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Brief Report

Simple Triage Algorithm and Rapid Treatment and Sort, Assess, Lifesaving, Interventions, Treatment, and Transportation mass casualty triage methods for sensitivity, specificity, and predictive values☆,☆☆

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ABSTRACT

Objective: Two common mass casualty triage algorithms are Simple Triage Algorithm and Rapid Treatment (START) and Sort, Assess, Lifesaving, Interventions, Treatment, and Transportation (SALT). We sought to determine the START and SALT efficacy in predicting clinical outcome by appropriate triage.
Methods: We performed a retrospective chart review of trauma registry of patients from our emergency department (ED). We applied the triage algorithms to 100 patient charts.
The end points categories were defined by patient outcomes and the need for intervention: minor/green, discharged without intervention other than minor ED procedure; delayed/yellow, patients get an intervention more than 12 hours after arrival to the ED; immediate/red, patients get an intervention less than 12 hours after arrival; dead/expectant/black, patients die within 48 hours after arrival.
Results: The mean age was 47 years (range, 17-92 years), and 72% were male. The mechanism of injury was 41% motor vehicle collision, 32% fall, and 16% penetrating trauma. Hospital outcome was 60% minor/green, 5% delayed/yellow, 29% immediate/red, and 6% dead/black. The SALT method resulted in 5 patients overtriaged (95% confidence interval [CI], 1.6-11.2), 30 undertriaged (95% CI, 21.2-40), and 65 met triage level (95% CI, 54.8-74.3). The START method resulted in 12 overtriage (95% CI, 6.4-20), 33 undertriaged (95% CI, 23.9-43.1), and 55 at triage level (95% CI, 44.7-65). Within triage levels, sensitivity ranged from 0% to 92%, specificity from 55% to 100%, positive predictive values from 10% to 100%, and negative predictive value from 65% to 97%.
Conclusion: Overall, neither SALT nor START was sensitive or specific for predicting clinical outcome.

1. Introduction

Triage is defined as "the sorting of and allocation of treatment to patients and especially battle and disaster victims according to a system of priorities designed to maximize the number of survivors" [1]. Although the word is clearly defined, the process of how to carry out triage is less well defined. As the definition states, "a system of priorities" will be needed to be applied, but how do we organize this system of priorities and how do we know it is effective? One such system, known as Simple Triage and Rapid Treatment (START) (Fig. 1), has been the standard triage algorithm since the 1980s when it was developed [2]. The START algorithm is appealing because it applies the same approach of evaluating airway, breathing, and circulation as taught in advanced trauma life support certification. However, there is not a single way to approach triage, and retrospective studies have shown that START is not nearly as sensitive and specific as it claims to be and also has significant overtriage [3]. A second algorithm for triage has more recently been developed, the Sort, Assess, Lifesaving Interventions, Treatment/Transport algorithm, commonly known as SALT (Fig. 2A and B) [4]. This model has been endorsed by the American College of Emergency Physicians, American Trauma Society, and American College of Surgeons Committee on Trauma [5]. The SALT model involves initial global sorting as well as basic lifesaving interventions such as controlling hemorrhage, opening airway/rescue breaths, autoinjector antidotes, and chest compressions.

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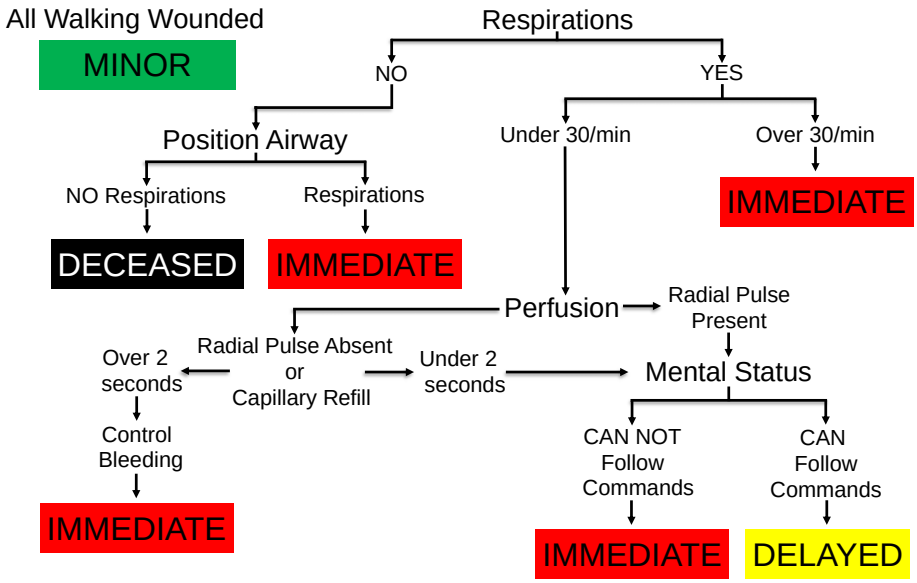

Fig. 1. START triage method.

