A real-world data analysis of Clinical Global Impression-Severity (CGI-S) as a transdiagnostic predictor of psychiatric hospitalisation

EPP1016

Emily OC Palmer[1], Maxime Taquet[2,3], Kira Griffiths[1], Sheryl Ker[1], Christian Liman[1], Soon Nan Wee[1], Scott Kollins[4] and Rashmi Patel[5]

1. Holmusk Europe Ltd., 415 Linen Hall, London UK., 2. Department of Psychiatry, University of Oxford, Oxford, UK., 3. Oxford Health NHS Foundation Trust, Oxford, UK., 4. Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, Durham, North Carolina, USA., 5. Institute of Psychiatry Psychology and Neuroscience, King's College London, London, UK.

holmusk

BACKGROUND

Admission to psychiatric hospital can be medically [1] and socially [2] challenging for individuals. Psychiatric hospitalisation contributes to high treatment costs and high economic burden [3] of mental disorders. Reducing psychiatric admissions could therefore benefit patients and healthcare systems. Besides a few intuitive predictors (such as the illness severity or previous hospitalisations), there is a lack of transdiagnostic risk factors for hospitalisation that can be identified in clinical practice. The Clinical Global Impression-Severity (CGI-S) scale is a 7-point measurement of symptom severity, independent of diagnosis. Due to its routine use in clinical practice and ease of administration, it may have potential as a transdiagnostic predictor of hospitalisation.

OBJECTIVE: To investigate whether early trajectories of CGI-S scores predict risk of hospitalisation over a 6 month-follow-up period.

METHOD

A retrospective cohort study was conducted, analysing Electronic Health Record (EHR) data from the NeuroBlu database [4] (Figure 1). The timeline, variables and primary outcome for the present study are shown in Figure 2.

Inclusion criteria

- An ICD-9 or ICD-10 code of major depressive disorder (MDD), bipolar disorder (BD), generalized anxiety disorder (GAD), post-traumatic stress disorder (PTSD), schizophrenia or schizoaffective disorder (SCZ), attention deficit hyperactivity disorder (ADHD), or personality disorder (PD).
- At least 5 recorded CGI-S scores within a 2-month period, defined as the 'index' period.

Exclusion criteria

- Patients who had been hospitalised before or within the index period.

Exposure

Clinical severity = Mean CGI-S score during the index period.

Clinical instability = Time-adjusted Root Mean Squared Subsequent Differences (tRMSSD) of all CGI-S scores recorded during the index period

Statistical analysis

- The relationship between early CGI-S trajectories and time to psychiatric hospitalisation was investigated using Cox regression.
- The analysis was adjusted for age, gender, race, number of years in education, and psychiatric diagnosis.

Figure 2. Schematic of study timeline. Clinical severity (mean CGI-S) and clinical instability were measured in a 2-month index period. The outcome of psychiatric hospitalization was evaluated in the subsequent 6-month follow up period.

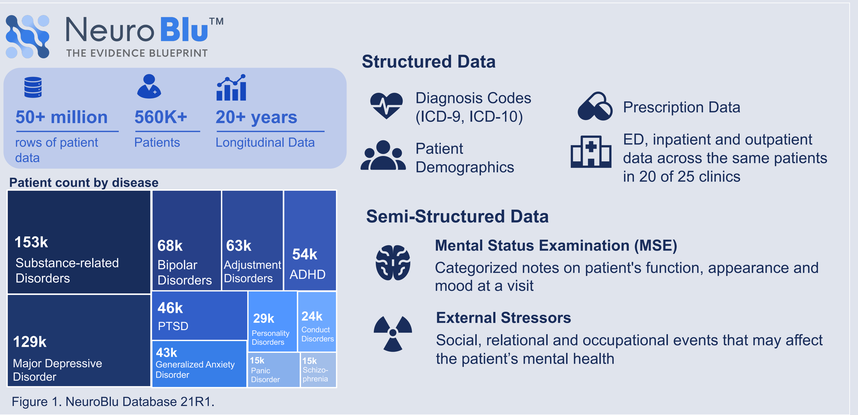

Figure 1. NeuroBlu Database 21R1.

RESULTS

A total of 36,914 patients were included (mean [SD] age: 29.7 [17.5] years; 57.3% female). The median follow-up time was 180 (interquartile range 101-180) days (we only analysed data for 180 days). An increase by one standard deviation in clinical instability (HR: 1.09, 95% CI 1.07-1.10, p<0.001) and severity (HR: 1.11, 95% CI 1.09-1.12, p<0.001) were associated with an increased risk of hospitalisation (8.7% and 10.6%, respectively). Associations were consistent across all psychiatric diagnoses (Figure 3). Patients in the top 50% of the population in terms of both severity and instability were at a 45% increased risk of hospitalisation compared to those in the bottom 50% along those two dimensions (Figure 4).

