

**STRONG CHILDREN'S RESEARCH CENTER**  
**Summer Research Scholar**

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**ABSTRACT**

**Title: *Falling Through The Cracks: Characteristics of Under-triage in Pediatric Trauma Patients***

**Background:**

Trauma is the primary cause of death in pediatric patients.<sup>1,2</sup> The injury severity score (ISS) is a commonly accepted method of retrospectively measuring the appropriateness/effectiveness of trauma activations.<sup>3,4</sup> An ISS >15 is associated with a 10% mortality and therefore is denoted as major trauma. The Cribari method is based on ISS and is commonly used to assess under- and over-triage in trauma systems. As it is based on anatomy, ISS can overlook the physiological backgrounds of patient groups, which increases the likelihood of under- or over-triage during major trauma activations.<sup>4</sup> This is concerning as studies have found that adult patients who are under-triaged are twice as likely to experience mortality and over-triage leads to inappropriate resource utilization and trauma staff fatigue.<sup>4,5</sup> In 2017, Roden-Foreman et al. developed the Need For Trauma Intervention (NFTI) system, a new method to standardize the assessment of triage efficacy. NFTI takes into account resource utilization, which can address the physiological differences in presentation due to age or comorbidities.<sup>4,6</sup> NFTI assumes the depleted reserves of the patient are correlated with the severity of the patient's trauma.<sup>6</sup> Strict time cut-offs are set to ensure that the resource utilization is due to trauma activation, rather than during recovery or from complications related to the initial trauma.<sup>4</sup> Studies have shown that NFTI is more sensitive than ISS when detecting mortality and hospital lengths of stay.<sup>2</sup>

**Objective:** The purpose of this study is to understand if differences between the Cribari and NFTI methods lead to systematic differences in patients who are under-triaged

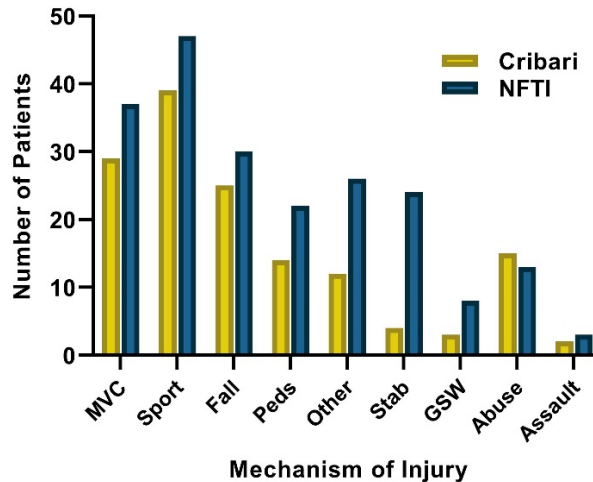
**Table:** Comparison of mechanism of injury in patients under-triaged by the Cribari and NFTI methods

Mechanism	Cribari UT (n = 143)	NFTI UT (n = 210)	p-value
<b>Sports / Recreation</b>	27.27% (39)	22.38% (47)	0.314
<b>Motor Vehicle Crash</b>	20.28% (29)	17.62% (37)	0.579
<b>Fall</b>	17.48% (25)	14.29% (30)	0.456
<b>Abuse</b>	10.49% (15)	6.19% (13)	0.162
<b>Pedestrian</b>	9.79% (14)	10.48% (22)	0.860
<b>Other / Unknown</b>	8.39% (12)	12.38% (26)	0.295
<b>Stab</b>	2.80% (4)	11.43% (24)	<b>0.003</b>
<b>Gunshot Wound</b>	2.10% (3)	3.81% (8)	0.536
<b>Assault</b>	1.40% (2)	1.43% (3)	1.000

**Results:** There were 1366 patients who triggered a trauma team activation during the study period (2014-2020). 143 patients were considered under-triaged (UT) using the Cribari Matrix (CM), producing a CM UT rate of 10.5% (143/1366; Figure 1). The NFTI UT rate was 15.4% (210/1366; Figure 1). There was disagreement between the CM and NFTI methods for 14.13% (193/1366). NFTI detected under-

triaged pediatric stab wound patients (mean ISS: 13.25) that Cribari would have missed ( $p = 0.003$ ). While the CM method used for pediatric stab wound victims produced a CM UT rate of 2.8% (3/143), NFTI produced an under-triage rate of 11.43% (24/210,  $p=0.003$ ; Table).

**Figure 1.** Patients Under-triaged by Cribari and NFTI according to mechanism of injury



**Conclusion:** NFTI is more sensitive than Cribari in detecting under-triage in pediatric stab wound victims. NFTI detected significantly more under-triaged pediatric stab wound patients than Cribari, including patients with  $ISS < 15$  that would have been missed by the Cribari method ( $p = 0.003$ ). Pediatric stab wound victims are more likely to be systematically under-triaged. It is critical to review URMC's current Trauma Triage Guidelines to address this issue. Raising critical stab wounds from a Pediatric Level II Trauma to a Pediatric Level I Trauma at URMC may decrease under-triage rates during trauma activation.

#### References:

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