportion prescribed an antipsychotic, whereas our data reflect the proportion that actually filled a prescription. Further, our estimate of medication dosing is based upon a calculation of the average daily dose over a treatment phase based on prescription claims, rather than relying on charts or patient self report.

We found treatment quality differences associated with age and gender (and consistent with prior literature^{22, 23}), but co-occurring substance use disorders were more strongly associated with a disparity in treatment quality. While consistent with other literature describing worse adherence in patients with co-occurring schizophrenia and substance use disorders,²⁴⁻²⁸ we cannot determine if decreased quality or adherence is related to patient factors, provider/system factors or both. Also, our finding that these patients were similarly likely to receive appropriate prescribed antipsychotic doses is consistent with prior literature.²³ Still, our results demonstrate the importance of additional policy or service system changes aimed at engaging and maintaining this population in treatment, such as increasing the capacity for integrated co-occurring treatment. However, it is also notable that while we found persons with co-occurring substance use disorder were less likely in maintenance phase to fill an antipsychotic prescription, those who did were more likely to fill a continuous supply. These results suggest better quality for a subset of persons with co-occurring substance use disorders who received antipsychotic pharmacotherapy.

The greatest disparity in overall medication quality and visit continuity based on race/ethnicity was between Blacks and Hispanics, with Hispanics at times faring better than Whites. However,

we also found a spottier quality record for the individual measures of treatment quality. Other research has also found that Blacks and Hispanics are less likely to receive a continuous supply of medication^{3, 4, 25, 28, 29} and that Blacks are less likely to have visit continuity.³⁰ Our observation that Blacks were equally likely to meet the PORT dose standard is consistent with some,²³ but not replicated in all,^{29, 31} prior literature. Although prior research has found no dosing appropriateness differences between Hispanics and Whites,²³ we found excessive dosing more likely for Hispanics, in maintenance phase.

We also found additional relationships between quality, race/ethnicity and co-occurring substance use disorders. A co-occurring substance use disorder diagnosis typically was associated with worse quality outcomes for Blacks but some better quality outcomes for Hispanics. However, the confidence intervals for Hispanics tended to be large, suggesting less stable estimates. Further research is needed to clarify the relationship between quality disparities and co-occurring substance use disorders and race/ethnicity.

There are several limitations worth noting. One is that we could not directly observe clinical symptoms, therefore our definitions of acute or maintenance phase may not entirely correspond to the clinical scenario. Further, we rely upon claims data to determine race/ethnicity and concerns have been raised about the accuracy of the non-White categories in large databases.³² However, there is some evidence that misclassification biases in administrative data are small for Blacks, Whites and Hispanics, due to high positive predictive values within a racial/ethnic category.³³

The 2003 PORT update reflected increasing choices in second generation antipsychotics, as well as an updated evidence base regarding psychosocial treatments. We apply these standards to care delivered from July 1996 through June 2001. The updated PORT recommendations are reasonable to apply to these data for two reasons. First, the dosing recommendations of newer medications follow the manufacturers' recommendations (and therefore were accessible to clinicians prior to publication of the updated PORT). Second, the limited frequency in these data of psychosocial treatments specifically recommended by the PORT necessitated a very liberal definition of psychosocial treatment quality: namely continuity.

The maintenance phases typically lasted nine to twelve months (depending upon whether one considers the mean or median/mode). Over this duration, it may be reasonable for service utilization to decrease as patients become more stable over time. However, our quality standards represent a minimum threshold of care that should be maintained over time. For example, individuals with a chronic, debilitating illness such as schizophrenia, most of whom are disabled and on Supplemental Security Income, should receive at least one mental health visit in a 60 day period. Or, over a 1 year maintenance phase period patients should receive an antipsychotic, at an appropriate dose and without any medication disruption for more than 30 days.

We do not examine treatment quality beyond fiscal year 2001. Possibly, our data do not reflect the current state of quality in this Medicaid program. However, while not directly comparable, study by other investigators of this Medicaid program demonstrate that the penetration of inpatient and outpatient psychiatric service utilization remained constant from January 1, 2001-June 30, 2004 in the fee-for-service plans.³⁴ Also, there were no changes in the financing of psychotropic medications. Thus, we think it reasonable to consider that the environment shaping mental health care changed little through at least 2004.

A further limitation is that we examined quality in one state Medicaid program. However, Florida has the 3rd largest Medicaid program in the United States. Additionally, the fiscal constraints facing Florida have been similar in other Medicaid programs, which also provide additional relevance of this study from a more general policy perspective.

