ORIGINAL ARTICLE

A quality improvement study of the emergency centre triage in a tertiary teaching hospital in northern Ethiopia

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ABSTRACT

Introduction: An effective emergency triage system should prioritize both trauma and non-trauma patients according to level of acuity, while also addressing local disease burden and resource availability. In March 2012, an adapted version of the South African Triage Scale was introduced in the emergency centre (EC) of Ayder Comprehensive Specialized Hospital in northern Ethiopia.
Methods: This quality improvement study was conducted to evaluate the implementation of nurse-led emergency triage in a large Ethiopian teaching hospital using the Donabedian model. A 45% random sample was selected from all adult emergency patients during the study period, May 10th to May 25th 2015. Patient charts were collected and retrospectively reviewed. Presence and proper completion of the triage form were appraised. Triage level was abstracted and compared with patient outcome (dichotomized as "admitted to hospital or died" and "discharged alive from emergency centre") to quantify over- and under-triage triage.
Results: From 251 randomly selected patients, 107 (42.6%) charts were retrieved. From these, only 45/107 (42.1%) contained the triage form filled within the chart. None of the triage forms were filled out completely. From 13 (28.9%) admitted or deceased patients, the under-triage rate was 30.7% and from 32 (71.1%) patients discharged alive from the EC the over-triage rate was 21.9%.
Discussion: The under-triage rate observed in this study exceeds the recommended threshold of 5% and is a serious patient safety concern. However, under-triage may have been magnified by irregularities in the hospital admission process. Haphazard medical record handling, poor documentation, erroneous triage decisions, and poor rapport between nurses and physicians were the main process-related challenges that must be addressed through intensive training and improved human resource management approaches to enhance the quality of triage in the emergency centre.

African relevance

- Triage is still a novel concept in many African emergency centres.
- Appropriate methods of triage are essential for the effective functioning of an emergency centre.
- This study reflects the weaknesses of triage seen in many African emergency centre settings.

Introduction

The goal of triage is to prioritize patients who require the most urgent care and increase efficiency when resources are insufficient to treat all patients at once [1]. An effective emergency centre (EC) triage system should sort both trauma and non-trauma patients according to level of acuity [2], while also considering local disease burden and the health facility's resource availability [3,4]. While there are many validated in-hospital triage algorithms designed to meet different user needs [1,5,6], such as the five-level Emergency Severity Index recommended for use in hospitals in the United States [2], and the South African Triage Score (SATS) developed for use in South Africa [7,8], it is important to recognise that a triage scale developed in one country or region may not be applicable elsewhere.

Ample evidence supporting the effectiveness of emergency triage to improve patient flow (efficiency), crowding, and outcomes has been generated in developed countries. Low-resource settings, however, face distinctive challenges that may significantly impact the choice of an appropriate triage scale and the success of its implementation. Examples of such challenges include shortages of material and human resources, poor record keeping practices, the ever-increasing triple disease burden of communicable disease, non-communicable conditions, and injuries, and limited access to health care for the general population [1,9,10]. Considering these complex differences, there is a surprising dearth of evidence on emergency triage implementation specifically in low-resource settings. In turn, ECs in developing countries have been given less attention by researchers and policy makers due to a general lack of locally relevant evidence [11].

As for most low-income countries, triage at the study site, an EC at an Ethiopian hospital, was non-existent until relatively recently. In January 2005, the Ethiopian Federal Ministry of Health endorsed the concept of triage as a patient flow management tool when it launched the Ethiopian Hospital Management Initiative in partnership with Yale School of Public Health and the Clinton Foundation HIV/AIDS Initiative [12]. In 2010, a national hospital performance monitoring system was introduced that incorporated 124 hospital management standards, several of which specifically mandated the conducting of emergency triage [13]. A manual with some technical detail on how to implement triage was provided to hospital administrations [14,15], but supervision visits revealed that triaging practice was not standardized between hospitals [16].

Opened in 2008, Ayder Comprehensive Specialized Hospital (ACSH) is a large referral and teaching institution affiliated with Mekelle University College of Health Sciences in Tigray Region, northern Ethiopia. From its outset, the EC at ACSH faced challenges similar to those observed in many other African settings, including inefficient patient flow, overcrowding, and poor patient outcomes [17]. To address these problems, and to comply with the national hospital management standards [14,15], nurse-led emergency triage was introduced in March 2012. ACSH management decided to use the South African Triage Score over other available triage algorithms because it was believed to best address the local circumstances [18], although certain components of the original SATS algorithm were adapted specifically for ACSH (Table 1).

