

ANALYZING THE USABILITY OF THE 5-LEVEL CANADIAN TRIAGE AND ACUITY SCALE BY PARAMEDICS IN THE PREHOSPITAL ENVIRONMENT

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Introduction: ED crowding negatively affects throughput, quality of care, and outcomes. Paramedics do not have an evidence-based, feasible triage instrument to guide classification of patients. No studies have compared the Canadian Triage and Acuity Scale (CTAS) used by prehospital paramedics against the Emergency Severity Index (ESI) used by nurses in the emergency department. This study sought to determine if a relationship exists between paramedics' triage scores and emergency nurses' scores in the emergency department using 2 common 5-level triage instruments, as well as to determine whether either instrument correlates with patient admission.

Methods: CTAS scores determined by paramedics on arrival at the emergency department were compared with the initial ESI scores determined by emergency nurses. Both scores were compared with the patient's disposition status. Data analyses included descriptive statistics, χ^2 statistics, and hierarchical regression analysis.

Results: The analysis included 2,222 patients. There was a poor relationship between the CTAS and the ESI at the facility ($P = .599$, $\kappa = -0.003$). The final regression model explained 32.9% of the admission variance ($P < .001$). The model correctly predicted 61.5% of admissions, with an 82% accuracy rate for all other forms of disposition and an overall model prediction rate of 73.7%.

Discussion: Using the CTAS, paramedics can predict admission comparably with nurses using the ESI. However, both instruments showed weakness in over- and under-triage rates. Additional studies are indicated to better understand prehospital paramedic triage and its impact on throughput.

Key words: Paramedics; Emergency nurses; Triage; CTAS; ESI

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Emergency department crowding is a hospital-wide problem that challenges the input-throughput-output model of ED care.^{1,2} Diagnostic testing in triage is associated with a significant reduction in ED treatment times, and when associated with admission prediction, improves throughput in the emergency department.^{3,4} Increased ED length of stay due to crowding is associated with adverse clinical outcomes, emergency medical services (EMS) diversion, and patient and clinician dissatisfaction.³

A standardized, moldable, and developing triage system is imperative to ensure the maximization of resources while maintaining a safe and efficient health care delivery system.⁵ The Emergency Nurses Association (ENA), in 2003, and the American College of Emergency Physicians, in 2005, recommended the use of a 5-level triage system in the emergency department, which was updated in 2010 to include the use of either the Emergency Severity Index (ESI) or a similar 5-level instrument.^{6,7} Although this addressed the need for ED triage, the patient experience often begins with paramedics in the prehospital environment. On average,

ambulances are used as the primary mode of transportation for 15.8% of ED patients.^{8,9} Currently, paramedics do not have an evidence-based, feasible, reliable, or valid triage instrument to guide identification or classification of patients in the prehospital setting or direct handover of care to nurses in the emergency department.¹⁰

Often providing care in extreme situations, paramedics must have confidence, trust, critical-thinking skills, and strong interpersonal and intraprofessional communication to protect life, limit loss, and improve outcomes.¹¹ Studies indicate that paramedics are unable to determine effectively, among noncritical patients, those who need admission or require additional resources, including laboratory, radiology, or specialist referral, or to determine triage category according to acuity or resource need, with reported under-triage rates varying from 5% to 17.9%.¹²⁻¹⁵ The literature supports the need for standardized, evidence-based guideline (EBG) development for paramedics.^{12,13} A review published by the Institute of Medicine (IOM) in 2007 encouraged the National EMS Advisory Council and the Federal Interagency Committee on EMS to establish an EBG development team to address the lack of a standard triage instrument for paramedics.¹⁶

ESI and Canadian Triage and Acuity Scale

The ESI and the Canadian Triage and Acuity Scale (CTAS) are two 5-level triage instruments with similar reliability and validity findings. Both the ESI and the CTAS measure patient acuity; however, they have shown limited success predicting admission.^{4,17} Both triage instruments classify patient acuity on a scale from 1 to 5, with 1 being most urgent and 5 being least urgent.

The ESI triage process uses an algorithm based on patient acuity and anticipated resource need to determine triage category.¹⁶ In a review of 12 analyses of reliability and validity, the ESI had a significant correlation with hospital mortality rate and resource utilization, with good to excellent interobserver reliability.¹⁶ However, there are concerns with the ESI relative to older patients and the increasing number of comorbidities, as well as challenges with atypical complaints.¹⁸ One study indicated moderate agreement in ESI level designation by paramedics and nurses (0.409; 95% confidence interval [CI], 0.256-0.562).¹⁹ Limitations to ESI use include the lack of a common language; differences in training between paramedics and nurses; differences in purpose and understanding of triage regarding the chronically ill/injured; and the need to limit under-triage.²⁰

In contrast to the structure of the ESI, the CTAS uses an extensive list of clinical complaints, symptoms, and modifiers, at strategic times, to direct users toward a specific classification.¹⁶ The CTAS is a 5-level triage system that has become the national triage system in Canada and other countries.²⁰ Contrary to the challenges faced by the ESI, the CTAS has shown strong reliability and validity among pediatric and adult populations and has shown a strong correlation (quadratic $\kappa = 0.69$; 95% CI, 0.68-0.71) with severity and resource need among elderly persons.²⁰

Despite extensive use of the ESI and CTAS instruments by emergency nurses, neither has been declared the gold standard in the United States, based on the belief that more testing is needed to support the psychometric properties of feasibility, reliability, and validity. Although studies exist comparing use of the ESI by paramedics in the field with that of nurses in the emergency department, no studies have compared the association of CTAS triage scoring used by paramedics with ESI scoring used by emergency triage nurses.¹⁹

The purpose of this study was to determine whether triage score determination by paramedics in the prehospital environment using the CTAS was associated with the triage scores determined by emergency nurses using the ESI. In addition, we sought to evaluate how triage scores related to patient disposition, specifically admission status. This study is the first step in a multistep process that seeks to develop a reliable and valid triage instrument for use by paramedics in the prehospital environment. Because paramedics function as the initial point of contact for emergency care of ill and injured persons across the spectrum of care, it is imperative that we seek to identify all factors that affect paramedics' ability to determine acuity and resource need. In turn, this information may improve information dissemination between paramedics in the field and nurses, advanced practice providers, and physicians in the tertiary care environment.

Methods

DESIGN/SETTING

This descriptive correlational study was conducted with the city of Columbus (Ohio) Division of Fire (CFD) and The Ohio State University (OSU). The CFD operates a full-time fire and EMS division composed of seven battalions, 32 fire stations, and 1,500 employees. In 2012 the CFD responded to 129,711 EMS incidents.²¹ The OSU Medical Center operates 2 medical facilities. OSU Main is a 976-bed Level I academic trauma center and OSU

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