

# Reliability of the Safety Threats and Adverse Events in Trauma (STAT) Taxonomy Using Trauma Video Review

Anisa Nazir<sup>1,2</sup> · Nemanja Baletic<sup>3</sup> · Ryan P. Dumas<sup>4</sup> · Caitlin Fitzgerald<sup>4</sup> · Keying Xu<sup>5</sup> · Melissa McGowan<sup>2</sup> · Brodie Nolan<sup>2,6</sup>

1. Institute of Medical Sciences, University of Toronto, Toronto, ON, 2. Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, ON, 3. Department of Emergency Medicine, USF/HCA Oak Hill Hospital, Brooksville, Florida, USA, 4. Department of Surgery, Division of Burn, Trauma, Acute, Critical Care Surgery, UTexas Southwestern Medical Center, Dallas, TX, USA, 5. Applied Health Research Centre (AHRC), Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, Canada, 6. Division of Emergency Medicine, Department of Medicine, University of Toronto, Toronto, ON, Canada



## Background

- The STAT (Safety Threats and Adverse Events in Trauma) taxonomy was developed through expert consensus, and groups 65 identified trauma resuscitation adverse events (AEs) into nine distinct categories. A practical tool, it provides a framework for standardized analysis of trauma resuscitations and creates a foundation for targeted quality improvement and patient safety initiatives.
- In our introductory study, The STAT taxonomy yielded 90.1% agreement between reviewers in the video recorded in-situ simulation trauma environment; demonstrating high inter-rater reliability. Thus far, the taxonomy has only been applied to in-situ simulations and not actual live trauma cases.

## Objective

- This study aims to evaluate the reliability of the STAT taxonomy in identifying AEs during live video-recorded trauma resuscitations. We hypothesize that the STAT taxonomy is reliable for assessing video-recorded trauma resuscitations in the trauma bay.

## Methods

- High-definition audiovisual data from 30 trauma resuscitations were reviewed. Videos were assessed and scored by four independent reviewers (two trainees and two staff). The STAT taxonomy was used to identify AEs based on binary responses: yes and no. Inter-rater reliability was calculated using Gwet's AC1. The frequencies of AEs were tallied and reported as counts and percentages.

**Design:**  
Retrospective Cohort

**Setting:**  
Parkland Hospital  
Dallas Level 1  
Trauma Center;  
TVR Program

**Sample:**  
30 live trauma resuscitations  
Kappa 0.85

**Subjects:**  
Adult Trauma patients (>16 yo) treated from Jan. 1, 2022-Jan 15<sup>th</sup>, 2022

**Evaluation:**  
65 AE tool with 6 categories

**Scoring:**  
Binary scoring (1-yes, 0-no) with respect to witnessed AE. 4 reviewers diverse training

- Data Analysis:** Age and Injury Severity Score (ISS) were reported as means, standard deviation, and sex and mechanism of injury are reported as count and percentages. The AEs were tallied by category and type and were reported as counts and frequencies. The inter-rater reliability between the four reviewers and between each category and type was calculated using **Gwet's AC1** statistic and was reported as medians and 95% confidence intervals

Figure 1: Categories of Adverse Events in the Safety Threats and Adverse events in trauma (STAT) Taxonomy (1)

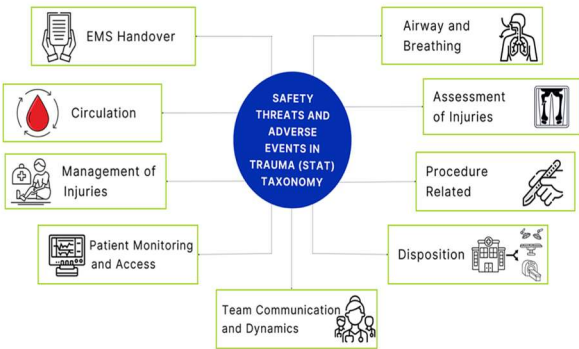


Table 1: Case Demographics

Total Number of Live Trauma Cases	30
Age in years (mean (SD))	38.8 (16.6%)
Sex (Male)	20 (66.7%)
Mechanism of Injury	
Blunt Trauma	23 (76.6%)
Penetrating Trauma	7 (23.3%)
Injury Severity Score (mean (SD))	24.5 (7.6%)

Table 2: Inter-rater reliability of STAT taxonomy between four reviewers using Gwet's AC1 statistic

Categories	Gwet's AC1	95% CI
Among all 4 raters	0.94	(0.93, 0.95)
Rater 1 vs Rater 2	0.95	(0.94, 0.96)
Rater 1 vs Rater 3	0.93	(0.92, 0.94)
Rater 1 vs Rater 4	0.94	(0.93, 0.95)
Rater 2 vs Rater 3	0.92	(0.90, 0.93)
Rater 2 vs Rater 4	0.93	(0.92, 0.94)
Rater 3 vs Rater 4	0.93	(0.91, 0.94)

## References

- Baletic N, Riggs J, Lebovic G, Petrosioniak A, Dumas RP, Nolan B. Introducing the Safety Threats and Adverse events in Trauma (STAT) taxonomy: standardized classification system for evaluating safety during trauma resuscitation. Eur J Trauma Emerg Surg. 2022. <https://doi.org/10.1007/s00068-022-02007-9>.

## Results

Table 3: Inter-rater reliability of STAT taxonomy categories using Gwet's AC1

Categories	Gwet's AC1	95% CI
EMS handover	0.82	(0.75, 0.88)
Airway and breathing	0.98	(0.98, 0.99)
Circulation	0.95	(0.93, 0.97)
Assessment of injuries	0.91	(0.88, 0.94)
Management of injuries	0.96	(0.95, 0.98)
Procedure-related	0.97	(0.96, 0.98)
Patient monitoring and access	0.98	(0.97, 1.00)
Disposition	0.98	(0.96, 1.00)
Team communication and dynamics	0.88	(0.85, 0.90)

## Discussion

- The study had three important findings. First, the STAT taxonomy demonstrated excellent inter-rater reliability between reviews in identifying AEs in an initial trauma resuscitation in the trauma bay.
- Second, the categories with the highest incidence of AEs were team communication and dynamics, followed by EMS handover and assessment of injuries.
- Third, technical errors in the study were related to assessing patient injuries and the primary survey, including airway, breathing, and circulation.
- The findings of this study have important implications for: trauma team education and training, resource management, innovative interventions, hospital policies, and the overall culture of the work environment.
- Future studies should consider larger sample sizes and multi-center comparisons to demonstrate the tool's applicability and effectiveness in different settings and healthcare system.

## Conclusion

- The STAT taxonomy has shown promising results in identifying AEs in video-recorded trauma resuscitations, with excellent inter-rater reliability between reviewers. This demonstrates the potential for utilizing video review as an objective tool for quantifying and assessing AEs in the initial resuscitation of patients in the trauma bay. By pairing this technology with a validated tool, we can gain valuable insights into the quality of care provided during resuscitation.