

Healthcare Resource Utilization Costs in People with Cognitive Impairment Associated with Schizophrenia: A US Non-Interventional Cohort Study of Real World Data

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Introduction

- CONTEXT** CIAS is a core symptom of schizophrenia and a key contributor to the overall morbidity and mortality burden.¹⁻⁴ Research indicates that 55%–85% of patients with schizophrenia have CIAS⁴⁻⁷
- UNMET NEED** While CIAS is a core feature of schizophrenia, there are currently no approved pharmacological treatments for CIAS, and its impact on healthcare resource utilization is not well understood
- RATIONALE** EHRs and associated claims data could be used to identify patients with CIAS and assess their healthcare resource utilization

Aims

To identify the proportion of patients with schizophrenia who have CIAS and compare their healthcare resource utilization with that of patients without CIAS

Methods

Study design

Non-interventional retrospective cohort study (October 1, 2016 – March 31, 2022)

Data source

Optum Market Clarity database (Q2 2022 version)
US-based de-identified real-world data from linked administrative claims and EHR data

72 million enrollees
500,000 patients with schizophrenia
>15 years of longitudinal data (January 1, 2007 – March 31, 2022)

Baseline period 12 months pre-index date
Index date First observed diagnosis of schizophrenia during the study period
End of follow-up Date of last encounter, end of database or death

- Inclusion criteria**
- ≥18 years of age at index date
 - ≥2 claims for diagnosis of schizophrenia during the study period (according to ICD-10 F20/ICD-9 295)
 - ≥1 year of continuous enrollment pre-index date

- Exclusion criteria**
- Presence of Alzheimer's disease, dementia, or epilepsy (during the baseline period); attention deficit hyperactivity disorder (≤1 year before or after index date); bipolar disorder I, bipolar disorder II, or intellectual disability (any time before index date)
 - Use of central nervous system stimulants, ketamine, or electroconvulsive therapy procedures ≤6 months pre-index date
 - Use of tricyclic antidepressants or transcranial magnetic stimulation ≤35 days pre-index date

Key Conclusions

- CIAS was identified in approximately 24% of adults with schizophrenia in this non-interventional cohort study using de-identified EHR and health claims data
- Total HCRU costs were 60% greater for patients with CIAS than those without, indicating a greater disease burden
 - Total medication and medical costs, inpatient and outpatient costs, and costs for mental health conditions were greater for patients with CIAS than for those without CIAS

Total costs PPPY, USD	CIAS-Y (n=43,458)	CIAS-N (n=138,172)
HCRU	\$56,236	\$32,386
Medical	\$48,406	\$25,571
Medication	\$7920	\$6815
Outpatient	\$18,509	\$10,140
Inpatient	\$25,657	\$12,569
MHD-related	\$38,806	\$18,896

Data analysis

Patient CIAS status was determined by calculating a weighted sum score based on individual CIAS indicator scores (claims code and NLP measure) and absolute distance to any schizophrenia diagnosis date

Score >0 Patients with a history of CIAS or CIAS at follow-up (CIAS-Y)
Score ≤0 Patients with no history of CIAS or CIAS at follow-up (CIAS-N)

- Total HCRU was analyzed for CIAS-Y and CIAS-N based on medical visit, medication, total costs per person per year, number of visits per person per year, and length of stay
- Adjusted mean cost differences (95% CI) were estimated using a generalized linear model with two-part log-link gamma function
- Adjusted mean number of visits and length of stay differences (95% CI) were estimated using a generalized linear model with two-part log link Poisson function
- Covariates included demographics, psychiatric diagnoses and medications, Elixhauser comorbidities and pre-index healthcare visits
- The top 1 percentile were excluded from the analyses to accurately estimate mean cost differences

Results

Patient characteristics

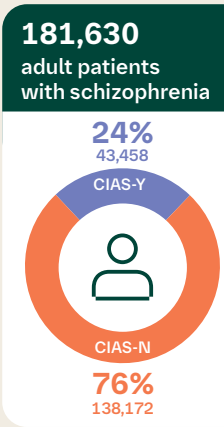


Table 1. Patient demographics and baseline characteristics (≤99th percentile cost dataset)

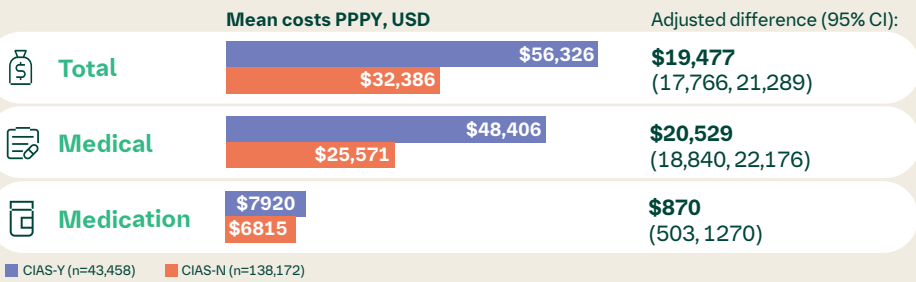
	CIAS-Y (n=43,458)	CIAS-N (n=138,172)	Overall (N=181,630)
Age, mean (SD)	52.1 (16.7)	46.4 (15.8)	47.8 (16.2)
Sex, n (%)			
Male	25,976 (59.8)	87,519 (63.3)	113,495 (62.5)
Race, n (%)			
Asian	573 (1.3)	2155 (1.6)	2,728 (1.5)
Black	13,437 (30.9)	39,855 (28.8)	53,292 (29.3)
Caucasian	21,255 (48.9)	60,324 (43.7)	81,579 (44.9)
Unknown	8193 (18.9)	35,838 (25.9)	44,031 (24.2)
Ethnicity, n (%)			
Hispanic	1888 (4.3)	7124 (5.2)	9012 (5.0)
Not Hispanic	31,654 (72.8)	86,619 (62.7)	118,273 (65.1)
Unknown	9916 (22.8)	44,429 (32.2)	54,345 (29.9)

