Review

Diagnostic value of Status Epilepticus Severity Score for survival conditions of patients with status epilepticus: A PRISMA-compliant systematic review and meta-analysis

Peipei Wang [a,1], Yong Guan [b,1], Xiaoyan Lin [a], Qiang Wang [c], Chun Fu [d], Xiaogang Wang [e], Shaoping Lv [a,*]

[a] Department of Rehabilitation Medicine, Affiliated Central Hospital of Qingdao University, Qingdao, Shandong, China
[b] Department of Neurosurgery, Qingdao Municipal Hospital, Qingdao, Shandong, China
[c] Department of Rehabilitation Medicine, Affiliated Hospital of Qingdao University, Qingdao, China
[d] Department of Intensive Care, Peking University People's Hospital, Beijing, China
[e] Department of Ultrasound, Linzi District People's Hospital, Zibo, Shandong, China

ARTICLE INFO

ABSTRACT

Objective: In recent years, the Status Epilepticus Severity Score (STESS) has been widely used to predict survival conditions of patients with status epilepticus (SE). However, the diagnostic value of STESS has not yet been evaluated. We therefore performed this meta-analysis to assess the overall diagnostic accuracy of STESS for predicting survival condition of patients with SE.
Methods: Systemic searches for relevant published studies were conducted in EMBASE, PubMed, Web of Science, and Cochrange databases up to July 2, 2017. Quality Assessment of Diagnostic Accuracy Studies (QUADAS) was used to evaluate the quality of included studies. All statistical analyses were performed using Stata12.0 and Meta-DiSc software.
Results: A total of 11 studies including 12 observations with 1356 patients were included in this meta-analysis. Summary estimates of the diagnostic value of STESS for survival condition of patients with SE were listed as follows: sensitivity, 0.81 (95% confidence intervals (CI): 0.76–0.85); specificity, 0.53 (95% CI: 0.50–0.56); positive likelihood ratio (PLR), 1.86 (95% CI: 1.57–2.21); negative likelihood ratio (NLR), 0.38 (95% CI: 0.30–0.48); diagnostic odds ratio (DOR), 5.24 (95% CI: 3.49–7.87); and area under the curve (AUC), 0.81. Metaregression analysis showed that ethnicity, study design, publish year, and sample size did not significantly influence the diagnostic performance statistically (all P > 0.05).
Conclusions: The STESS is a promising candidate for predicting survival condition of patients with SE. However, the potential tool should be validated in well-designed studies with larger sample sizes.

© 2017 Elsevier Inc. All rights reserved.

1. Introduction

Status epilepticus (SE) is a serious neurological emergency with substantial mortality and morbidity ranging from 7.6 to 39% [1–3], and prompt treatment is recommend [4–6]. So far, there is no uniform consensus on management and treatment of patients with SE; SE treatment protocols range from small doses of benzodiazepine and other antiepileptic drugs to coma induction [4,5]. Identifying prognostic factors that predict clinical outcome and survival condition of patients with SE is important, because these factors may be useful for management and treatment of SE.

Rossetti et al. [7] developed a score named Status Epilepticus Severity Score (STESS) to predict in-hospital mortality after SE, and the cut-off value of STESS was set at three points (STESS-3), meaning that scores ≥3 represent a relatively high risk of death after SE. The STESS includes four clinical parameters: age, history of seizures, seizure type, and extent of consciousness impairment [8]. Subsequently, several studies [7–17] assessed the diagnostic value of STESS in predicting survival condition of patients with SE. In 2015, another score, epidemiology-based mortality status epilepticus (EMSE) score, was developed based on six parameters (etiology, age, comorbidity, electroencephalogram (EEG), level of consciousness, and duration of SE), and the results suggested that EMSE appears superior to STESS in the prediction of mortality after SE [13]. However, one study [18] suggested that there is no statistically significant difference between the STESS and EMSE in predicting in-hospital mortality. In addition, Sutter et al. [19] conducted an observational cohort study and demonstrated that STESS-3 was a robust predictor for death in patients with out-of-hospital SE and in-hospital SE.

