

Early clinical instability and increased risk of psychiatric hospitalization: real-world evidence from an analysis of electronic health record data

Maxime Taquet^{1,2}, Kira Griffiths³, Emily OC Palmer³, Sheryl Ker³, Christian Liman³, Soon Nan Wee³, Scott Kollins⁴ and Rashmi Patel⁵

1. Department of Psychiatry, University of Oxford, Oxford, UK., 2. Oxford Health NHS Foundation Trust, Oxford, UK., 3. Holmusk Europe Ltd., London 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.



BACKGROUND

- Mental health service provision could be optimized by identifying patients at increased risk of psychiatric hospitalization. Early unstable clinical trajectories may be associated with poor clinical outcomes.^{1,2}
- The Clinical Global Impression-Severity Scale (CGI-S) is a generalizable measure of mental illness severity.
- This study investigated whether early trajectories of CGI-S are associated with subsequent hospital admission.

METHOD

Study design
A retrospective cohort study using Electronic Health Record (EHR) data from the NeuroBlu database.³

Inclusion criteria

- Common psychiatric diagnosis (ICD-9 or ICD-10 reflecting major depressive disorder, bipolar disorder, generalized anxiety disorder, post-traumatic stress disorder, schizophrenia or schizoaffective disorder, attention deficit hyperactivity disorder, or personality disorder).
- At least 5 recorded CGI-S scores within a 2-month period, defined as the 'index' period.

Exclusion criteria

- Record of hospitalization within or prior to the index period.

Exposure of interest
Clinical instability

- A measure of CGI-S fluctuation over the index period
- Operationalised as the time-adjusted Root Mean Squared Subsequent Differences (tRMSSD) of all CGI-S scores recorded during the index period

Outcome of interest

- Any inpatient stay as coded using the Observational Medical Outcomes Partnership Common Data Model (OMOP CDM) within 6-months after the end of the two-month index period (Figure 1).

Statistical analysis

- Time-to-event analysis performed using Cox regression, where clinical instability was the primary independent variable of interest.
- The model was adjusted for mean CGI-S score, age, gender, race, number of years in education, and psychiatric diagnosis.
- Robustness of results was subsequently examined via several changes in the model specification (Table 1).
- Potential interactions between clinical instability and clinical severity (mean CGI-S over the index period) were also investigated.

RESULTS

Table 1. Output from Cox regression analyses investigating associations between clinical instability across an initial two-month index period and time to hospitalization in the following 6 months.. Hazard ratios (HR) and 95% confidence intervals (CI) for clinical instability are reported.

Main analyses	HR (95% CI)	P-value	Cohort size	Number of events, n (%)
Fully adjusted*	1.09 (1.07-1.10)	<0.0001	36,914	9,294 (25.2)
Adjusted for sociodemographic factors*	1.07 (1.05-1.09)	<0.0001	36,914	9,294 (25.2)
Unadjusted	1.07 (1.06-1.09)	<0.0001	36,914	9,294 (25.2)
Secondary robustness analyses				
Follow-up extended to 1 year	1.06 (1.05-1.08)	<0.0001	36,914	13,922 (37.7)
Number of CGI-S measurements** included as a covariate	1.06 (1.05-1.08)	<0.0001	36,914	9,294 (25.2)
Index period extended to 6 months	1.19 (1.18-1.21)	<0.0001	70,304	14,903 (21.2)
Adjusted for year of first CGI-S measurement	1.06 (1.05-1.08)	<0.0001	36,914	9,294 (25.2)

*The analysis adjusted for sociodemographic factors was adjusted for gender, number of years in education, age, race, and psychiatric diagnosis. The fully adjusted analysis was also adjusted for clinical severity (mean CGI-S) during the index period.
**Refers to the number of CGI-S measurements recorded in the index period.

- 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.
- Clinical instability was significantly associated with increased risk of hospitalization (HR = 1.09, 95% CI = 1.07 – 1.10, p < 0.0001), and this association was robust (Table 1).
- Clinical instability and severity (mean CGI-S) were independent predictors of future risk of hospitalization. There was no interaction between the two (HR=0.99, 95% CI 0.98-1.01, p=0.33) and the HR of one did not inflate when the other was removed from the model (1.07, 95% CI 1.05-1.09 for instability, and 1.09, 95% CI 1.07-1.11 for severity).

CONCLUSION

- CGI-S trajectories within the first 2 months of clinical presentation are significantly associated with an increased risk of future hospital admission.
- The association was present across patients with several major psychiatric disorders and therefore CGI-S instability may have value as a transdiagnostic predictor of hospitalization.
- The predictive value of CGI-S instability should be assessed to understand how this may better stratify risk of adverse outcomes in managed care.

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

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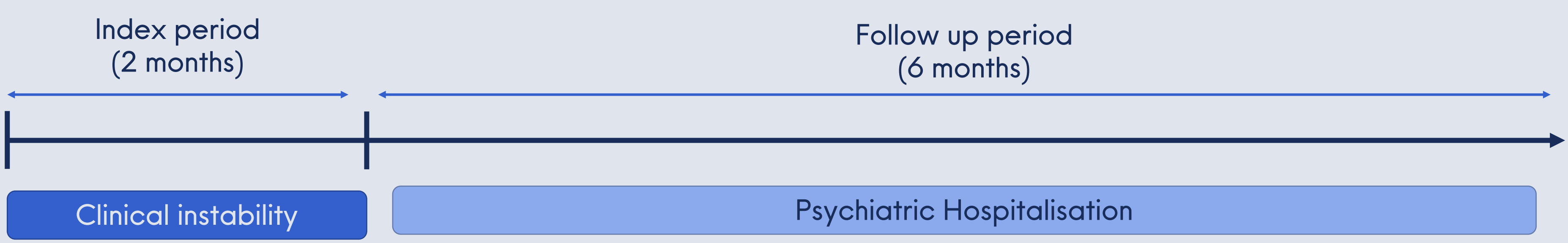


Figure 1. Schematic of study timeline. Clinical severity (mean CGI-S) and clinical instability were measured in a 2-month index period. The outcome of psychiatric hospitalization was evaluated in the subsequent 6-month follow up period.