Associations between cognitive symptoms and poor clinical outcomes in schizophrenia: real-world evidence from an electronic health record study

Kira Griffiths[1], Sheryl Ker[1], Emily OC Palmer[1], Rashmi Patel[1,2]
[1]Holmusk Technologies, Inc., New York, NY, USA. [2]Kings's College London, London, UK.

BACKGROUND

- Cognitive impairment is a core feature of schizophrenia.[1,2] No therapies exist which improve cognitive function to a clinically meaningful degree.[3]
- Real-world data allows the study of large and well-representative samples of patients receiving mental healthcare in clinical practice, and the ascertainment of real-world clinical outcomes.

AIMS

- To apply natural language processing to de-identified electronic health record (EHR) data[4], to identify cognitive symptoms that were documented during the mental state examination of patients with schizophrenia.
- To investigate associations between cognitive symptoms and clinical outcomes.

METHODS

- NeuroBlu[5] (Figures 1 and 2) was used to assemble a cohort of adults with schizophrenia (ICD-9: 295*; ICD-10: F20*).
- Cognitive symptoms recorded within 14 days of first recorded schizophrenia diagnosis in the EHR were extracted (Table 1).
- Patients were categorised according to whether they presented with or without cognitive symptoms.
- Cox and generalised linear model regression analyses were performed to evaluate the association of cognitive symptoms with 1) time to psychiatric hospitalisation and 2) number of unique antipsychotic trials in the 12 months following diagnosis.
- Models were adjusted for age, gender, race, antipsychotic prescription, comorbid substance use disorder and illness severity (CGI-S).

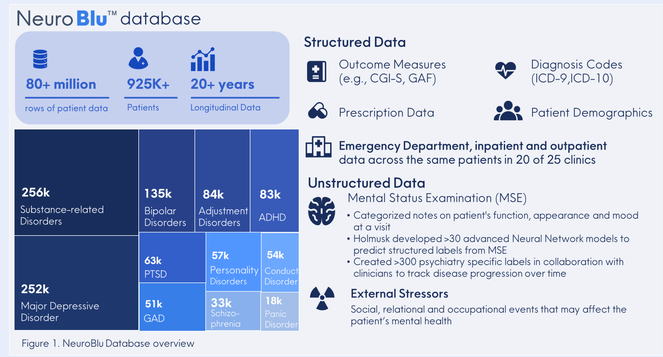

Figure 1. NeuroBlu Database overview

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.[4]

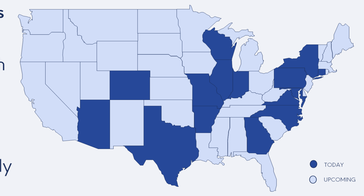

Figure 2. State specific data source for NeuroBlu

RESULTS

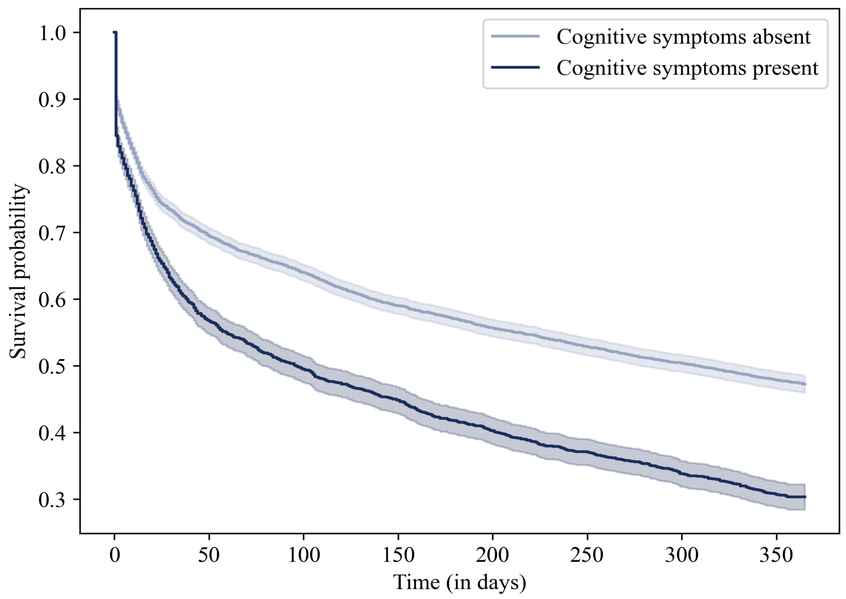

Figure 3. Kaplan-Meier estimates of the risk of psychiatric hospitalization in the 12 months following diagnosis for patients with or without cognitive symptoms (n = 10,070).

