

**Online Supplement**

## **Description of Measures**

### Psychiatric and Non-Psychiatric Hospitalizations

Beginning in 2013, CMS began redacting all claims containing information about substance abuse treatment or diagnosis from the Medicare Part A and Part B claims data. Prior research suggests that the redaction has resulted in the deletion of a sizable share of Part A claims for beneficiaries with serious mental illness and Part A expenditures for those with redacted claims are underreported by an average of 57% (1). The CCW Master Beneficiary Services Cost and Use File provides an alternative source of beneficiary-level data on hospital utilization and spending, but these data do not provide the same granular information (e.g., diagnosis codes, procedure codes, dates of service) as the claims and therefore cannot be used to directly distinguish psychiatric from non-psychiatric hospitalizations.

Inpatient hospital utilization and spending data in the Cost and Use file are reported separately for care received in “acute” vs. “other inpatient” settings. “Acute” hospitalizations are defined as admissions to acute care and critical access hospitals, while “other inpatient” hospitalizations consist of admissions to psychiatric hospitals and psychiatric units of acute and critical access hospitals (2). To validate that “acute” hospitalizations corresponded to non-psychiatric admissions and “other inpatient” to psychiatric admissions, we analyzed the Part A claims data for the subset of our cohort with no redacted claims (N=11,702) to determine the overlap between admissions with a psychiatric condition listed as the primary diagnosis in the claims (3) and those designated as “other inpatient” admissions in the Cost and Use file. We determined that 91.5% of “other inpatient” admissions had a psychiatric condition listed as the primary diagnosis, compared to just 12.8% of acute admissions. Based

on this distinction, we classified “other inpatient” hospitalizations as psychiatric and “acute” hospitalizations as non-psychiatric.

### Substance Abuse Disorders

Since all substance abuse information is currently redacted from the Medicare claims data, we created a proxy measure for comorbid substance abuse disorder based on whether or not each beneficiary had evidence of any deleted Part A or Part B claims. This measure was created by comparing spending totals derived from the redacted Parts A and B claims to the unredacted Parts A and B spending totals from the Cost and Use file for each beneficiary (1). Differences between the claims-based spending totals and the Cost and Use were attributed to redacted claims and beneficiaries with non-matching totals were classified as having a diagnosis of substance abuse disorder.

### **References**

1. Roberto P, Brandt N, Onukwugha E, et al: Redaction of substance abuse claims in Medicare research files affects spending outcomes for nearly one in five beneficiaries with serious mental illness. *Health Services Research* (Epub ahead of print, July 24, 2016)
2. Chronic Conditions Data Warehouse: Medicare Administrative Data User Guide Version 3.1. Baltimore, Buccaneer Computer Systems and Services, Inc. Available at: [https://www.ccwdata.org/cs/groups/public/documents/document/ccw\\_userguide.pdf](https://www.ccwdata.org/cs/groups/public/documents/document/ccw_userguide.pdf). Accessed August 14, 2016
3. Weiden PJ, Kozma C, Grogg A, et al: Partial compliance and risk of rehospitalization among California Medicaid patients with schizophrenia. *Psychiatric Services* 55:886-891, 2004

**Appendix Table 1: Characteristics of Medicare Part D Enrollees with Schizophrenia<sup>a</sup>**

Variable	N	%
Total sample	13,861	100
Adherence category		
PDC < .70	13.3	1,813
.70 ≤ PDC < .80	5.5	748
.80 ≤ PDC < .90	10.4	1,424
PDC ≥ .90	70.9	9,696
Age		
<65	80.1	10,958
65-74	10.8	1,475
75-84	6.3	857
≥85	2.9	391
Male	58.4	7,993
Race		
White	67.9	9,292
Black	22.8	3,124
Hispanic	4.3	589
Other	4.9	676
LIS recipient	89.0	12,178
CCI score		
0	63.4	8,679
1-2	27.5	3,767
3+	9.0	1,235
Depot antipsychotic use	4.0	547
Comorbid condition		
Anxiety disorder	21.1	2,880
Depression	27.3	3,739
Personality disorder	4.0	545
Substance abuse disorder	15.8	2,159
Asthma	6.3	866
Cancer	2.7	366
CHF	8.7	1,190
COPD	12.4	1,690
Diabetes	28.7	3,923
Heart disease	14.0	1,917
Hyperlipidemia	37.4	5,110
Hypertension	42.4	5,795
Any non-psychiatric hospitalization	15.2	2,072
Any psychiatric hospitalization	8.5	1,158
Non-psychiatric hospital expenditures (mean ± SD)	\$2,060 ± \$7,661	

Psychiatric hospital expenditures (mean  $\pm$  SD) \$1,373  $\pm$  \$6,831

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<sup>a</sup> PDC, proportion of days covered; LIS, low-income subsidy; CCI, Charlson Comorbidity Index; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; SD, standard deviation.