A strength is that we examined multiple domains of quality in acute and maintenance phases of treatment, and also control for insurance status, socioeconomic level, illness severity and co-occurring illness. However, we cannot distinguish between drugs that were prescribed (i.e., recommended) versus what was received. Patients may have been prescribed treatments (either visits or medications) that were not received either because of patient preference or barriers to care. The distinction between differences due to preferences versus barriers is important when examining disparities.³⁵ However, the observation that there were time trends in some of these quality decrements, independent of patient characteristics, suggests that barriers to care are likely to play a significant role in the quality shortfalls observed.

Our results demonstrate a mixed picture in terms of changes in quality and disparities of care in this Medicaid population during the study period. Less than 25% of the person-phases included treatment that met a minimum recommended standard of care. Over time, patients with schizophrenia were more likely to fill an antipsychotic prescription but less likely to meet continuity quality standard for visits with mental health professionals. These results highlight the importance measuring pharmacotherapy and psychosocial visit quality, as well as treatment phase specific quality, when conducting population-based quality assessment and improvement. They also highlight that the most significant disparities were associated with race/ethnicity and co-occurring substance use disorders. Such information provides policy guidance that identifies particular patient populations which could most benefit from system/programmatic quality improvement initiatives.

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Table 1

Schizophrenia diagnosed population characteristics 1996-2001

Sample sizes by fiscal year	Total # persons	Acute phase		Maintenance phase [*]	
		# persons	# phases	# persons	# phases
96-97	12,522	3,886	5,000	12,018	13,285
97-98	12,620	3,907	5,081	12,131	13,436
98-99	12,290	3,830	5,063	11,812	13,170
99-00	12,962	4,172	5,498	12,432	13,850
00-01	14,060	4,434	5,853	13,478	14,965
Patient Characteristics Across Study Fiscal-Years (N=28,153)					
Age (mean/s.d.)		41.4		11.9	
		N		%	
Female		14,812		52.6	
Substance use disorder		5,770		20.5	
Ethnicity					
Black		7,374		26.2	
White		1012,244		43.5	
Hispanic		1,182		4.2	
Other/Missing		7,858		27.9	
Enrolled in Medicaid via Supplemental Security Income more months than via any other Medicaid eligibility category		25,473		90.5	
Mental health hospitalization (>=1)		12,526		44.5	
Hospitalized for schizophrenia		9,637		34.2	

* Mean duration of maintenance phases: 290.7 days, s.d. 100.3; median and mode duration 365 days.

Table 2

Person-phase unadjusted frequencies for overall and medication treatment quality in the Florida Medicaid schizophrenia population.

Composite Quality Standards Full Population	Fiscal Year		1996-1997		1997-1998		1998-1999		1999-2000		2000-2001	
	freq	%	freq	%	freq	%	freq	%	freq	%	freq	%
Acute Phase	N=5,000		N=5,081		N=5,063		N=5,498		N=5,853			
Medication and Visit Quality ^{a,b}	1,248	25.0%	1,250	24.6%	1,263	25.0%	1,358	24.7%	1,476	25.2%		
Medication Quality ^a	2,454	49.1%	2,838	55.9%	2,829	55.9%	3,144	57.2%	3,467	59.2%		
Maintenance Phase	N=13,285		N=13,436		N=13,170		N=13,850		N=14,965			
Medication and Visit Quality ^{a,b}	1,562	11.8%	1,573	11.7%	1,524	11.6%	1,604	11.6%	1,930	12.9%		
Medication Quality ^a	6,506	49.0%	6,824	50.8%	6,924	52.6%	7,440	53.7%	8,404	56.2%		
Non-Decanoate Population												
Acute Phase	N=4,534		N=4,663		N=4,606		N=4,999		N=5,312			
Medication and Visit Quality ^{b,c}	830	18.3%	864	18.5%	817	17.7%	904	18.1%	948	17.9%		
Medication Quality ^c	1,709	37.7%	2,025	43.4%	1,969	42.8%	2,217	44.4%	2,420	45.6%		
Maintenance Phase	N=11,739		N=11,924		N=11,689		N=12,383		N=13,435			
Medication and Visit Quality ^{b,c}	855	7.3%	869	7.3%	825	7.1%	906	7.3%	1,075	8.0%		
Medication Quality ^c	4,316	36.8%	4,559	38.2%	4,593	39.3%	5,027	40.6%	5,651	42.1%		

Table 2 (continued): Person-phase unadjusted frequencies for individual quality standards of medication and visit quality in the Florida Medicaid schizophrenia population.

