

Improving Trauma Triage Accuracy: Evaluating Focal Neurologic Deficits as a Predictor for Spine Injury



Kate Dellonte, MBA, RN; Michael Vella MD, MBA; Maria Durdach MD, Michael Nabozny MD; Mark Gestring MD
University of Rochester Medical Center Kessler Trauma Center, Rochester, NY

Problem/Background

- Overtriage is a burdensome problem within trauma systems
 - increased costs
 - unnecessary high resource utilization
- Perceived concern for spinal cord injury (SCI) in patients with extremity paresthesia following blunt trauma, despite gap in literature regarding implications of neurologic deficit as a diagnostic indicator of SCI
- This concern for SCI based on initial presentation prompted the inclusion of "focal neurologic deficit" into our trauma team activation (TTA) criteria
- We found consistent pattern of high resource utilization for patients with focal neurologic deficit 2/2 trauma without findings of significant injury*, if any at all

*Significant injury defined as injury severity score (ISS) > 15



Methods

Study Design

- Retrospective, quality improvement project
- Urban level 1 trauma center within an academic medical center
- Data collection: pre-implementation = 1/1/2018-12/31/20 & post-Implementation = 1/1/21-9/30/21
- Convenience sample - 2435 patients
 - Inclusion criteria: within our registry, age > 15, +TTA, blunt mechanism

Pre-Implementation

1. Reviewed all of our TTA pages for arrivals between 1/1/18-12/30/20 for evidence of paresthesia and/or motor deficit as criteria for TTA
 1. Age > 16, GCS >= 12, blunt trauma = 995 patients
 2. Evidence of neurologic deficit = 176 patients
2. Registry query for injury severity scores, outcome measures
3. Statistical analysis (sensitivity/specificity/NPV/PPV, receiver operator curves, logistic regression modeling)
4. Results:
 - ✓ Isolated paresthesia was not predictive of SCI ($p < 0.001$)
 - ✓ Neurologic deficits or bilateral paresthesia with an additional deficit are associated with, but not diagnostic of, SCI (OR = 3.26, $p < 0.05$)

Intervention

- Revised our TTA criteria on 1/1/21 as follows:
 - Level 2 Activation = bilateral neurologic deficit secondary to trauma including paresthesia, paralysis, weakness
 - Pre-implementation criteria: Level 2 Activation = focal neurological deficit following trauma

Post-Implementation

- Continued to utilize our triage outlier case review process on all TTA arriving between 1/1/21-9/30/21