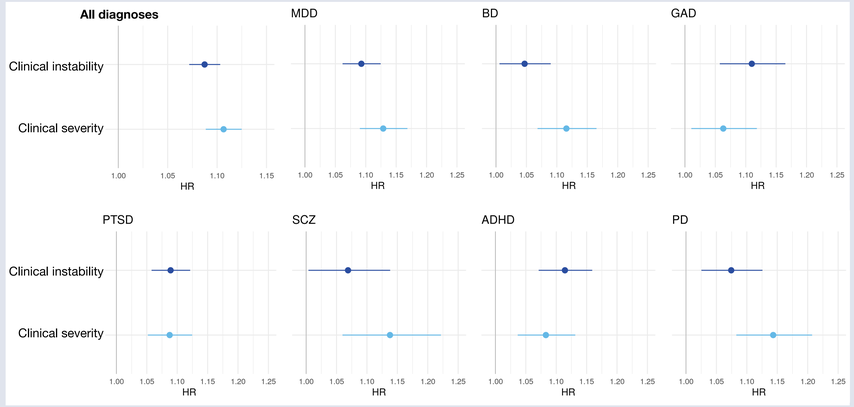

Figure 3. Hazard ratios (HR) for the 6-month risk of hospitalization corresponding to an increase by 1 standard deviation in clinical instability and severity. The horizontal bars represent 95% confidence intervals. The results are given for the primary model with all diagnoses included (top left) as well as for each diagnosis independently. Acronyms: major depressive disorder (MDD), bipolar disorder, generalized anxiety disorder (GAD), post-traumatic stress disorder (PTSD), schizophrenia or schizoaffective disorder (SCZ), attention deficit hyperactivity disorder (ADHD), or personality disorder (PD).

Figure 4. Hazard ratios (HR) for the risk of being hospitalized for those in the top vs. bottom half of the population in terms of clinical severity and instability. Each comparison is made with respect to the reference taken to be the subgroup in the bottom half of the population both in terms of severity and instability. The diameter of each circle is proportional to the HR which is reported alongside its 95% confidence interval within each circle. Acronyms: Clinical Global Impression-Severity (CGI-S)

CONCLUSION

Early clinical trajectories (defined as the first 2 months of CGI-S recording) reflecting clinical severity and instability were independently associated with increased risk of hospitalisation across diagnoses. This risk was compounded when instability and severity were present together.

We reported only on the transdiagnostic risk of clinical severity and instability, these could be integrated into more elaborate predictive models to further increase the ability to predict hospitalisation.

These results have translation potential in predicting individuals who are at high risk of hospitalisation and could benefit from preventative strategies to mitigate this risk.

Limitations: 1) no distinction between voluntary and compulsory hospital admission, 2) outcome variable was the first admission, with subsequent readmissions not considered, 3) cohort included only a subset of mental disorders, 4) The observational nature of the study means that causal links cannot be inferred.

Conflicts of Interest: MT is a consultant for Holmusk inc. EOCP, KG, SK, SNW, SK, RP and CL are employees of Holmusk Inc. SNW. RPGrant / Research support from: National Institute of Health Research (NIHR301690); Medical Research Council (MR/S003118/1); Academy of Medical Sciences (SGL015/1020); Janssen,

References:

1. Aftab A, LaGrotta C, Zyzanski SJ, et al. Impact of psychiatric hospitalization on trust, disclosure and working alliance with the outpatient psychiatric provider: A pilot survey study. Cureus 2019; 11: e4515.
2. Sharac J, McCrone P, Clement S, Thornicroft G. The economic impact of mental health stigma and discrimination: a systematic review. Epidemiol Psichiatr Soc 2010; 19: 223–32.
3. 2. Stensland, M., P.R. Watson, and K.L. Grazier, *An examination of costs, charges, and payments for inpatient psychiatric treatment in community hospitals.* Psychiatr Serv, 2012. **63**(7): p. 666-71.
4. Patel R, Wee SN, Ramaswamy R, Thadani S, Tandi J, Garg R, Calvanese N, Valko M, Rush AJ, Rentería ME, Sarkar J. NeuroBlu, an electronic health record (EHR) trusted research environment (TRE) to support mental healthcare analytics with real-world data. BMJ open. 2022 Apr 1;12(4):e057227.