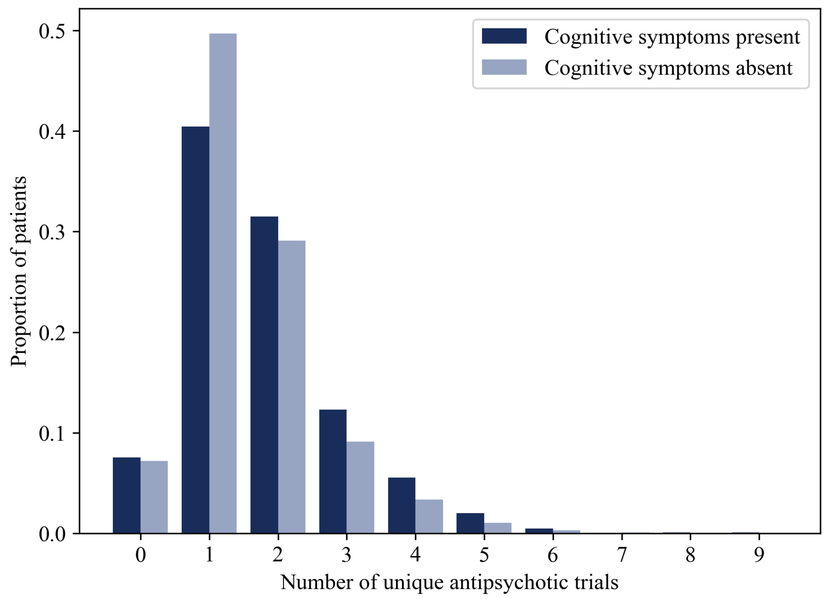

Figure 4. Number of unique antipsychotic trials in the 12 months following baseline for patients with or without cognitive symptoms. This analysis included only patients with a minimum of 12 months data availability following baseline. (n = 4,318).

Key Findings

- A total of 10,070 participants were included and 2,834 (28.1%) had clinician-reported cognitive symptoms (Table 1).
- Presence of cognitive symptoms was associated with increased risk of hospitalisation (HR=1.23, 95% CI=1.16, 1.31, p<0.001) (Figure 3).
- Presence of cognitive symptoms was associated with a higher number of unique antipsychotic trials in the year following diagnosis (n = 4,318, IRR=1.11, 95% CI=1.01, 1.21, p=0.02) (Figure 4).

Table 1. Number of frequency of patients with at least one recorded cognitive symptom within a given category (total n = 10,070)

Cognitive Symptom	N (%)
General issues	995 (9.88%)
Issues with attention / concentration	2,064 (20.5%)
Issues with fund of knowledge	104 (1.03%)
Issues with executive function	676 (6.71%)

CONCLUSION

This finding adds further evidence that cognitive dysfunction may be a marker of a worse illness course in schizophrenia, and that development of novel treatments for this patient group should be a clinical priority.

REFERENCES

1. Elvevag B, Goldberg TE. Cognitive impairment in schizophrenia is the core of the disorder. Critical Reviews™ in Neurobiology. 2000;14(1).

2. Green MF. Cognitive impairment and functional outcome in schizophrenia and bipolar disorder. Journal of Clinical Psychiatry. 2006 Oct 15;67:3.

3. Nielsen RE, Levander S, Kjaersdam Telleus G, Jensen SO, Östergaard Christensen T, Leucht S. Second-generation antipsychotic effect on cognition in patients with schizophrenia—a meta-analysis of randomized clinical trials. Acta Psychiatrica Scandinavica. 2015 Mar;131(3):185-96.

4. Mukherjee SS, Yu J, Won Y, McClay MJ, Wang L, Rush AJ, Sarkar J. Natural language Processing-Based Quantification of the mental state of psychiatric patients. Computational Psychiatry. 2020 Dec 31;4

5. Patel R, Wee SN, Ramaswamy R, Thadani S, Tandi J, Garg R, Calvanese N, Valko M, Rush AJ, Rentería ME, Sarkar J. Cohort profile: NeuroBlu, an electronic health record (EHR) trusted research environment (TRE) to support mental healthcare analytics with real-world data. BMJ Open. 2022;12(4).

Conflicts of Interest: All authors report personal fees from Holmusk Technologies, Inc. RP reports equity ownership in Holmusk Technologies, Inc.