Individual Quality Standards	Fiscal Year		1996-1997		1997-1998		1998-1999		1999-2000		2000-2001	
	freq	%	freq	%	freq	%	freq	%	freq	%	freq	%
Acute Phase	N=5,000		N=5,081		N=5,063		N=5,498		N=5,853			
Any antipsychotic	2,662	53.2%	3,038	59.8%	3,030	59.9%	3,390	61.7%	3,698	63.2%		
Conditional on any antipsychotic, continuous supply ^a	2,454	92.2%	2,838	93.4%	2,829	93.4%	3,144	92.7%	3,467	93.8%		
Conditional on non-decanoate antipsychotic, dose consistent with PORT recommendations ^b	1,830	83.3%	2,170	82.8%	2,116	82.2%	2,386	82.5%	2,577	81.6%		
Mental health visit	3,089	61.8%	2,942	57.9%	2,890	57.1%	3,082	56.1%	3,282	56.1%		
Continuous Contact ^c	1,849	37.0%	1,762	34.7%	1,709	33.8%	1,801	32.8%	1,917	32.8%		
Therapy visit >= 1 per month	1,298	26.0%	488	9.6%	448	8.9%	368	6.7%	426	7.3%		
Maintenance Phase	N=13,285		N=13,436		N=13,170		N=13,850		N=14,965			
Any antipsychotic	8,686	65.4%	9,282	69.1%	9,296	70.6%	9,951	71.9%	11,021	73.7%		
Conditional on any antipsychotic, continuous supply ^a	6,506	74.9%	6,824	73.5%	6,924	74.5%	7,440	74.8%	8,404	76.3%		
Conditional on non-decanoate antipsychotic, dose consistent with PORT recommendations ^b	5,527	77.4%	6,054	77.9%	6,054	77.5%	6,692	78.9%	7,451	78.5%		
Mental health visit	10,331	77.8%	10,273	74.5%	10,019	76.1%	10,516	75.9%	11,535	77.1%		
Continuous Contact ^c	2,760	20.8%	2,583	19.2%	2,494	18.9%	2,571	18.6%	2,946	19.7%		
Therapy visit >= 1 per month	1,574	11.9%	1,305	9.7%	1,063	8.1%	1,006	7.3%	1,290	8.6%		

^aMedication quality for full population = Receipt of any antipsychotic and continuous prescription (i.e., no gap in days supply >30 days for oral antipsychotic and 60 days for decanoate).

^bVisit quality = continuous contact (i.e., no gap in mental health visit frequency > 60 days).

^cMedication quality for non-decanoate population = Receipt of any antipsychotic + continuous prescription + dose consistent with PORT recommendations.

^aContinuous supply = no gap in days supply >30 days for oral antipsychotic and 60 days for decanoate medication.

^b Only calculated for patients with non-decanoate antipsychotic medication.

^c Continuous contact = no gap in mental health visit frequency > 60 days.

Table 3

Likelihood of Patients with Schizophrenia in the Florida Medicaid Program Meeting Quality Standards in Acute Phase

	Overall Quality ^d		Medication Quality ^b		Any Antipsychotic		Continuous Supply		Dose Consistent with PORT Recommendations		Visit Continuity	
	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI	OR	CI
Fiscal Year ^c												
1997	1.02	.92-1.13	1.27**	1.18-1.38	1.31**	1.22-1.40	1.20	.98-1.47	.97	.83-1.12	.90**	.84-.98
1998	.99	.89-1.10	1.25**	1.16-1.36	1.33**	1.24-1.43	1.20	.98-1.47	.94	.81-1.10	.88**	.82-.95
1999	1.00	.91-1.11	1.33**	1.22-1.43	1.43**	1.33-1.54	1.10	.91-1.33	.92	.80-1.07	.84**	.78-.91
2000	.97	.88-1.08	1.38**	1.28-1.49	1.53**	1.42-1.64	1.29**	1.06-1.57	.85*	.74-.99	.83**	.77-.90
Patient Characteristics												
Substance Use Disorder (SUD)	.62**	.55-.69	.68**	.63-.74	.63**	.58-.68	.53**	.44-.65	1.10	.94-1.29	.71**	.66-.78
Male	.84**	.78-.91	.92**	.87-.97	1.07**	1.02-1.13	1.10	.96-1.25	.72**	.65-.80	.92**	.86-.97
Black ^d	.79**	.71-.88	.86**	.79-.94	.91*	.85-.99	.84	.68-1.02	1.02	.88-1.18	.91*	.84-.99
Hispanic ^d	.88	.64-1.21	1.12	.89-1.42	.96	.77-1.21	.82	.45-1.52	1.69*	1.04-2.72	.90	.69-1.15
Hispanic* SUD	2.18*	1.20-3.97	1.40	.88-2.24	1.42	.92-2.20	1.67	.49-5.62	1.19	.42-3.37	2.15*	1.33-3.48
Black* SUD	.94	.78-1.14	1.07	.93-1.22	.99	.87-1.12	1.36	.98-1.88	1.07	.83-1.39	.86*	.75-.98
Age	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
	-.0023	.0016	.0039**	.0011	.0004	.0011	.0025	.0029	.0104**	.0021	-.0037**	.0013