---

* Corresponding author at: Department of Rehabilitation Medicine, Affiliated Central Hospital of Qingdao University, No. 127 Siliu South Road, Qingdao, Shandong 266042, China.
   E-mail address: qdkangfulsp@163.com (S. Lv).
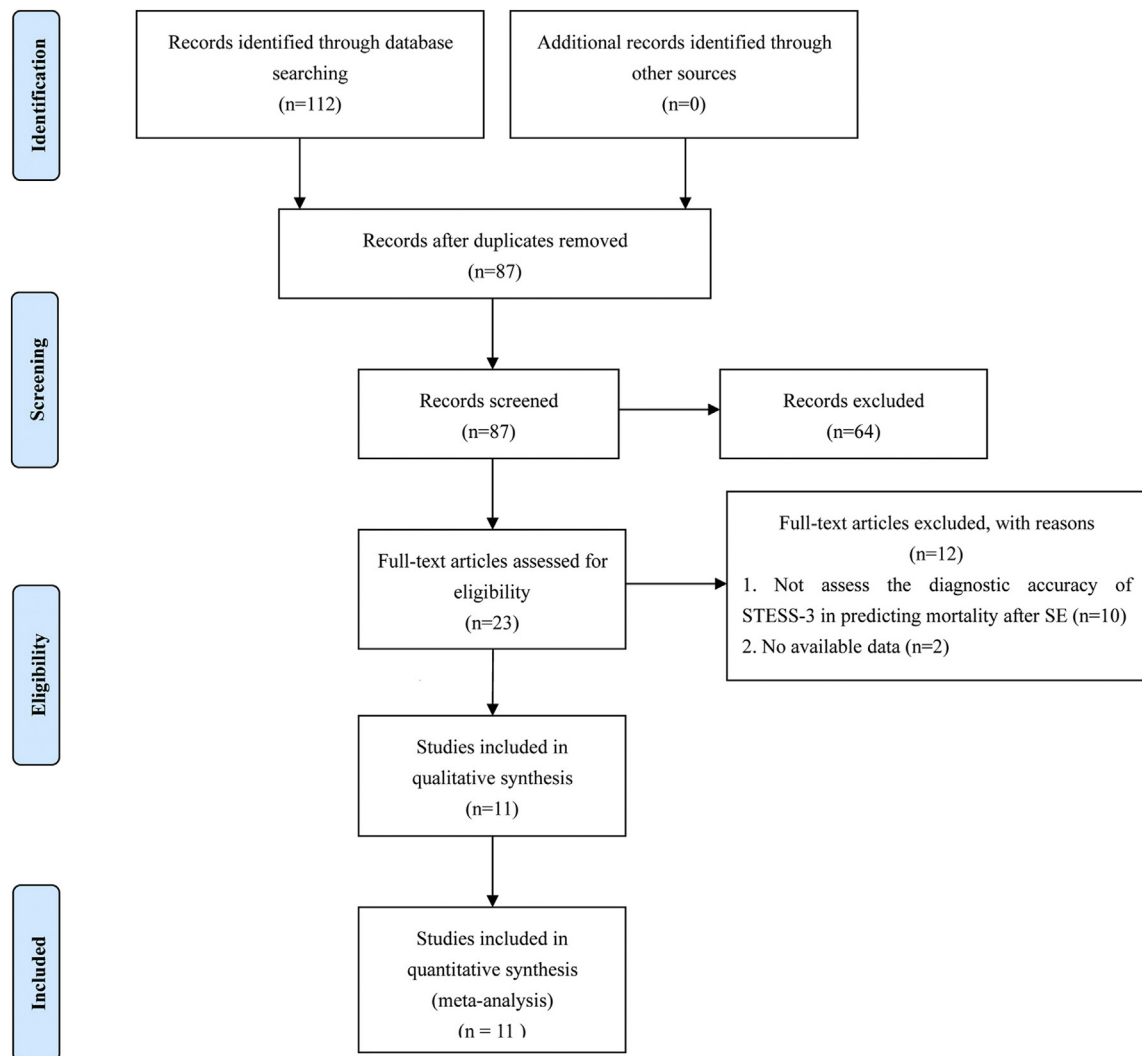[1] The two authors contributed equally to this work.

Fig. 1. Flow diagram of study selection process.

Whether the STESS could be used as a useful tool for clinicians to predict survival condition after SE is still controversial. As far as we know, a single study lacks strong evidences to evaluate the diagnostic value of STESS in predicting survival condition after SE. Therefore, our study aimed to estimate the overall accuracy of STESS for predicting mortality after SE through a comprehensive meta-analysis.

2. Materials and methods

This systematic review was conducted and reported in compliance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement [20]. The ethical approval was not necessary because this meta-analysis was based on data extracted from previously published studies.

2.1. Literature search

We identified the available studies by searching EMBASE, PubMed, Web of Science, and Cochrane databases from September 3, 2008 to December 15, 2017. The search terms were "status epilepticus or SE" and "sensitivity or specificity or accuracy" and "Status Epilepticus Severity Score or STESS". We also manually searched the reference lists of included studies to identify other potential studies. Only studies published in English were included.

2.2. Inclusion and exclusion criteria

Studies included in this meta-analysis should meet the following criteria: (1) the study was a retrospective or prospective study; (2) the study was an original article that used STESS to predict the survival condition of patients with SE; (3) the study included adult patients

Table 1
Basic characteristics of the selected studies included.

Author	Year	Cut-off (STESS)	Sample size	Study design	Country	ethnicity
Canas	2018	≥3	40	ROS	Portugal	Caucasian
Giovannini	2017	≥3	162	POS	Italy	Caucasian
Aukland	2016	≥3	125	ROS	Denmark	Caucasian
Goyal	2015	≥3	44	POS	India	Asian
Pacha	2016	≥3	46	ROS	Argentina	Caucasian
Gonzalez-Cuevas	2016	≥3	136	ROS	Spain	Caucasian
Leitinger	2015	≥3	92	ROS	Austria	Caucasian
Rossetti	2008	≥3	154	POS	Switzerland	Caucasian
Rossetti	2013	≥3	225	POS	Switzerland	Caucasian
Sutter	2013	≥3	171	POS	Switzerland	Caucasian
Rossetti (a)	2006	≥3	127	ROS	Switzerland	Caucasian
Rossetti (b)	2006	≥3	34	POS	Switzerland	Caucasian

POS: prospective observation study; ROS: retrospective observation study.