Real-World Analysis of Insurance Churn among Young Adult Patients with Schizophrenia Using the Colorado All Payer Claims Database (CO APCD)

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BACKGROUND

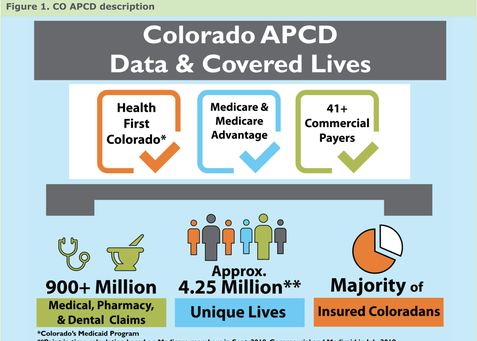
- Schizophrenia (SCZ) not only necessitates greater use of healthcare resources but also is likely to lead to changes in and/or loss of employment, which may result in changes to insurance coverage, or insurance "churn," among those with commercial insurance
- Insurance churn may cause gaps and disruptions in coverage and access for patients with SCZ, potentially leading to treatment disruptions and healthcare burden
- Since most males with SCZ are diagnosed in late adolescence or during their early twenties and most females with SCZ are diagnosed during their late twenties/early thirties, and because the Affordable Care Act allows adult children to remain on their parents' commercial insurance plan until age 26 years,[2] we may see more insurance churn in this population
- Our objective was to examine the extent of insurance churn in the younger SCZ population with commercial insurance coverage at diagnosis compared with a matched non-SCZ cohort

METHODS

Data Source

- Colorado All-Payer Claims Database (CO APCD) was used to conduct the study
- All-payer claims databases (APCD) are state-level healthcare databases pooled from most payers operating within the state (private and public) and contain medical claims, pharmacy claims, dental claims, and eligibility files from the state[1]
- The database allows for tracking patients across changes in insurance coverage from month to month[1]
- The CO APCD contains medical, pharmacy, and dental claims as well as data on eligibility for approximately 76%[3] of the insured CO population, including commercial, Medicaid, and Medicare enrollees, allowing a comprehensive and longitudinal view into patients' healthcare use.[4] Claims are available from January 1, 2012, through December 31, 2019

Figure 1. CO APCD description



Inclusion Criteria (Table 1)

SCZ Cohort

- At least 1 inpatient claim or 2 outpatient claims with a diagnosis of SCZ or schizoaffective disorder (International Classification of Diseases, 9th Revision, Clinical Modification [ICD-9-CM] code: 295.xx; International Classification of Diseases, 10th Revision, Clinical Modification [ICD-10-CM] code: F20.xx, F25.xx), with at least 1 diagnosis as the primary diagnosis
- The index date was defined as the first diagnosis of SCZ
- At least 12 months of continuous eligibility prior to index date
- Aged 18-34 years on the index date
- On a commercial insurance plan on the index date

Non-SCZ Cohort

- A 25% random sample of members
- An imputed pseudo-index date was randomly assigned to members such that the distribution of index dates of the cohort aligned with the SCZ cohort
- At least 12 months of continuous eligibility prior to the pseudo-index date
- No SCZ or schizoaffective diagnoses at any time in their history
- Aged 18-34 years on the pseudo-index date
- On a commercial insurance plan on the index date

Table 1. Selection of the Analysis Cohort

Step	Description	SCZ Cohort n	Matched Non-SCZ Cohort n
0	CO APCD dataset (2012-2019)	1,197,191	1,197,191
1	Diagnosed with SCZ[a]	16,374	-
2	AND has at least 1 inpatient diagnosis or 2 outpatient diagnoses	11,913	-
3	AND has 12 months of continuous enrollment prior to index date[b]	4,616	329,643
4	AND aged 18-34 years at index date and not missing gender data	3,774	249,658
5	AND propensity score matched to SCZ cohort	3,678	18,398
6	AND started on commercial insurance at index	**510**	**9,430**

[a]ICD-9-CM code: 295.xx; ICD-10-CM code: F20.xx, F25.xx.
[b]Control patients were assigned a random index date that matched the distribution of SCZ patients.
CO APCD, Colorado All-Payer Claims Database; ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification, ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification; SCZ, schizophrenia.

