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Systematic review and meta-analysis of suicide risk categorisation after psychiatric discharge from hospital inpatient units and emergency departments

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - Dr Large has provided evidence to coroners courts about matters that involve post discharge suicides.

INPLASY registration number: INPLASY202620052

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 February 2026 and was last updated on 16 February 2026.

INTRODUCTION

Review question / Objective Primary objective To systematically identify and synthesise evidence on the constituent risk factors, the methods used to amalgamate these factors into risk categorisation models, and the predictive performance of suicide risk categorisation approaches applied at or near psychiatric discharge.
Secondary objectives
1. To examine whether predictive performance differs between discharge settings:
o psychiatric inpatient discharge
o emergency department psychiatric discharge
2. To examine whether predictive performance differs according to method type:
o clinician judgement
o structured risk assessment scales
o statistical prediction models
o machine-learning models
3. To examine whether model complexity (number of candidate predictors and number of predictors retained in the final model) is associated with predictive performance.
To systematically identify and synthesise evidence on the constituent risk factors, the methods used to amalgamate these factors into risk categorisation models, and the predictive performance of suicide risk categorisation approaches applied at or near psychiatric discharge.

Rationale Suicide risk is substantially elevated following discharge from psychiatric inpatient care, particularly during the early post-discharge period. Although numerous clinical and statistical methods have been developed to identify individuals at increased risk of suicide, including clinician-based risk categorisation, structured risk scales, regression-based prediction models, and more recently machine-learning approaches, the predictive performance and clinical utility of these methods remain uncertain.
Previous systematic reviews have examined suicide risk factors following psychiatric discharge,

risk categorisation among current psychiatric inpatients, or suicide outcomes following emergency department presentations with suicidal behaviour. However, no comprehensive synthesis has evaluated the performance of suicide risk categorisation or prediction approaches specifically at the point of psychiatric discharge across both inpatient and emergency department psychiatric populations. Furthermore, existing reviews have generally focused on populations presenting with suicidality, potentially overlooking individuals discharged following non-suicidal psychiatric presentations who subsequently die by suicide.
A systematic review and meta-analysis are therefore required to evaluate the content, methodological characteristics, and predictive performance of suicide risk categorisation approaches applied at or near the point of psychiatric discharge from inpatient units and emergency departments.

Condition being studied Suicide after discharge from hospital care.

METHODS

Search strategy Information Sources and Search Strategy
Databases
• MEDLINE
• Embase
• PsycINFO
• PubMed (supplementary targeted search)
Primary search terms
(suicid*[Title]) AND
((hospital* OR admit* OR admission* OR inpatient* OR discharge* OR "emergency department" OR "emergency room" OR casualty OR "toxicology service")[Title/Abstract])

Supplementary targeted search terms (on PubMed)
(suicid*[Title]) AND
(("risk assessment" OR "risk categorisation" OR "risk stratification" OR "risk classification" OR "risk score" OR "prediction model" OR predict* OR prognos* OR "screening tool" OR "screening instrument" OR "risk scale" OR algorithm* OR "machine learning" or "artificial intelligence" OR "deep learning" OR "neural network")[Title/Abstract])

Additional search methods
Reference checking and hand-searching of relevant review articles and included studies.

Additional limits
• English language
• 1975 to present.

Participant or population Population Patients discharged from:
• psychiatric inpatient units
• emergency departments following a psychiatric presentation.

Intervention Suicide risk categorisation approaches applied at or near the time of discharge, including clinician risk categorisation, structured risk scales, statistical prediction models, or machine-learning models.

Comparator Higher-risk versus lower-risk classification groups, or other forms of risk stratification.

Study designs to be included Cohort and control design.

Eligibility criteria Inclusion criteria
Studies will be included if they:
(i) reported on cohort or controlled studies of patients discharged from psychiatric inpatient units or from emergency departments following a psychiatric presentation;
(ii) compared the clinical characteristics of groups of patients who died by suicide during follow-up with those who survived;
(iii) used two or more clinical variables to define a higher-risk group for suicide at or near the point of discharge, either by:
• Clinical judgement (assuming clinicians used more than one risk factor)
• use of an ad hoc scale with a cut-off point,
• use of multivariable regression-based models; or
• use of machine-learning models.
(iv) reported the numbers of true positives, false positives, false negatives and true negatives, or reported sensitivity and specificity, or provided sufficient data to allow these to be calculated;
(v) where contingency table data are not directly reported, true and false positives and negatives will be derived from other reported effect size statistics (e.g., odds ratios, sensitivity, specificity, or predictive values) and, where necessary, confirmed with the authors of the primary studies.
Exclusion criteria
Studies will be excluded if they:
(i) examined suicide during psychiatric admission only, without follow-up after discharge;
(ii) examined suicide among outpatients only, without a defined discharge from psychiatric inpatient or emergency department care;
(iii) included mixed inpatient and outpatient samples, or mixed psychiatric discharge groups with other populations, where risk estimates or

mortality outcomes could not be separated for the discharge cohort;
(iv) reported on suicide attempts or self-harm without suicide mortality;
(v) examined non-psychiatric patient groups (e.g. general medical or surgical patients);
(vi) exclusively examined biological, genetic, or treatment-related risk factors without defining risk groups or prediction models;
(vii) examined forensic or criminological discharge samples;
(viii) did not report sufficient data to allow calculation of diagnostic or classification performance, and where such data could not be obtained from the authors.

