Associations of comorbid substance use disorders with healthcare service utilization: a cohort study using electronic health record data

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BACKGROUND

Comorbid substance use disorders are associated with worse clinical outcomes in people with serious mental illness[1,2,3,4] but less is known about their impact on mental healthcare service delivery.

OBJECTIVE

To investigate healthcare utilization in people with comorbid substance use disorders using a largescale electronic health record (EHR) dataset.

METHOD

- A retrospective, cohort study was conducted on adults with the ICD-10 substance use disorder diagnoses: alcohol (F10*), opioid (F11*), cannabis (F12*), and cocaine (F14*) use disorders receiving US mental healthcare services.
- Patients were assigned into the following three groups: schizophrenia and related disorders (F2*), mood disorders (F3*), and other mental disorders (not F2* or F3*).

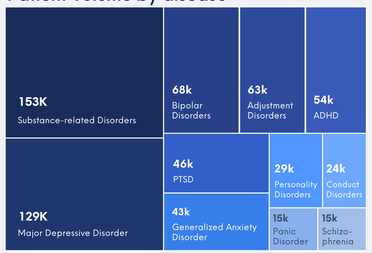
RESULTS

- A total of 20,988 patients with substance use disorders (alcohol: 51.7%; opioid: 27.7%; cannabinoid: 14.9%; cocaine: 5.8%) were included in the study with a mean age of 39 years and 58% male sex.
- Cannabis use disorders were most frequent in patients with schizophrenia and related disorders (Figure 4).
- A greater proportion of patients with schizophrenia and related disorders visited the emergency department than individuals with mood disorders or other mental health disorders, especially those with a comorbid Cocaine use disorder (Figure 5A).
- There was a decrease in CGI-S score across all mental health disorders 6-12 months after SUD diagnosis. This was lowest for opioid use disorder in mood disorders and mental heath disorders and cannabis use disorder in patients with schizophrenia (Figure 5B).
- χ^2 tests revealed that individuals with both Schizophrenia ($p < 0.001$) and mood disorders ($p < 0.001$) were significantly more likely to visit the emergency department than individuals with other mental health disorders.
- T-tests revealed that individuals with both Schizophrenia ($p < 0.001$) and mood disorders ($p < 0.001$) had significantly higher CGI-S scores at both baseline and 6-12 months later.

NeuroBlu™ database

50+ million rows of patient data | **560K+** Patients | **20+ years** Longitudinal Data

Patient volume by disease



Structured Data

- **Outcome Measures (e.g., CGI-S, GAF)**
- Diagnosis Codes (ICD-9,ICD-10)
- Prescription Data
- Patient Demographics
- **Emergency Department, inpatient and outpatient** data across the same patients in 20 of 25 clinics

Unstructured Data

Mental Status Examination (MSE)

- Categorized notes on patient's function, appearance and mood at a visit
- Holmusk developed >30 advanced Neural Network models to predict structured labels from MSE
- Created >300 psychiatry specific labels in collaboration with clinicians to track disease progression over time

External Stressors

Social, relational and occupational events that may affect the patient's mental health

Figure 1. NeuroBlu Database overview

Data Source of US Health Facilities

De-identified EHR data were obtained from U.S. mental health services that use the MindLinc EHR system. The data were analysed in NeuroBlu, a secure Trusted Research Environment (TRE) that enables data assembly and analysis using an R/Python code engine.

