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Evaluation of the implementation of the South African Triage System at an academic hospital in central Haiti

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ABSTRACT

Background: Effective triage is an important part of high quality emergency care, yet is frequently lacking in resource-limited settings. The South African Triage Scale (SATS) is designed for these settings and consists of a numeric score (triage early warning score, TEWS) and a list of clinical signs (known as discriminators). Our objective was to evaluate the implementation of SATS at a new teaching hospital in Haiti.
Methods: A random sample of emergency department charts from October 2013 were retrospectively reviewed for the completeness and accuracy of the triage form, correct calculation of the triage score, and final patient disposition. Over and under triage were calculated. Comparisons were evaluated with chi-squared analysis.
Results: Of 390 charts were reviewed, 385 contained a triage form and were included in subsequent analysis. The final triage color was recorded for 68.4% of patients, clinical discriminators for 48.6%, and numeric score for 96.1%. The numeric score was calculated correctly 78.3% of the time; in 13.2% of patients a calculation error was made that would have changed triage priority. In 23% of cases, chart review identified clinical discriminators should have been circled but were not recorded. Overtriage and undertriage were 75.6% and 7.4% respectively.
Conclusion: This study demonstrates that with limited structured training, SATS was widely adopted, but the clinical discriminators were used less commonly than the numeric score. This should be considered in future implementations of SATS.

1. Background

As emergency medicine continues to expand globally, it is increasingly important that hospitals adopt strategies to improve the quality and efficiency of emergency care. Triage, the process of sorting patients according to need so that the sickest patients receive priority treatment [1], has become a corner stone of emergency department (ED) quality and patient flow [2]. Triage allows for early recognition and treatment of critically ill patients, improves resource utilization and patient satisfaction, and decreases length of stay and admission rates [3]. The lack of a triage system, in contrast, is associated with increased morbidity and mortality [4]. In resource-limited settings, where resource prioritization is often even more critical, effective triage is requently lacking [5–7].

Multiple triage systems have been adopted in high-resource settings, including the Estimated Severity Index, the Canadian Triage and Acuity Scale, and the Manchester Triage System [1,8–11]. Some, like the Estimated Severity Index, rely on experienced providers to predict the resources a given patient will require [10]; others are chief complaint based [1]. However, the systems used in high resource settings may not apply to resource-limited environments, where experienced providers may be fewer, spaces and supplies more limited, and the disease burden different.

In resource-limited settings, triage systems remain underutilized, and resultant delays in the identification and treatment of critically ill patients continue to contribute to avoidable death and disability [4–6]. Barriers to traditional triage include inadequate record keeping, lack of nursing staff and limited infrastructure and equipment [4]. The South African Triage Score (SATS)

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was created to address these needs and was validated in these settings [12,13].

The SATS is a two-step composite triage score initially developed in 2004. It stratifies patients into 4 groups based on urgency: red (the most urgent), orange, yellow, and green (least urgent), as well as blue for those who are dead on arrival [12,14]. It has been shown to have low rates of under- and overtriage, correlate well to patient outcomes [15,16], increase efficiency [17–19], and decrease waiting times [20]. It has been successfully implemented in multiple low-resource settings [16–18,21,22].

The SATS is composed of two parts: a clinical discriminator list and the Triage Early Warning Score (TEWS). The clinical discriminator list includes signs and symptoms that assign a triage color based on the urgency of evaluation needed. For example, a facial burn is assigned red (highest priority) while other burns are assigned yellow (a lower priority color). The TEWS calculates a numeric score based on patient mobility, respiratory rate, heart rate, systolic blood pressure, temperature, level of consciousness, and if trauma occurred. The final TEWS score corresponds with a priority color. The final calculated triage color is the higher of the TEWS and clinical discriminator colors [14]. Each triage level is associated with a specific target time in which the patient should be seen [23]. The full SATS can be found at: http://emssa.org.za/sats/.

