Effectiveness Evaluation of Early Assessment Tools for Earthquake Trauma Patients

Menglu Jia, MD;[1,2] ⓘ Xiaoman Cao, MD;[1,2] Xinyu Bai, MD[1,2]

1. West China School of Medicine, Sichuan University, Chengdu, Sichuan, China
2. Disaster Medicine Association, Sichuan University, Chengdu, Sichuan, China

Correspondence:
Menglu Jia,
MD Sichuan University, Chengdu City,
Sichuan Province, P. R. China
E-mail: 249835772@qq.com

To the Editor,

The article by Hai Hu, et al is inspiring.[1] The study identified nine independent mortality-related factors that contributed to adult earthquake trauma patients (AETPs) in-patient mortality and constructed an instruction, which is a nomogram, to screen for AETPs with a higher risk of in-patient mortality. This instruction makes sense because it uses simple prehospital factors, which produces great practical value in disaster environments where resources are scarce.

However, this instruction is novel and needs to be verified. To verify the effectiveness of the novel instruction in earthquake trauma patients, earthquake casualty data from a tertiary hospital in the 2008 Wenchuan earthquake were studied retrospectively. The patients' age, respiratory rate (RR), pulse rate, diastolic blood pressure (DBP), Glasgow Coma Score (GCS), crush injury, coronary heart disease (CHD), malignant tumor, chronic kidney disease upon admission, and the outcome (in-hospital death) were collected. Statistical Product and Service Solutions (SPSS) Version 26.0.0.0 (IBM Corporation; Armonk, New York USA) was used to perform a Receiver Operating Characteristic curve (ROC curve) analysis and calculate the Area Under Curve (AUC).

In total, 1,847 trauma patients who admitted in the hospital in the 2008 Wenchuan earthquake were extracted from the hospital electronic registration system. Excluding instances that lacked of RR (n = 31), DBP (n = 52), GCS (n = 19), and CHD (n = 34), a total of 1,711 cases were enrolled in the study and 38 cases (2.22%) were dead. The
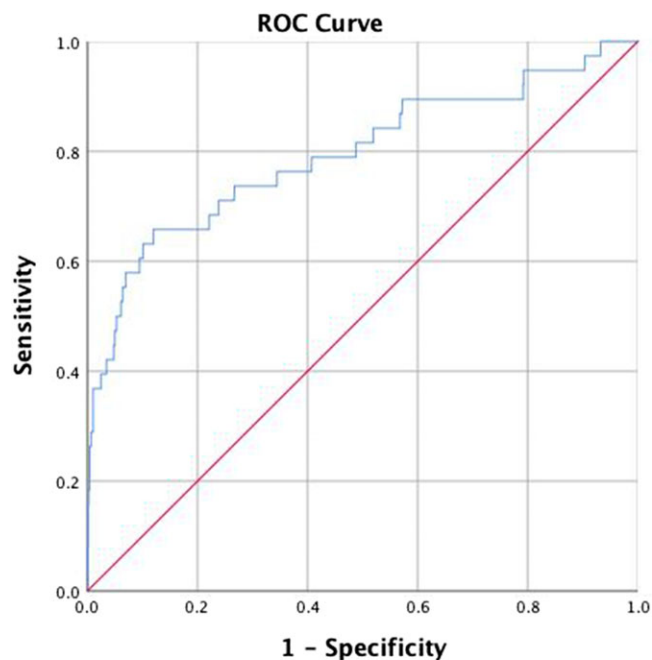
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Figure 1. The ROC of the Instruction for Earthquake Trauma Patients. Abbreviations: ROC, Receiver Operating Characteristics.

AUC	Standard Error	P Value	95% CI
0.794	0.046	.000[a]	0.704-0.884

Table 1. The AUC of ROC Curve of the Instruction for Earthquake Trauma Patients
Abbreviations: AUC, Area Under the Curve; ROC, Receiver Operating Characteristics.
[a] P <.05.

mean age of the enrolled patients was 45.71 and the median (25% quartile, 75% quartile) Injury Severity Score (ISS) was nine (4, 16) for survival and ten (5.25, 24.5) for death. The ROC curve is shown in Figure 1. The AUC was 0.794 (SE: 0.046; 95%CI, 0.704-0.884; P = .000), which is shown in Table 1.

The result showed that the instruction in the Hu's study was effective and practicable to screen for earthquake trauma patients with a higher risk of in-patient mortality. Sijia Liu's study identified old age ($\geq$ 65 years), crush syndrome, and cardiac/respiratory disease as independent mortality-related factors.[2] Some previous studies on adult trauma reported that vital signs, the state of consciousness, and comorbidities which were not treated in time were risk factors worthy of attention.[3–6]

However, the study is limited by its retrospective design and missing data (7.36%). A large-scale, multi-center, prospective study is needed to evaluate its effectiveness and capability further.

In conclusion, the instruction in the original article is effective and practicable in earthquakes to assess trauma patients rapidly and may be adopted in the triage of patients and be beneficial for patients to get more appropriate treatment.

References
1. Hu H, Lai X, Tan C, Yao N, Yan L. Factors associated with in-patient mortality in the rapid assessment of adult earthquake trauma patients. *Prehosp Disaster Med.* 2022;37(3):299–305.
2. Liu S, He C. Related factors associated with earthquake inpatient mortality. *Disaster Med Public Health Prep.* 2022;16(1):55–70.
3. Hu Z, Zeng X, Fu P, et al. Predictive factors for acute renal failure in crush injuries in the Sichuan earthquake. *Injury.* 2012;43(5):613–618.
4. Mubang RN, Stoltzfus JC, Cohen MS, et al. Comorbidity-polypharmacy score as predictor of outcomes in older trauma patients: a retrospective validation study. *World J Surg.* 2015;39(8):2068–2075.
5. Nolte PC, Häske D, Lefering R, et al. Training to identify red flags in the acute care of trauma: who are the patients at risk for early death despite a relatively good prognosis? An analysis from the TraumaRegister DGU. *World J Emerg Surg.* 2020;15(1):47.
6. Wan-Ting C, Chin-Hsien L, Cheng-Yu L, et al. Reverse shock index multiplied by Glasgow Coma Scale (rSIG) predicts mortality in severe trauma patients with head injury. *Sci Rep.* 2020;10(1):2095.