INPLASY PROTOCOL

To cite: Zhang et al. Performance of the National Early Warning Score in predicting mortality among patients with infection outside the intensive care unit: a meta-analysis. Inplasy protocol 202040046. doi: 10.37766/inplasy2020.4.0046

Received: 09 April 2020

Published: 09 April 2020

Corresponding author:
Kai Zhang

21718324@zju.edu.cn

Author Affiliation:
Zhejiang University School of Medicine

Support: **Not applicable**

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

Conflicts of interest:
The authors declare that they have no competing interests.

Performance of the National Early Warning Score in predicting mortality among patients with infection outside the intensive care unit: a meta-analysis

Zhang, K[1]; Zhang, G[2]; Zhang, Z[3]; Cui, W[4].

Review question / Objective: **We want to estimate the accuracy of NEWS for predicting mortality in patients with infection outside the intensive care unit**
Condition being studied: **Varied scoring systems have been developed and widely used in the emergency department (ED) to predict clinic outcomes, characterize disease severity and guide the treatment for patients. National Early Warning Score (NEWS) was introduced in 2012 by the Royal College of Physicians, who aimed to provide a standardized early warning score. Over the last ten years, NEWS have been introduced into nearly all UK hospitals, and are already recommended in National Institute for Health and Care Excellence (NICE) guidance for monitoring critically ill patients in hospital and Royal College of Physician guidance for monitoring of all adult patients in acute hospital settings. In some centres, a certain score (for example, greater than 5), will trigger a pager alert to senior medical staff or critical care outreach services. Although there is some evidence that this method identifies sick patients, the evidence is limited.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 April 2020 and was last updated on 09 April 2020 (registration number INPLASY202040046).

INTRODUCTION

Review question / Objective: **We want to estimate the accuracy of NEWS for predicting mortality in patients with infection outside the intensive care unit.**

Condition being studied: **Varied scoring systems have been developed and widely used in the emergency department (ED) to predict clinic outcomes, characterize disease severity and guide the treatment for patients. National Early Warning Score (NEWS) was introduced in 2012 by the Royal College of Physicians, who aimed to provide a standardized early warning score. Over the last ten years, NEWS have been introduced into nearly all UK**

hospitals, and are already recommended in National Institute for Health and Care Excellence (NICE) guidance for monitoring critically ill patients in hospital and Royal College of Physician guidance for monitoring of all adult patients in acute hospital settings. In some centres, a certain score (for example, greater than 5), will trigger a pager alert to senior medical staff or critical care outreach services. Although there is some evidence that this method identifies sick patients, the evidence is limited.

METHODS

Search strategy: Pubmed = #1 sepsis[Title/Abstract] OR septic[Title/Abstract] OR sepsis[MeSH Terms] OR septic shock[MeSH Terms] OR infection[Title/Abstract] OR infection[MeSH Terms] OR infect*[Title/Abstract] #2 mortality[Title/Abstract] OR mortality[MeSH Terms] OR death[Title/Abstract] OR death[MeSH Terms] #3 news [Title/Abstract] OR national early warning score [Title/Abstract] #1 AND #2 AND #3

Participant or population: Patients with infection outside the ICU.

Intervention: NEWS score measurement done during the hospital period to predict the short-term mortality.

Comparator: Not applicable.

Study designs to be included: Observational study.

Eligibility criteria: Inclusion criteria (1) The study recruited adult patients (≥18 years old) outside the ICU; (2) The study applied the NEWS for predicting mortality (28-day mortality, 30-day mortality or in-hospital mortality); (3) The study should provide sufficient data to calculate the true positive (TP), false positive (FP), false negative (FN), true negative (TN) results; (4) Full-length articles written in English and research object was limited to human; Exclusion criteria: (1) The study population was not adult patients; (2) The article was not written in English; (3) The study did not report sufficient data to calculate TP, FP, FN, and TN results; (4) Case reports, case series, animal studies, pediatric studies; (5) The study evaluated NEWS score only for a composite outcome (e.p. combination of in-hospital mortality, ICU admission, adverse outcomes and so on); (6) If studies used the same database, we included the study with the most patients and excluded the others.

Information sources: Three electronic databases will be searched (PubMed, Embase, Scopus) for eligible studies published from January 2012 to April 2020. Full-length articles in English-language journals were eligible.

Main outcome(s): Short-term mortality (In-hospital mortality, or 28-day, 30-day mortality).

Data management: One investigator independently collected the following variables from the included articles: author information, year of publication, country, study design, diagnosis and definition of infection, number of patients, mean or median age, and mortality (in-hospital, 28-day, or 30-day). Two investigators independently collected true-positive, false-positive, true-negative, and false-negative counts; the total number of survivors and cases; and sensitivity, specificity, AUROC of NEWS score. Disagreements were resolved by consensus.

Quality assessment / Risk of bias analysis: QUADAS-2 (Quality Assessment of Diagnostic Accuracy Studies 2) tool used to assess quality.

Strategy of data synthesis: The data will be presented as mean values for continuous variables and as frequencies (%) for categorical variables. For the diagnostic meta-analysis, we will extract the number of patients with true-positive, false-positive, false-negative, and true-negative test results either directly, or through a recalculation based on the reported measures of accuracy in combination with

the prevalence and sample sizes from the included studies. We will then calculate the pooled sensitivity and specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), diagnostic odds ratios (DORs) as point estimates with 95% confidence intervals (CI), and will also construct hierarchical summary receiver operating characteristics (HSROC) curves to overcome some limitations of the traditional summary ROC curve procedure. Between-study statistical heterogeneity will be assessed using I^2 and Cochran's Q test, with I^2 values > 50% indicating substantial levels of between-study heterogeneity, requiring the use of a random-effects model otherwise (for values < 50%, a fixed-effect model will be used). In addition, if there is found to be a substantial level of heterogeneity, analysis via meta-regression will be performed to identify potential sources of bias. Publication bias will also be evaluated using the Deek test for funnel plot asymmetry, and a P value < 0.05 will be considered as statistically significant. All analyses will be performed using Revman 5.3 and Stata 12.0.

Subgroup analysis: Subgroup analyses are planned to further investigate heterogeneity of studies by cutoff value (≥5 versus ≥7), setting (emergency department versus general hospital ward), outcome definition (in-hospital mortality versus 28/30-day mortality), disease (infection versus sepsis), country (UK versus other countries).

Sensibility analysis: Sensitivity analyses will be conducted by repeating the analyses after excluding studies with high risk of bias.

Language: English.

Keywords: NEWS, sepsis, infection, mortality, Meta-analysis.

Contributions of each author:
Author 1 - Data acquisition, data interpretation, and statistical analysis and drafted the manuscript.
Author 2 - Study design, data acquisition, data interpretation, statistical analysis.
Author 3 - Statistical analysis and manuscript revision.
Author 4 - Critical revision of the manuscript.