- CIAS prevalence ranged from 17% to 64%, depending on the availability of NLP data and antipsychotic prescription data from EHR sources (prescription orders, hospital records, and outpatient pharmacy claims) during the follow-up period

Healthcare resource utilization

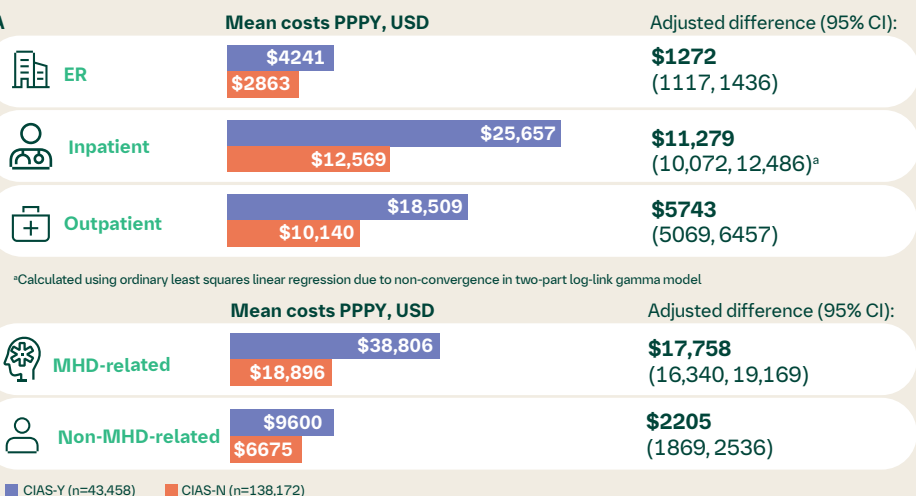
- Total HCRU costs were 60% greater in patients with CIAS versus patients without CIAS (Figure 1)

Figure 1. Total, medical, and medication costs



- Medical costs were consistently higher for patients with CIAS than those without, for all encounter types (ER, inpatient, and outpatient; Figure 2A) and for both mental health- and non-mental health-related disorders (Figure 2B)

Figure 2. Medical costs by (A) encounter type and (B) disorder type



- Patients with CIAS had more outpatient and inpatient visits and longer stays (Table 2), contributing to their higher HCRU

Table 2. Number of outpatient/inpatient visits and length of stay

	CIAS-Y	CIAS-N	Mean difference (95% CI)
Mean number of outpatient visits	93.34	70.82	11.07 (9.04, 13.06)
Mean length of stay of outpatient visits (days)	0.57	0.27	0.31 (0.28, 0.34)
Mean number of inpatient visits	1.80	1.11	0.61 (0.56, 0.67)
Mean length of stay of inpatient visits (days)	6.78	4.06	2.71 (2.52, 2.91)

Additional Conclusions

- Patients with schizophrenia with CIAS can be identified using real-world EHR and claims data
- Overall CIAS prevalence (24%) was lower than previously reported⁴⁻⁷, but frequency varied widely by data availability. The highest rate (64%) occurred in patients with both NLP and EHR antipsychotic prescription data from multiple sources
- Underreporting in EHR and claims data and methodological differences, such as stricter inclusion criteria, the use of validated neuropsychological tests, or variations in NLP algorithms for data extraction, could also contribute to the lower overall CIAS prevalence
- The data are limited to US populations enrolled in healthcare insurance plans covered by the Optum Market Clarity database
- This study highlights the increased medical burden and costs of CIAS and the need to develop and deliver effective treatments

Abbreviations

CI, confidence interval; CIAS, cognitive impairment associated with schizophrenia; CIAS-N, CIAS no; CIAS-Y, CIAS yes; EHR, electronic health record; ER, emergency room; HCRU, healthcare resource utilization; ICD, International Classification of Diseases; MHD, mental health disorder; NLP, natural language processing; PPPY, per person per year; SD, standard deviation; USD, United States Dollar.

References

- McCutcheon RA, et al. *Mol Psychiatry* 2023;28:1902–18.
- GBD 2019 Mental Disorders Collaborators. *Lancet Psychiatry* 2022;9:137–50.
- Dickerson F, et al. *JAMA Netw Open* 2024;7:e2432401.
- Mascio A, et al. *Front Digit Health* 2021;3:711941.
- Domingo SZ, et al. *Schizophr Res Cogn* 2015;146–58.
- Peng XJ, et al. *Front Hum Neurosci* 2021;14:599720.
- Reichenberg A, et al. *Schizophr Bull* 2009;35:1022–9.

Disclosures

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