Purpose/Goal

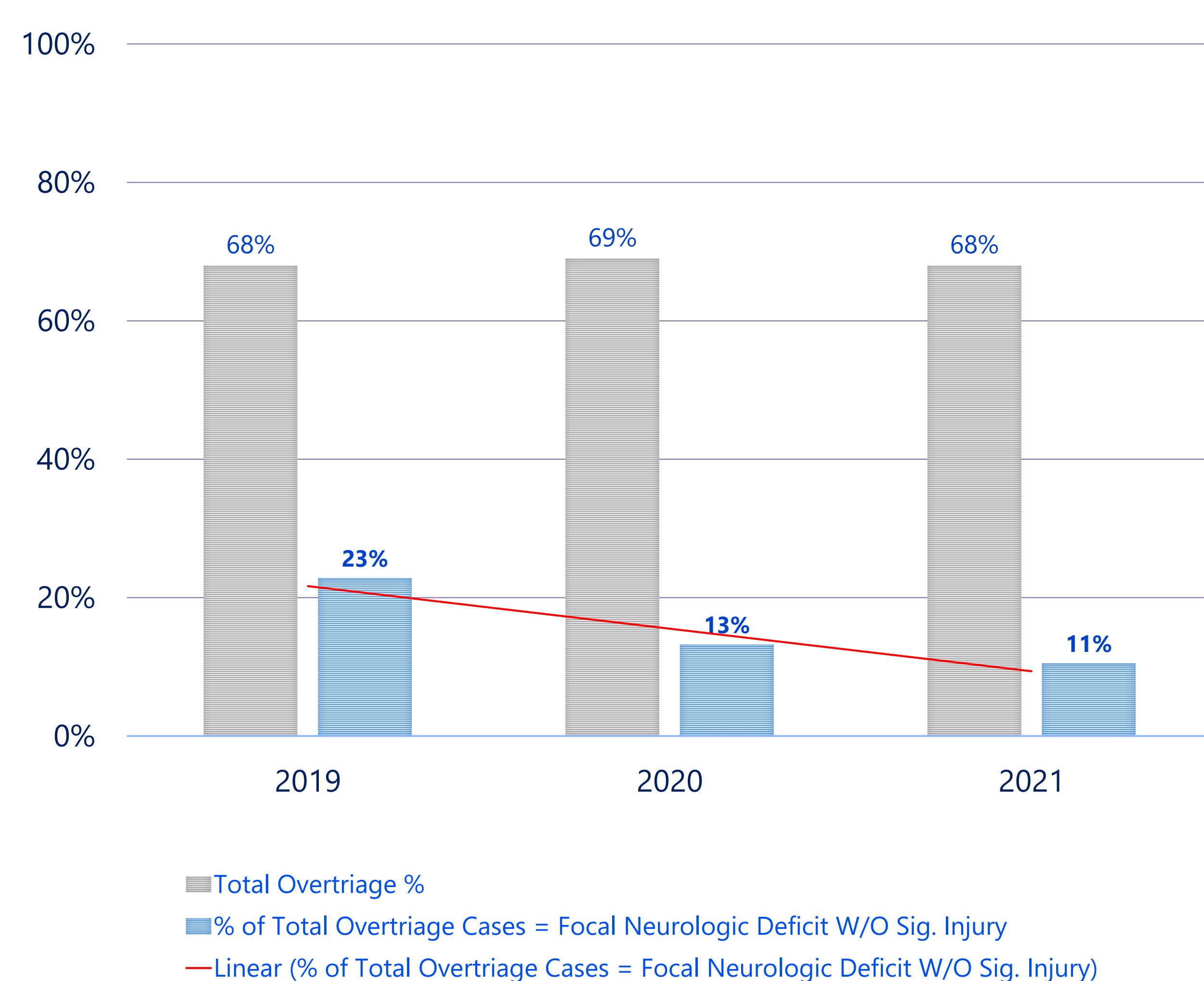
Purpose

Evaluate the predictive nature of focal neurologic deficit in diagnosis SCI in order to utilize any significant findings in our TTA revisions

Goal

Decrease overall overtriage rates which in turn will decrease the high costs and unnecessary high resource utilization associated with these cases

OVERTRIAGE TRENDS 2019-2021



Kessler Trauma Center Triage Outlier Review

Injuries Identified?	Yes/No
Registry Entry Valid? (ISS, Diagnoses, Level Activation)	Yes/No
Met Level Criteria?	Yes/No
Criteria =	(specific criterion)
Opportunity for Improvement?	(text)

Results

1. No change in overall rate of overtriage
2. **Decrease** in number of overtriage cases attributed to patient presenting with focal neurologic deficit without significant injury (ISS > 15)
3. There were **zero** undertriage cases pertaining to spine injuries who presented with unilateral neurologic deficits (no "misses" due to criteria change)

Discussion/Implications

- ❖ In-depth triage data reviews will allow an institution to adjust their TTA to fit the evolving needs of their patient population in order to provide safe, proper care with the appropriate resources, to avoid unnecessary costs, and to reduce number of overtriage cases
- ❖ To work towards our goal in decreasing our overall overtriage rates:
 1. Continue to utilize this workflow across various patient injury characteristics to further improve the accuracy of our triage criteria in predicting injury
 2. Amend our triage criteria annually to reflect review findings
- ❖ Further study is warranted to evaluate the diagnostic, predictive ability of neurologic deficit in spine injuries
 - We are expanding our data set within our own institution to continue our studies in sensitivity and specificity of neurologic deficits as a predictor for SCI
 - Plan to collaborate with other institutions for multicenter study design