Following the establishment of nurse-led emergency triage in ACSH EC, there was a need to assess whether it was being implemented properly. Recognizing the complexity of factors that could impact its implementation, we applied the Donabedian model [19] of quality improvement to frame our research in terms of structure, process, and outcome. The aim of this study was to evaluate the triage system at ACSH EC, focusing on process-level factors (Fig. 1). Our paper is one of the first that specifically evaluates the implementation process of an emergency triage system in an Ethiopian hospital. In addition, hospital managers as well as regional and national health stakeholders can use our results to improve the quality of triaging in Ethiopia.

Methods

This quality improvement study was conducted in the EC at ACSH, a tertiary teaching and referral institution located in Mekelle, the capital of the Tigray region, located in northern Ethiopia. Among other services, ACSH provides adult and paediatric emergency care to the 5.1 million residents of the Tigray region as well as parts of the neighbouring Afar and Amhara regions, treating between 1500 and 2000 emergency patients per month [17].

Mekelle University College of Health Sciences does not offer integrated post-graduate education in emergency medicine for physicians, and as a result, the EC at ACSH is physically and functionally fragmented along existing academic departmental lines. There are four separate examination rooms- medical, surgical, gynaecology and obstetrics, and paediatrics- each staffed by rotating clinicians from the respective academic departments. Prior to implementing emergency triage, nurses would classify arriving patients by department without performing any objective prioritization based on the patient's condition. With the introduction of the emergency triage system in March 2012, nurses were expected to assign a triage level based on an adapted SATS algorithm before sending or escorting the patient to the appropriate department based on their chief complaint. The triage nurse fills out a triage form (Fig. 2, data supplement) which is given to the treating physicians so they can prioritize patients by triage level, and the form is finally filed with the patient's chart. The triage nurse also keeps a simple logbook of triaged patients at the triage area. All emergency nurses received an initial half day in-service training on the new triage system prior to its roll-out.

ACSH's adapted SATS algorithm employs the Triage Early Warning Score (TEWS) to summarize the patient's physiological status. Using the calculation matrix shown in the triage form (Fig. 3), the triage nurse gives a value from 0 to 3 on seven parameters (respiratory rate, pulse rate, systolic blood pressure, temperature, mobility, level of consciousness, and exposure to trauma), and the sum total is the patient's TEWS.

Since physiology alone does not identify all patients needing urgent treatment, additional factors (referred to as "discriminators") are cross-checked that may classify the patient into a higher triage category, such as mechanism of injury, specific types of presentations, and level of pain. Fig. 4 lists the discriminators and associated triage levels adapted for use in ACSH. The patient is ultimately assigned the highest indicated colour code based on TEWS, mechanism of injury, presentation, level of pain, or a senior healthcare provider's discretion. The specific elements of the original SATS adult triage algorithm that were adapted for use in ACSH are summarized in Table 1, along with their justifications.

All patients over the age of 18 years who attended the ACSH EC during the two-week study period from May 10th to May 25th 2015 were eligible for inclusion in this study. The authors abstracted the medical record numbers of all eligible patients from the triage logbook to create the sampling frame. From 557 total eligible patients, a representative sample with 95% confidence level and 5% margin error was calculated to be 228 patients (40.9%).

Table 1
SATS adaptation for use in Ayder Comprehensive Specialized Hospital, Mekelle, Tigray, Ethiopia.

SATS Adult Triage Algorithm [7]	Adaptations for use in ACSH
Used for patients older than 12 years of age or 150 cm in height	• Used for patients older than 18 years of age in order to align with the Department of Paediatrics definition of "pediatric patient" • No height cut off is used, since the average Ethiopian is shorter than 150 cm.
Respiratory Rate from 9–14 is scored "0" and 15–20 is scored "1"	• Respiratory Rate from 9 to 20 is scored "0" based on consistent feedback from triage nurses. This could be related to the high altitude in Mekelle and different cardiovascular capacity of Ethiopians compared with South Africans.
Pregnancy with antepartum hemorrhage is not listed as a discriminator	• Pregnancy with antepartum hemorrhage added as a RED discriminator because of the high maternal mortality rate and priority placed on maternal health in Ethiopia.