Table 2. Baseline Cohort Characteristics

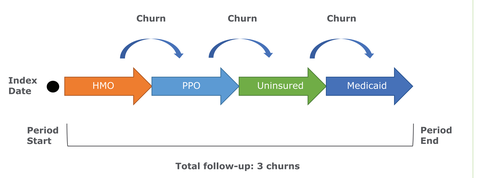
	SCZ Cohort (N = 510) n	SCZ Cohort (N = 510) %	Matched Non-SCZ Cohort (N = 9,430) n	Matched Non-SCZ Cohort (N = 9,430) %	*p* Value
Gender					
Male	343	67.3%	6,503	69.0%	0.418
Female	167	32.7%	2,927	31.0%	
Age at index diagnosis, years					
Mean (SD)	24.11	(4.54)	26.53	(4.71)	<0.001
Median (IQR)	23.00	(8.00)	27.00	(8.00)	
18-21	167	32.7%	1,657	17.6%	<0.001
22-25	180	35.3%	2,507	26.6%	
26-29	78	15.3%	2,206	23.4%	
30+	85	16.7%	3,060	32.4%	
Commercial insurance type at index					
HMO	173	33.9%	3,803	40.3%	<0.001
PPO	81	15.9%	2,208	23.4%	
POS	45	8.8%	1,433	15.2%	
Self-funded	29	5.7%	871	9.2%	
HMO + Medicaid	85	16.7%	265	2.8%	
Other	97	19.0%	850	9.0%	
Health exchange member at index					
No	477	93.5%	9,265	98.3%	<0.001
Yes	33	6.5%	165	1.7%	
At least 1 month of Medicaid in the prior 12 months					
No	357	70.0%	8,732	92.6%	<0.001
Yes	153	30.0%	698	7.4%	
Prior non–mental health inpatient admits					
0	407	79.8%	8,526	90.4%	<0.001
1	73	14.3%	638	6.8%	
2	15	2.9%	173	1.8%	
3+	15	2.9%	93	1.0%	
Charlson Comorbidity index					
0	454	89.0%	8,570	90.9%	0.074
1	42	8.2%	705	7.5%	
2	8	1.6%	115	1.2%	
3+	6	1.2%	40	0.4%	
Number of prior mental health medications					
At least 1 prior mental health medication	313	61.4%	1,286	13.6%	<0.001
Mean (SD)	2.81	(3.41)	0.25	(0.84)	<0.001
Median (IQR)	2.00	(4.00)	0.00	(0.00)	
Number of churns in the prior 12 months					
Mean (SD)	0.38	(0.65)	0.20	(0.50)	<0.001
Median (IQR)	0.00	(1.00)	0.00	(0.00)	
0	357	70.0%	7,925	84.0%	<0.001
1	123	24.1%	1,201	12.7%	
2	22	4.3%	271	2.9%	
3+	8	1.6%	33	0.3%	

HMO, health maintenance organization; IQR, interquartile range; POS, point of service; PPO, preferred provider organization; SD, standard deviation.
[a]Kruskal-Wallis or chi-square as appropriate.

Statistical Analysis/Definitions

- Descriptive statistics are presented for the SCZ and non-SCZ cohorts
- Non-SCZ patients were propensity score matched with patients with SCZ (5:1) on the following characteristics: gender, age category at index date, number of churns 12 months prior to index date, number of prior nonpsychiatric inpatient admissions, Charlson Comorbidity Index (CCI) score, whether receiving insurance from an ACA health insurance exchange, and geographic region (**Table 2**)
- Commercial insurance is defined as having an insurance type of: HMO, PPO, POS, or a combination of one of these with Medicaid (commercial pays first in these instances)
  - Churn was defined as a change in insurance type (HMO, PPO, POS, Medicaid, Medicare, etc.) (**Figure 2**) during the follow-up period, including periods of being uninsured
  - The number of cumulative churns over time (months from index date) was calculated
  - A Cox proportional hazards regression was conducted to examine time to first churn controlling for the covariates: age at index, prior number of insurance churns, number of prior mental health medications, number of non–mental health admissions, insurance type at index date, CCI score, and whether receiving insurance from an ACA health insurance exchange
  - Longitudinal Poisson regression using generalized estimating equations (GEE) clustered at the patient level to estimate churn rate for each 6-month period was used. Robust standard errors were used. We controlled for the same covariates in the Cox model
  - The percentage of patients with each type of insurance are presented by month (**Figure 3**)