**Appendix Table 2: Characteristics of Medicare Part D Enrollees with Schizophrenia by Adherence Category<sup>a</sup>**

Variable	PDC < 0.70 (N=1,813)		.70 ≤ PDC < .80 (N=748)		.80 ≤ PDC < .90 (N=1,424)		PDC ≥ 0.90 (N=9,696)		χ <sup>2b</sup>	p
	N	%	N	%	N	%	N	%		
Male	1,032	56.9	409	54.7	832	58.4	5,720	59.0	7.30	.063
Race										
White	938	51.7	451	60.3	901	63.3	7,002	72.2	334.08	<.001
Black	686	37.8	230	30.8	369	25.9	1,839	19.0	348.18	<.001
Hispanic	106	5.9	31	4.1	67	4.7	385	4.0	13.69	.003
Other	83	4.6	36	4.8	87	6.1	470	4.9	4.85	.183
Age (mean±SD) <sup>c</sup>	52.5±15.8		52.3±16.2		52.5±15.2		53.0±14.2			.227
LIS recipient	1,518	83.7	632	84.5	1,234	86.7	8,794	90.7	103.61	<.001
CCI score										
0	1,159	63.9	495	66.2	902	63.3	6,123	63.2	2.96	.398
1-2	469	25.9	181	24.2	380	26.7	2,737	28.2	9.55	.023
3+	185	10.2	72	9.6	142	10.0	836	8.6	6.86	.076
Depot antipsychotic use	48	2.7	28	3.7	67	4.7	404	4.2	11.31	.010
Comorbid condition										
Substance abuse	444	24.5	170	22.7	256	17.9	1,289	13.3	180.90	<.001
Anxiety disorder	452	24.9	193	25.8	313	22.0	1,922	19.8	36.13	<.001
Depression	603	33.3	216	28.9	436	30.6	2,484	25.6	55.04	<.001
Personality disorder	83	4.6	38	5.1	66	4.6	358	3.7	7.76	.051
Asthma	133	7.3	38	5.1	77	5.4	618	6.4	7.14	.068
Cancer	70	3.9	15	2.0	42	2.9	304	3.1	6.41	.093
CHF	183	10.1	61	8.2	122	8.6	824	8.5	5.24	.155
COPD	241	13.3	90	12.0	164	11.5	1,195	12.3	2.47	.480
Diabetes	472	26.0	184	24.6	403	28.3	2,864	29.5	15.88	.001
Heart disease	308	17.0	124	16.6	197	13.8	1,288	13.3	21.72	<.001
Hyperlipidemia	555	30.6	237	31.7	498	35.0	3,820	39.4	66.25	<.001
Hypertension	796	43.9	304	40.6	604	42.4	4,091	42.2	2.79	.043

<sup>a</sup> PDC, proportion of days covered; LIS, low-income subsidy; CCI, Charlson Comorbidity Index; CHF, congestive heart failure. COPD, chronic obstructive pulmonary disease.

<sup>b</sup> df = 3

<sup>c</sup> F=3.03, df=3,13677

**Appendix Table 3: Share of Medicare Part D Enrollees with Schizophrenia with Any Psychiatric or Non-Psychiatric Related Hospitalization and Average Hospital Expenditures by Adherence Category**

Variable	PDC < 0.70 <sup>a</sup> (N=1,813)		.70 ≤ PDC < .80 <sup>a</sup> (N=748)		.80 ≤ PDC < .90 <sup>a</sup> (N=1,424)		PDC ≥ 0.90 <sup>a</sup> (N=9,696)		p
	N	%	N	%	N	%	N	%	
Any non-psychiatric hospitalization <sup>b</sup>	342	18.9	112	15.0	220.0	15.5	1,398	14.4	<.001
Any psychiatric hospitalization <sup>c</sup>	260	14.3	84	11.2	138	9.7	676	7.0	<.001
Non-psychiatric hospital expenditures (mean±SD) <sup>d</sup>	\$2,580±\$8,722		\$2,216±\$8,597		\$2,272±\$8,049		\$1,919±\$7,302		.005
Psychiatric hospital expenditures (mean±SD) <sup>e</sup>	\$2,513±\$9,450		\$1,923±\$7,973		\$1,529±\$6,915		\$1,095±\$6,073		<.001

<sup>a</sup> PDC, proportion of days covered

<sup>b</sup>  $\chi^2 = 23.61$ , df=3

<sup>c</sup>  $\chi^2 = 118.83$ , df=3

<sup>d</sup> F=4.34, df=3,13677

<sup>e</sup> F=24.19, df=3,13677