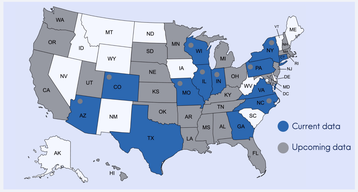


Figure 2. Sate specific data source for NeuroBlu

Comorbidity of SUD and Mental Illness by sex

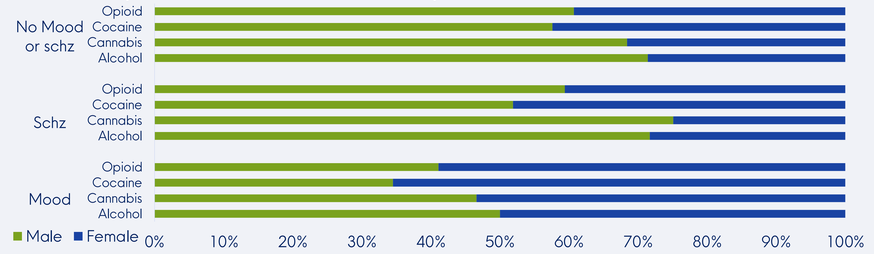


Figure 3. Proportion of individuals with mental illness and comorbid substance use disorder by substance and biological sex. Green bars represent males and blue bars represent females. Data is shown as percentage of gender within the subset of mental illness with specific substance comorbidity. No mood or schz=other mental disorders (not F2* or F3*), Schz=schizophrenia and related disorders (F2*), Mood=mood disorders (F3*).

Comorbidity of SUD and Mental Illness

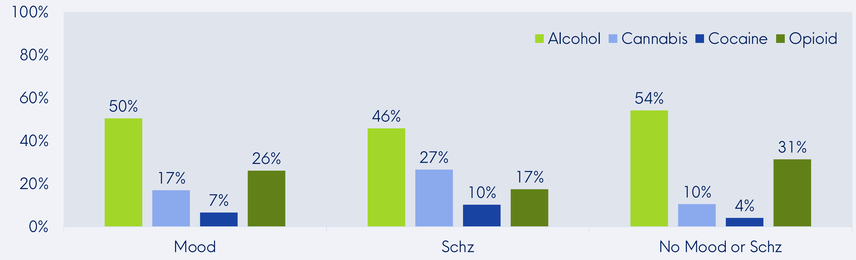
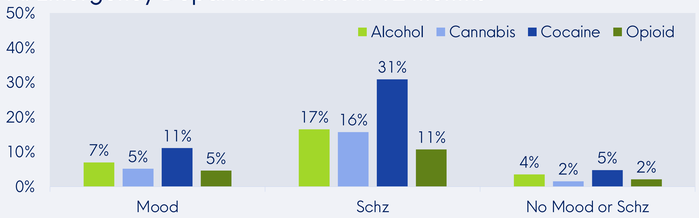


Figure 4. Prevalence of comorbid SUDs within health disorder groups. No mood or schz=other mental disorders (not F2* or F3*), Schz=schizophrenia and related disorders (F2*), Mood=mood disorders (F3*).

A. Emergency Department Visits in 12 months



B. Average change in CGI-S at 6 -12 months after first SUD

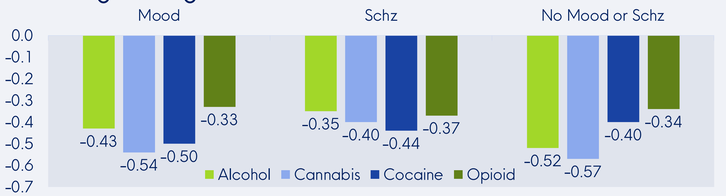


Figure 5. A. Percentage of individuals in each group that visited the emergency department within 12 months after the first recorded SUD diagnosis. B. Change in Clinical Global Impression – Severity (CGI-S) score 6-12 months after the first SUD diagnosis. Schz=schizophrenia and related disorders (F2*), Mood=mood disorders (F3*).

CONCLUSION

- Cannabis use was more frequent among patients with schizophrenia and related disorders consistent with its potential etiological role.
- Substance use disorder patients who had either schizophrenia and related or mood disorder diagnoses were significantly more likely to attend the ED within 12 months. This could indicate greater risk of substance overdose or mental health crisis among these groups.
- Dual diagnosis services could help to reduce the impact on healthcare utilization by ensuring that patients receive appropriate care for both substance use disorders and schizophrenia.

References:

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2. Patel R., Wilson R., Jackson R., et al,(2016). Association of cannabis use with hospital admission and antipsychotic treatment failure in first episode psychosis: an observational study. *BMJ Open* 2016;6:e009888. http://dx.doi.org/10.1136/bmjopen-2015-009888
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