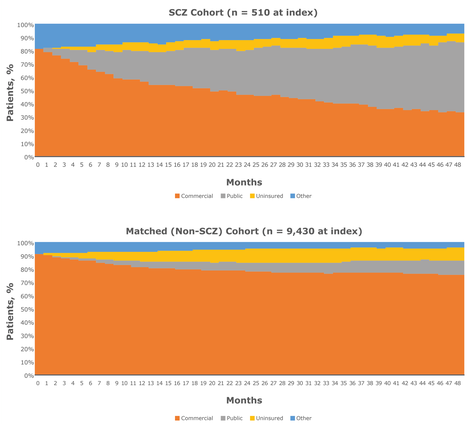
Figure 2. Illustrative example of insurance churn



Note: Each arrow represents a period of coverage with the indicated insurance product (or uninsured period). A switch in any of these is considered a churn.

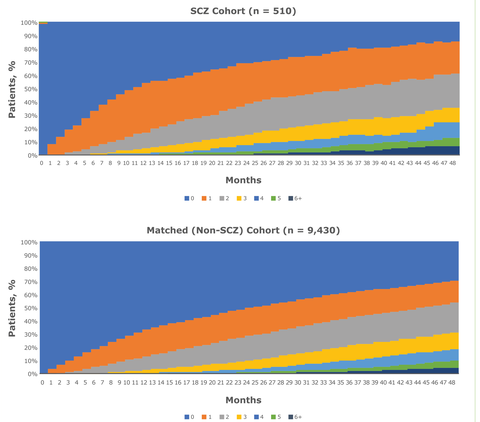
RESULTS

Figure 3. Insurance type by month



- After propensity score matching, there were 3,678 patients in the SCZ cohort and 18,398 patients in the non-SCZ cohort, of which the subset of those with commercial coverage at the index date were used for this analysis. The analysis cohort comprised 510 patients in the SCZ cohort and 9,430 patients in the non-SCZ cohort (**Table 1**)
- More than two-thirds of patients were male in both the SCZ and non-SCZ cohorts, with an average age of 24 and 27 years, respectively. Most patients started on an HMO type of commercial insurance (34% vs 40%) (**Table 2**)
- Patients with SCZ experienced first insurance churn sooner compared with patients without SCZ (**Figure 4**)
  - At 12 months post-index, 38% of patients with SCZ had one insurance churn (vs 20% for non-SCZ) and 16% had churned 2 or more times (vs 13% for non-SCZ)
  - At 24 months post-index, 31% of patients with SCZ had insurance churn once (vs 21% for non-SCZ) and 38% had churn 2 or more times (vs 28% for non-SCZ)
  - At 36 months post-index, 30% of patients with SCZ had insurance churn once (vs 19% for non-SCZ) and 50% had churn 2 or more times (vs 43% for non-SCZ)

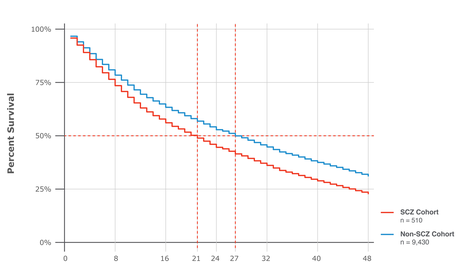
Figure 4. Cumulative churns by month



SCZ, schizophrenia.