At University Teaching Hospital at Mirebalais (UTHM), a teaching hospital in rural Haiti, the SATS was implemented when the ED was opened in 2013. Slight modifications to the system were undertaken to account for local context, and a local UTHM triage form was designed based on the system. To our knowledge, this represents the first implementation of SATS at a public hospital in the Caribbean, and one of a few implementations outside of Africa [17,24]. The objective of this study was to evaluate the implementation of the SATS at UTHM.

2. Methods

2.1. Study design

The study was a retrospective chart review of a sample of patients who presented to UTHM ED during a one-month period (October 2013). This study was approved by institutional review boards at Partners Healthcare (Boston, USA) and Zanmi Lasante (Port–au-Prince, Haiti).

2.2. Study setting

UTHM is a 300-bed academic referral center in central Haiti. At the time of the study, the ED was a 15-bed unit that saw all non-obstetric emergency patients with a visit volume of approximately 1100 patients per month. Emergency care in Haiti is very limited, and most hospitals do not use any triage system. At UTHM, SATS was implemented in the ED when it was opened in 2013.

2.3. Triage at UTHM

One week prior to opening in June 2013, ED staff attended a four-hour structured training on the triage process, including the principles of triage, the specifics of SATS, and practice using SATS with sample cases. Training time prior to opening was limited by time and human resource constraints. After opening, the hospital nurse educator spent time in triage aiding staff with the triage process. There are two nursing cadres in Haiti: senior level nurses and auxiliary nurses. Senior level nurses have four years of schooling and are licensed to give all medications except sedation. Auxiliary nurses have two years of schooling, can do vital signs and give oral, intramuscular or subcutaneous medications. They cannot administer intravenous medications. Due to staffing limitations, at the time of the study all triage nurses in the UTHM ED were auxiliary nurses.

The SATS was modified slightly for use at UTHM with the addition of two 'red' clinical discriminators (age under 4 weeks and oxygen saturation <85%). An UTHM triage form was designed with spaces for documentation of the final triage color, the presence or absence of clinical discriminators, and the TEWS score.

2.4. Sample size

Based on a predicted visit volume of 1500 patients, a desired 5% margin of error and a 95% confidence level, the desired sample size to detect a triage accuracy rate of 50% was 306 patients.

2.5. Study protocol

The study period was defined as October 2013. This time period was the first month that all inpatient and outpatient hospital services were fully open, and thus represented the best measure of the initial implementation of the SATS. A list of all patients seen in the ED during the study period was generated from the electronic medical record. From this list, 400 patients over one month of age were randomly selected. Patients under one month of age were excluded as these patients are seen immediately as per hospital policy.

Each ED chart was reviewed by one of two trained physician reviewers. Data were entered into a standardized data collection instrument using the REDCap electronic data capture software [25]. Charts were evaluated for the presence of a triage form and use of the correct age-appropriate form. Only charts with a triage form were included in later data analysis. Chief complaint, vital signs, discriminators identified, and calculated score were recorded from the triage form. Patient demographics and final disposition were also extracted. The physician note was reviewed for the presence of clinical discriminators that should have been identified during triage.

2.6. Definitions and data analysis

Forms were analyzed for completeness and accuracy. The discriminator section of the triage form includes the list of clinical discriminators (which are circled when identified) and summary yes/no questions on if any discriminator of that color was present. A discriminator section was considered complete if either the checkboxes were completed and/or a discriminator was circled.

To evaluate if discriminators were missed at triage, a subset of discriminators documented on the triage form were compared to the physician documentation. Given the retrospective nature of the study, subjective discriminators (such as severity of pain) or those unlikely to be reliably recorded on the physician note (such as a post-ictal state) were not evaluated. A discriminator was defined as missed if it was listed in the physician documentation but not the triage form.

To evaluate errors in the TEWS score calculation, a TEWS score was manually calculated from the recorded vital signs, mental status, and neurological status on the triage form, as well as the presence of trauma based on overall chart review. This was compared to the score recorded on the triage form. The TEWS was not manually calculated for charts with missing data. The color corresponding to the manually calculated TEWS was compared to the recorded color to determine if calculation errors would have changed triage priority.

A significant number of forms did not have a final triage color recorded. Thus, an "adjusted" final triage color was calculated for