Information sources Peer-reviewed publications indexed in MEDLINE, Embase. PsycINFO. PubMed.

Main outcome(s) Suicide and non-suicide in higher and lower risk groups.

Additional outcome(s) None.

Data management Two reviewers will independently screen studies and extract data using a standardised extraction form capturing:
• study name;
• year of publication;
• geographic location (country);
• study design;
• derivation versus validation sample;
• population characteristics;
• psychiatric diagnostic composition of the sample;
• discharge setting;
• risk categorisation method;
• number of variables included in the high-risk model and the number of candidate variables from which they were derived;
• follow-up duration;
• sample size and number of suicides in the high-risk and low-risk groups;
• diagnostic, predictive, or classification performance measures (e.g. sensitivity, specificity, AUC, predictive values);
• other reported effect size data;
• reporting strength assessment.
All date will be retained electronically and the data used in the analysis will be published as and e-supplement.

Quality assessment / Risk of bias analysis Study quality in the primary studies will be assessed using a seven-item reporting strength scale adapted from the Newcastle–Ottawa Scale for non-randomised studies. The scale will assess whether the study:
(i) ascertained suicide mortality using external mortality or national death registry data, rather than local hospital records alone;
(ii) recorded clinical risk factors prospectively, rather than by retrospective extraction of medical records after the outcome occurred;
(iii) reported on a cohort rather than controlled design
(iv) accounted for variation in follow-up time (e.g., through survival analysis or time-to-event modelling), rather than analysing outcomes without adjustment for time at risk;
(v) defined the higher-risk group using a multivariable approach to risk categorisation, rather than by use of an accumulated risk score;
(vi) reported the predictive metrics in a validation rather than derivation study.
(vii) reported classification performance in a form allowing construction of contingency tables (e.g., sensitivity, specificity, or numbers of true and false positives and negatives), rather than requiring back-calculation of these statistics from reported effect size data or author correspondence.
Studies will be awarded one point for each item, with higher scores indicating stronger reporting quality.

Strategy of data synthesis Descriptive Synthesis
Data from included studies will be extracted into predefined data extraction spreadsheets and summarised descriptively in tables describing study characteristics, discharge setting, prediction methods, follow-up periods, and outcome definitions. A narrative synthesis will summarise methodological differences across studies and the characteristics of the suicide risk categorisation approaches used.
Additional tables will summarise the methods used to construct risk categorisation models and the risk factors included and excluded from each model, including how predictors were combined (e.g., clinical judgement, scoring systems, regression-based models, or machine-learning approaches). The frequency of inclusion of individual predictors across studies will also be tabulated to describe commonly used risk factors and variation in model composition.

Quantitative Analysis
Studies reporting classification of patients into higher-risk versus lower-risk groups will be used to construct 2×2 contingency tables (suicide vs. no suicide by risk category). Where not directly reported, contingency table data will be derived from reported statistics or obtained from study authors where possible.
For each study, odds ratios comparing suicide risk in higher-risk versus lower-risk groups will be

calculated and pooled using a random-effects meta-analysis. Diagnostic performance measures, including sensitivity, specificity, and, where possible, positive predictive value, will also be pooled using random-effects diagnostic accuracy methods, with pooled estimates reported alongside 95% confidence intervals and prediction intervals.

Assessment of heterogeneity and publication bias
Statistical heterogeneity across studies will be assessed using the I^2 statistic and the between-study variance. Potential outliers and influential studies will be examined through visual inspection of forest plots and analysis of residuals or influence diagnostics. Publication bias will be assessed using visual inspection of funnel plots, Egger's regression test, and trim-and-fill methods, where appropriate. Where quantitative pooling is not appropriate because of insufficient comparable data, findings will be synthesised narratively.

Subgroup analysis
Subgroup and moderator analyses
Subgroup meta-analyses will examine differences in predictive performance according to:
• discharge setting (psychiatric inpatient vs. emergency department);
• study design (cohort vs. controlled studies);
• type of risk categorisation method (clinician judgement, structured risk scales, statistical prediction models, and machine-learning models).

Sensitivity analysis Categorical moderator variables will be examined using mixed-effects subgroup analyses, while continuous moderator variables (e.g., follow-up duration or sample characteristics) will be examined using meta-regression analyses. Where multiple moderator variables are available, multivariable meta-regression will be conducted to assess their independent associations with effect size estimates.

Language restriction English Language.

Country(ies) involved Australia.

Other relevant information This is a generalisation of a previous meta-analysis examining risk categorization among psychiatric inpatients to discharged patients.Large M, Myles N, Myles H, Corderoy A, Weiser M, Davidson M, Ryan CJ. Suicide risk assessment among psychiatric inpatients: a systematic review and meta-analysis of high-risk categories. Psychol Med. 2018 May;48(7):1119-1127.

Keywords Suicide, post-discharge, inpatient, emergency department, risk assessment, risk cateforisation,, suicide prediction modeling.

Dissemination plans We anticipate submission to a peer reviewed journal.

Contributions of each author
Author 1 - Matthew Large - Conception, searches, data extraction, data synthesis, interpretation of findings, and review of manuscript.
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