

EVALUATING IMPLEMENTATION OF THE EMERGENCY SEVERITY INDEX IN A BELGIAN HOSPITAL

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Introduction: Triage aims to categorize patients based on their clinical need and the available departmental resources. To accomplish this goal, one needs to ensure that the implemented triage system is reliable and that staff use it correctly. Therefore this study assessed the ability of Belgium nurses to apply the Emergency Severity Index (ESI), version 4, to hypothetical case scenarios after an educational intervention.

Methods: An ESI educational intervention was implemented in accordance with the ESI manual. Using paper case scenarios, nurses' interrater agreement was assessed by comparing triage nurse ESI levels with the reference answers noted in the implementation manual. Interrater agreement was measured by the percentage of agreement and Cohen's κ coefficient using different weighting schemes.

Results: Overall, 77.5% of the scenario cases were coded according the ESI guidelines, resulting in a good interrater agreement ($\kappa = 0.72$, linear weighted $\kappa = 0.84$, quadratic

weighted $\kappa = 0.92$, and triage-weighted scheme = 0.79). Interrater agreement varied when evaluating each ESI level separately. Undertriage was more common than overtriage. The highest misclassification range (37.8%) occurred in ESI level 2 scenarios, with 99.2% of the misclassifications being undertriaged.

Discussion: Implementation of the ESI into a novel setting guided by a locally developed training program resulted in suboptimal interrater agreement. Existing weighted κ schemes overestimated the interrater agreement between the triage nurse-assigned ESI level and the reference standard. By providing an aggregated measure of agreement, which allows partial agreement, clinically significant misclassification was masked by a misleading "good" interrater agreement.

Key words: Emergency nursing; Emergency service, hospital; Triage; Implementation

Emergency departments are increasingly confronted with situations in which their function is impeded when the number of patients who are waiting to be

seen, undergoing assessment and treatment, or waiting for discharge exceed the physical and/or staffing capacity of the emergency department.^{1,2} The problem does not end at the ED door; hospitals in general are getting saturated, resulting in unreasonable waiting times before ED patients can be transferred to a staffed hospital bed.¹⁻³ These situations, known as crowding and access block, cause extended ED waiting times that potentially jeopardize patient safety.⁴⁻⁶

A frequently used method to prevent unsafe waiting times is to determine clinical priorities among visiting patients. Several urgency classification methods are available within the literature.⁷ One example is the Emergency Severity Index (ESI), a 5-level triage scale.^{8,9} Essentially, triage is a process of sorting patients into meaningful groups. These groups can be used to manage the waiting patients by giving priority to certain groups or streaming patients according their needs. The overall objective of a triage system is to identify high-risk patients, essentially those who cannot wait to be seen.⁷⁻⁹ The ESI is based around a new conceptual model of ED triage. It retains the

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traditional foundation of patient urgency (ie, sorting of patients) while seeking to accomplish a second goal of patient streaming: that is, getting the right patient to the right resources at the right place and time.¹⁰ The ESI attempts to accomplish these 2 goals by indicating which patients should be seen first and, additionally, considering the resources required to determine the patient's disposition.^{9,10} Triage is intended to ensure patient safety among waiting patients, and thus accurate triage is fundamental, especially because the assigned triage level determines the waiting time and initial level of care a patient will receive.¹¹ Therefore the triage system needs to be valid and reliable at the same time. Several studies indicate sufficient to excellent validity and reliability of the ESI.¹²⁻²⁰

Implementation of the ESI has primarily taken place in the United States, although some European countries have adopted this system as well.²¹ In Belgium, nurse triage has only been legally possible since 2007. Subsequently, many Belgian hospitals have been persuaded to implement a triage system. For the previously stated reasons, emergency departments are inclined to implement a triage system with demonstrated validity and reliability. After implementation of a new system, formal evaluation of its performance within the new setting is recommended.

The objectives of this study are 2-fold. First, we evaluated the ability of Belgian nurses to apply the ESI to hypothetical paper-based case scenarios according to an educational program. A second objective of this study was to compare different measures of interrater agreement in hypothetical triage scenarios.

Methods

DESIGN, SETTING, AND PARTICIPANTS

This cross-sectional observational study was conducted at the emergency department of a 1900-bed tertiary care teaching hospital in Belgium. The emergency department has an annual census of approximately 54 000 patients and a census of 102 to 210 patients per day. Between 2005 and 2008, the patient volume increased by approximately 3814 patients (8%). The ESI was implemented in the emergency department in January 2009. The ED staff had no previous experience with the ESI or triage in general. Under Belgian law, only nurses with a license in intensive care and emergency care (gained after obtaining an additional bachelor's degree in intensive and emergency care nursing) are allowed to perform triage in the emergency department. During the period from December 2008 to March 2009, all emergency nurses allowed to perform triage were trained (N = 52). Besides having a license in intensive care and

emergency care, all participating nurses had at least 2 years of work experience in the emergency department.

PROCEDURE

A multidisciplinary implementation team consisting of 3 emergency physicians and 4 emergency nurses developed and provided an education program to teach nurses to use the ESI triage standards (version 4). The content was obtained from the ESI implementation manual.¹⁰ Educational support came from one of the team members, a qualified teacher in Medico-Social Sciences. The resulting training program consisted of a 3-hour interactive theoretical presentation, followed by a practice session with 30 paper-based case scenarios, also adopted from the implementation manual (chapter 9: practice cases).¹⁰ The original implementation manual was not distributed among the nurses. Instead, handouts of the theoretical presentation and a reference card were provided. To succeed in the training program, all participating nurses had to complete a survey consisting of 30 paper-based case scenarios, which were also adapted from the implementation manual (chapter 10: competency cases).¹⁰ Prior to implementation of the training program, 2 independent medical management assistants translated the practice and competency cases into Dutch. The translated cases were translated back to English by the implementation team to correct translation inconsistencies. All team members had excellent knowledge of English.

The training program was spread over 2 days, dividing theoretical and practice sessions, allowing the nurses to process the material. The survey was conducted after the practice session. Nurses were allowed to use the reference card containing the ESI algorithm and a summary of the resources as defined in the ESI algorithm, version 4.

DATA ANALYSIS

The survey answers (triage nurse–assigned ESI level) were compared with the reference answers provided in the implementation manual (true ESI level).¹⁰ We defined undertriage as the assignment of a lower triage level compared with the reference answer. Overtriage was defined as assignment of a higher triage level compared with the reference answer. Based on a contingency table, data were descriptively analyzed with use of frequencies and percentages. Because of the lack of international consensus regarding the evaluation of interrater agreement in triage, several statistical measures were used. Cohen's κ coefficient is a frequently used measure; it is a statistical measure in which agreement of 2 or more raters or methods (interrater

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