^a Medication quality + visit continuity

^b For person-phases without decanoate medication only: Any antipsychotic, continuous supply and dose consistent with PORT recommendations.

^c Reference category = 1996.

^d Reference category = White

* p</.05

** p</.01

Table 4

Likelihood of Patients with Schizophrenia in the Florida Medicaid Program Meeting Quality Standards in Maintenance Phase

	Overall Quality ^d			Medication Quality ^b			Any Antipsychotic ^c			Continuous Supply			Dose Consistent with PORT Recommendations			Visit Continuity		
	OR	CI		OR	CI		OR	CI		OR	CI		OR	CI		OR	CI	
Fiscal Year ^c																		
1997	.98	.89-1.07	1.05	1.00-1.10	1.16	**	1.12-1.22	.93*		.88-.99	1.02		.96-1.09			.88**	.84-.93	
1998	.93	.84-1.02	1.09**	1.04-1.15	1.24	**	1.19-1.30	1.00		.94-1.06	1.00		.93-1.07			.84**	.80-.89	
1999	.95	.87-1.05	1.15*	1.10-1.21	1.32	**	1.25-1.38	1.02		.96-1.08	1.07		1.00-1.14			.82**	.77-.86	
2000	1.06	.97-1.17	1.20**	1.15-1.26	1.41	**	1.34-1.48	1.08**		1.02-1.15	1.05		.98-1.13			.89**	.84-.94	
Patient Characteristics																		
Substance Use Disorder (SUD)	.77**	.67-.89	1.64**	.59-.69	.39	**	.36-.42	1.22**		1.07-1.39	1.12		.98-1.29			1.11*	1.02-1.22	
Male	.88**	.81-.95	1.96*	.92-1.00	1.16	**	1.11-1.21	1.14**		1.08-1.20	.62**		.58-.66			.96	.91-1.01	
Black ^d	.60**	.54-.68	1.75**	.71-.79	.97		.91-1.02	.56**		.53-.60	.93		.86-1.01			.82**	.77-.88	
Hispanic ^d	.62**	.45-.84	1.13*	1.00-1.28	.99		.86-1.14	.66**		.55-.80	1.99**		1.56-2.55			.61**	.49-.75	
Hispanic SUD	.97	.24-3.86	1.19	.74-1.91	1.17		.73-1.87	2.50		.81-7.72	.78		.31-1.94			1.16	.58-2.33	
Black SUD	.86	.65-1.14	.95	.83-1.08	.83	**	.74-.93	1.34**		1.10-1.64	.92		.74-1.14			.82**	.71-.95	
Age																		
	Coeff.	s.e.		Coeff.	s.e.		Coeff.	s.e.		Coeff.	s.e.		Coeff.	s.e.		Coeff.	s.e.	
	-.0045**	.0016	.0041**	.0009	.0043**	.0010	.0008	.0012	.0037**	.0013						-.0020	.0011	

^a Medication quality + visit continuity

^b For person-phases without decanoate medication only: Any antipsychotic, continuous supply and dose consistent with PORT recommendations.

^c Reference category = 1996.

^d Reference category = White

* p<=.05

** p<=.01

Table 5

Adjusted Predicted Probabilities of Meeting Medication and Visit Treatment Quality Standards

Characteristic	Acute Phase			Maintenance Phase		
	Medication Quality Mean Probability	Visit Continuity s.d.	Mean Probability	Medication Quality Mean Probability	Visit Continuity Mean Probability	sd.
Substance Use Disorder	.41	.046	.33	.32	.037	.075
No Substance Use Disorder	.49	.048	.41	.43	.042	.071
Male	.43	.063	.34	.39	.061	.070
Female	.45	.064	.36	.40	.062	.072
White	.45	.065	.36	.42	.055	.074
Black	.42	.059	.33	.35	.053	.063
Hispanic	.50	.049	.39	.45	.049	.053
Age 20-39	.47	.048	.43	.41	.041	.074
Age 40-64	.49	.048	.41	.42	.041	.071

* Patients receiving decanoate not included in analysis