- The adjusted median time to first churn was 21 (SCZ cohort) versus 27 months (non-SCZ cohort) ($p < 0.001$) (**Figure 5**)

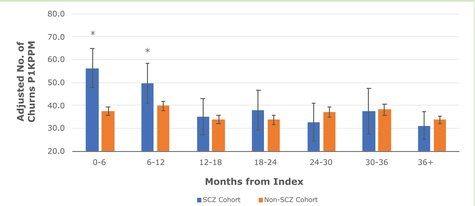
Figure 5. Adjusted Cox proportional hazards: time to first churn by SCZ status (n = 9,940)[a-c]



SCZ, schizophrenia.
[a]Presented are the plotted survival functions.
[b]The model is adjusted for prior number of churns, prior number of mental health medications, age at index, prior number of non–mental health admissions, insurance at index, Charlson comorbidity index, exchange insurance at index.
[c]Among patients with commercial insurance at the index date.

- The Poisson model results show the adjusted rates of churn[b] per 1,000 patients per month. Patients with SCZ had higher rates of churn in the first and second 6-month periods compared with patients without SCZ (**Figure 6**)
  - SCZ patients had 56.3 and 49.8 churns per 1,000 patients per month versus 37.5 and 39.8 churns per 1,000 patients per month for non-SCZ patients in the first and second 6-month periods, respectively
- Rates of churn stabilized in the later months, at approximately 35 churns per 1,000 patients per month
- Among patients initially diagnosed with SCZ while on commercial insurance, insurance churn usually equated to movement to Medicaid or other public insurance (Medicaid, FFS Medicare or dual eligible) (**Figure 3**)
  - By 24 months, 33.8% of the SCZ cohort were publicly insured versus 6.4% of the non-SCZ cohort; at month 48, 52.4% versus 10.7% were publicly insured
- A considerable proportion of patients were using commercial insurance throughout the study period (**Figure 3**)
  - By month 24, 46.2% of SCZ patients and 77.5% of non-SCZ patients continued to be on commercial insurance. At month 48, the percentages only declined to 33.2% and 75.2%, respectively

Figure 6. Adjusted rate of churn for every 6-month period (per 1,000 patients per month)[a]



CCI, Charlson Comorbidity Index; CI, confidence interval; P1KPPM, per 1,000 patients per month; SCZ, schizophrenia.
*$p < 0.05$
Error bars = 95% CI.
[a]The model is adjusted for prior number of churns, prior number of mental health medications, age at index, prior number of non–mental health admissions, insurance at index, CCI, exchange insurance at index.

LIMITATIONS

- The data consist of residents from the state of Colorado only, and thus may not be generalizable to the overall US population
- The database does not capture insurance claims or costs for incarcerated, uninsured, or Veterans Administration/Tricare individuals
- Due to privacy restrictions, individual plans could not be identified, so it is possible that a patient switched from one PPO plan to another PPO plan, which could not be counted as a churn
- Propensity score matching was done prior to selecting patients with commercial insurance at index, which may have introduced a sampling bias. We accounted for the underlying differences in the patient cohorts with the help of the Cox model and the GEE model
- Administrative claims data are not collected for research purposes but for billing, and therefore, diagnostic coding may be driven by reimbursement rather than by clinical factors. Providers may fail to code diagnoses, or diagnoses appearing on claims may be coded incorrectly. This may affect the measurement of clinical characteristics

CONCLUSIONS

- **Young, commercially insured patients with SCZ in Colorado experience insurance churn more frequently and more rapidly compared with patients without SCZ**
- **While churn is more frequent among young adults with SCZ compared with individuals without SCZ, close to 50% are enrolled in a commercial health plan 2 years after diagnosis**
- **Young adults with SCZ who are diagnosed while on commercial insurance overwhelmingly moved to Medicaid (vs other commercial insurance plans)**
- **The disruption resulting from churning from commercial to public insurance as well as periods of being uninsured may lead to reduced access to care and possible treatment gaps for this vulnerable patient population. Further research is warranted to evaluate the effect of these gaps on patient care**

References

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