The nature of mass causality incidents (MCIs) does not allow for randomized studies to compare the START and SALT triage algorithms. There is limited literature directly comparing the 2 triage algorithms when applying them to the same patient. One study evaluated the efficacy of START triage to predict mortality but did not assess the correlation with other outcomes [6]. The goal for this pilot study is to retrospectively apply the START and SALT triage methods to patients presenting to our level I trauma center as surgical or trauma activations and evaluate the accuracy based on patient outcomes and interventions required. Our hypothesis is that START and SALT triage methods are sensitive and specific and predict clinical outcome.

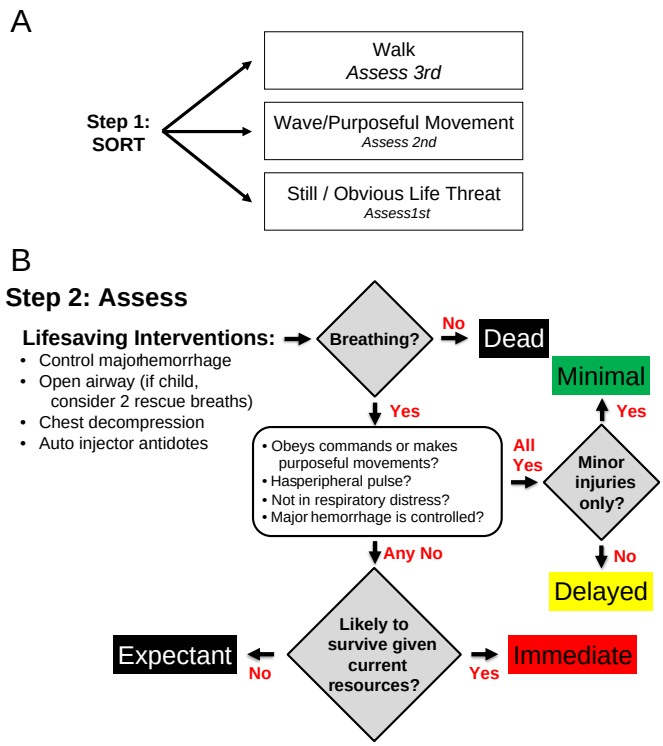

Fig. 2. A and B, SALT triage method.

2. Methods

2.1. Study design

We applied the START and SALT triage algorithms to patient data from our trauma registry to assess the sensitivity and specificity of the algorithms. This study was approved by the local institutional review board.

2.2. Study setting and population

We performed a retrospective chart review of trauma patients, in 2013, who presented for evaluation at our level I Midwestern trauma center, starting on January 1, 2013. The emergency department (ED) has more than 80 000 adult patient visits per year from a large trauma catchment area. We collected data from the first 100 charts with complete data available from the first health care encounter either emergency medical service (EMS) or ED, if self-transported. Patients transferred from other hospitals or freestanding EDs were excluded from the study. Our trauma registry is collected as part of our membership in the Northeastern Ohio Regional Trauma Network.

2.3. Study protocol

We collected demographic data on age, sex, and trauma mechanism. Mechanism categories were defined as motor vehicle collision, fall, penetrating trauma, pedestrian/bicycle struck, and industrial accident.

The START triage (Fig. 1) review included determining from review if patient could walk, which would triage them as green. If unable to walk, respirations reported less than 30 breaths per minute and systolic blood pressure (BP) greater than 80 mm Hg (correlating with radial pulse or normal cap refill), and patient was following commands, patient was triaged as yellow. If there is any abnormality in the aforementioned group with respirations, BP, and ability to follow commands, patient was triaged as red. If patient was apneic, they were triaged as black/expectant.

The SALT triage (Fig. 2) breaks triage into 2 steps. Sorting is first, in which patients who can walk are assessed last, those who cannot walk but can wave/purposefully respond are assess second, and those patients who are still/unresponsive are immediately seen. Assess and lifesaving treatment is next. Patients are triaged as green if they can obey commands or make purposeful movements, have a peripheral pulse, are not in respiratory distress, do not have a hemorrhage, and