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A simplified trauma triage system safely reduces overtriage and improves provider satisfaction: a prospective study



Robert R. Shawhan, M.D.^a, Derek P. McVay, D.O.^a, Linda Casey, R.N.^a,
Tara Spears, R.N.^a, Scott R. Steele, M.D.^a,
Matthew J. Martin, M.D., F.A.C.S.^{a,b,*}

^aDepartment of Surgery, Madigan Army Medical Center, 9040-A Fitzsimmons Drive, Tacoma, WA 98431, USA; ^bDepartment of Surgery, Legacy Emanuel Medical Center, Portland, OR, USA

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Abstract

BACKGROUND: Standard triage systems result in high rates of overtriage to achieve acceptably low undertriage. We previously validated optimal triage variables and used these to implement a new simplified triage system (NEW) at our hospital.

METHODS: All trauma entries from May 2010 to Feb 2013 were prospectively reviewed. Calculation of the undertriage and overtriage rates was based on the need for any urgent or life-saving intervention.

RESULTS: We identified 704 trauma patients. Level 1 activations were reduced from 32% (OLD) to 19% in the NEW system ($P < .05$). Overtriage was reduced from 79% (OLD) to 44% in the NEW system ($P < .01$). The undertriage rate was 1.6% in the NEW system, compared with 1.2% in the OLD system ($P =$ nonsignificant). Of all patients, 14% (63) required a life-saving intervention. There were no deaths among undertriaged patients.

CONCLUSION: The NEW simplified triage system significantly reduced the rate of overtriage, while safely maintaining a low undertriage rate.

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* Corresponding author. Tel.: +1-253-968-2361; fax: +1-253-968-5900.

E-mail address: matthew.j.martin16.mil@mail.mil

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The appropriate and accurate triage of the acutely injured patient is a cornerstone of modern trauma care and effective trauma systems. Multiple studies have demonstrated the positive impact of appropriate triage on morbidity and mortality.^{1–3} Although the perfect triage system would always match patient needs to the available resources, current systems inherently result in various degrees of overtriage, undertriage, and mistriage. Among these, the most widely discussed and feared is undertriage, which can result in patient morbidity and mortality because of delayed or missed interventions.^{2,4} For this reason, most triage systems have focused on minimizing undertriage

rates as much as possible without regard to the impact on overtriage or mistriage. The result has been an acceptance of overtriage rates well above 50% as a “necessary evil” of avoiding undertriage and missed significant injuries.^{5,6}

Although the negative impacts of undertriage have been well described, there has been much less investigation of the potential negative impacts or burden of high overtriage rates. The most obvious of these is a waste of resources, including personnel, time, and equipment, on a patient with minimal or no injuries. Additional demonstrated or hypothesized effects include staff and resident frustration, provider and hospital unwillingness to participate in trauma coverage, and the exposure of patients to unnecessary or excessive tests and interventions. The degree of impact of overtriage may also be highly variable depending on the particular system and the level of available resources, and would be expected to have more of a negative impact at centers with fewer resources (Level 2 or 3) compared with a Level 1 trauma center. The majority of the data currently used to design triage systems comes from experiences at Level 1 centers, and may not take into account the significant differences in resources and infrastructure at Level 2 or 3 centers.⁷

Our Level 2 trauma center had previously used the Pierce County emergency medical system (EMS) Trauma Triage System (Fig. 1), a 3-tiered graded system of trauma activation that considered physiologic, demographic, and mechanistic variables to determine the level of trauma team activation. We found this system to be both confusing and poorly predictive of the need for trauma team

resources, mainly because of the inclusion of a number of variables that had little to no independent predictive ability to identify injury or need for intervention. On retrospective analysis, we found that this system was associated with a 79% overtriage rate and a 14% mistriage rate. In addition, we were able to identify the important triage variables that independently predicted the presence of injuries and need for urgent life-saving interventions (LSIs).⁸ Based on this analysis, our Trauma Committee developed a new simplified system for in-hospital trauma triage and trauma team activation that was implemented in April 2010. The purpose of this study is to prospectively analyze the safety, efficacy, and surgeon satisfaction with the newly introduced triage system.

Patients and Methods

The study was approved by the Madigan Army Medical Center Institutional Review Board. Our hospital is a Level II trauma center located in Pierce County, Washington. Based on the prior studies at our institution,^{8,9} we changed our activation criteria from the 3-tiered Pierce County EMS system to a more simplified 2-tiered system beginning in April 2010 (Fig. 2). We established a prospective database to closely track all patients triaged using the newly implemented system. Data collected included the level of trauma activation, reason for activation, prehospital vital signs, emergency department (ED) vital signs, demographics, injuries, and all ED or operative interventions. The

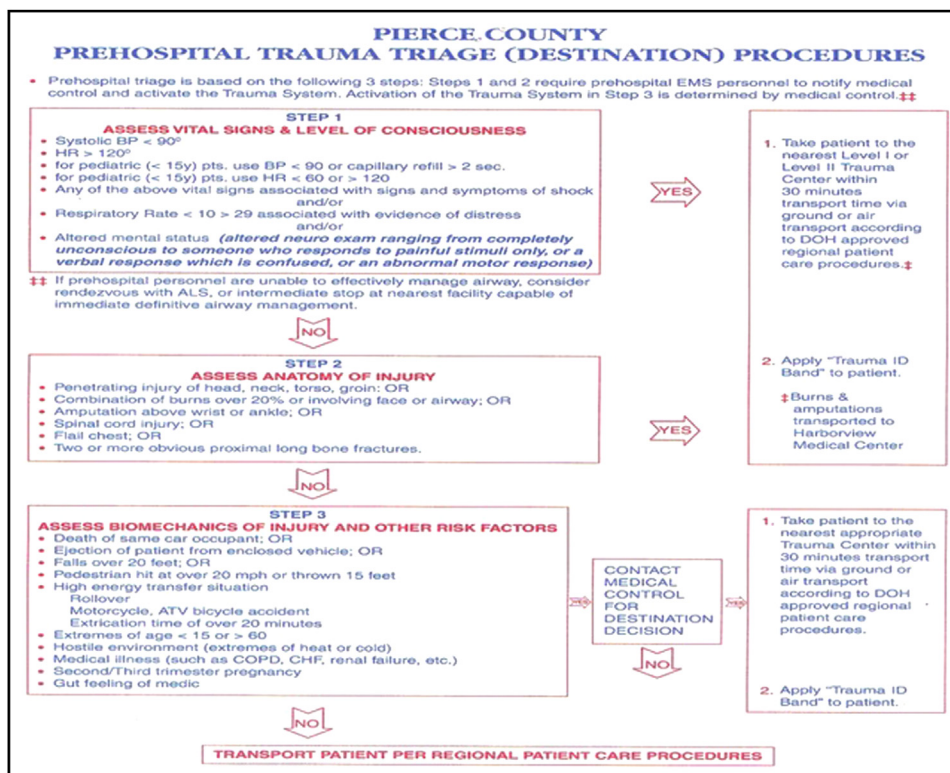


Figure 1 Pierce County pre-hospital trauma triage procedures. Used before implementation of the NEW triage system.

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