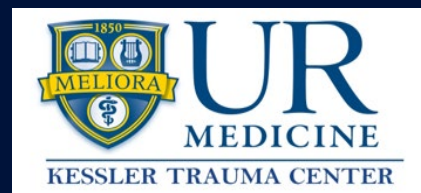


Improving Trauma Triage Accuracy: *Evaluating Focal Neurologic Deficits as a Predictor for Spine Injury*

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Problem/Background

- Overtriage is a burdensome problem within trauma systems
 - increased costs
 - unnecessary resource utilization

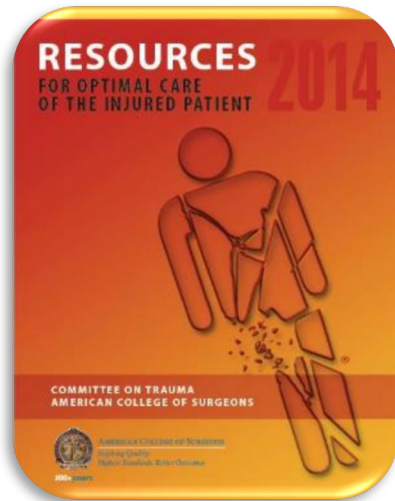


- Perceived concern for spinal cord injury (SCI) in patients with extremity paresthesia following blunt trauma
- Included extremity paresthesia as criteria for trauma team activation (TTA) at our institution
- Scarce literature regarding the implications of neurologic deficit as a diagnostic indicator of SCI

Problem/Background

According to Resources For Optimal Care of the Injured Patient 2014:

“Rates of undertriage and overtriage can be calculated after the potential cases identified have been reviewed and validated. These rates must be monitored and reviewed quarterly (CD 16–7).”



Our process:

| Current Triage Review Process for Outliers | |
|---|----------------------|
| ISS < 15, TTA | |
| 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) |

Our findings:

- Consistent pattern of high resource utilization for patients with isolated paresthesia without significant injury*, if any at all

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

Purpose/Goal

Purpose

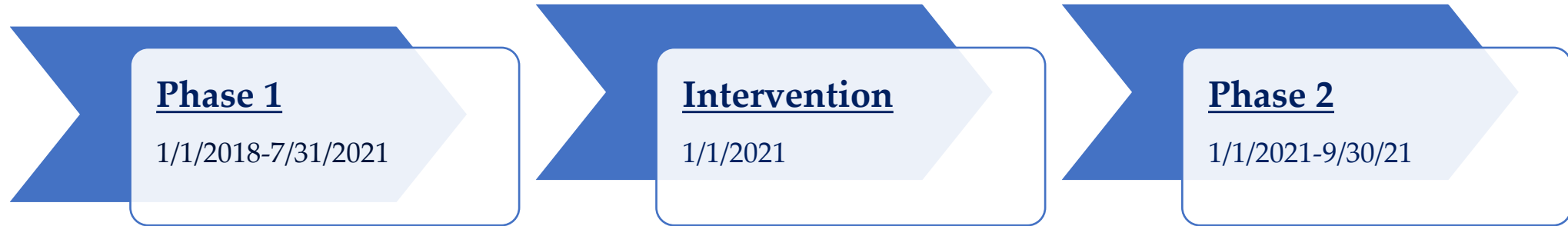
Evaluate the predictive nature of isolated paresthesia in diagnosing SCI & utilize any significant findings in our TTA revisions



Goal

Decrease overtriage rates which would in turn decrease the unnecessary high resource utilization associated with these cases

Project Timeline



- ✓ **Phase 1:** Determine diagnostic accuracy of 1) isolated paresthesia, 2) paresthesia + other deficit, and 3) other deficit only
- ✓ **Intervention:** Amend triage criteria (if warranted)
- ✓ **Phase 2:** Evaluate effect of findings from phase 1 on overtriage rates

Study Design

Retrospective, quality improvement project

• Setting

- Urban level 1 trauma center within an academic medical center
- 800+ beds
- Registry volume > 3,000 adult entries/yr

• Data Collection

○ Timeline

- Phase 1: 1/1/2018-7/31/2020
- Intervention: 1/1/2021
- Phase 2: 1/1/2021-9/30/2021

○ Sample

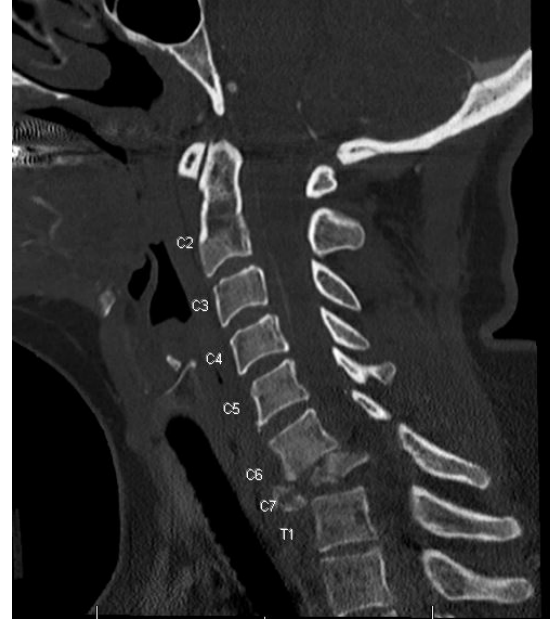
- Convenience sample of trauma registry patients
- 1449 patients in total
 - phase 1 = 995 patients
 - phase 2 = 454 patients



Phase 1

Methods

1. Inclusion criteria = all TTA arriving between 1/1/18-7/31/20, age > 16, GCS \geq 12, +blunt trauma
 - 995 patients
2. Review criteria met for TTA
 - Evidence of paresthesia and/or motor deficit = 176 patients
3. Registry query for injury severity scores and outcome measures
4. Data:
 - Performed statistical analysis to determine diagnostic accuracy of paresthesia on spine injury
 - Calculated overtriage rates on cases with TTA 2/2 isolated paresthesia
5. Statistically significant results:
 - **Isolated paresthesia was not predictive of SCI**
 - ✓ Area under receiver operator curve for diagnostic accuracy = 0.49
 - **Bilateral paresthesia with additional deficit associated with, but not diagnostic of, SCI**



Intervention/Phase 2

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”)

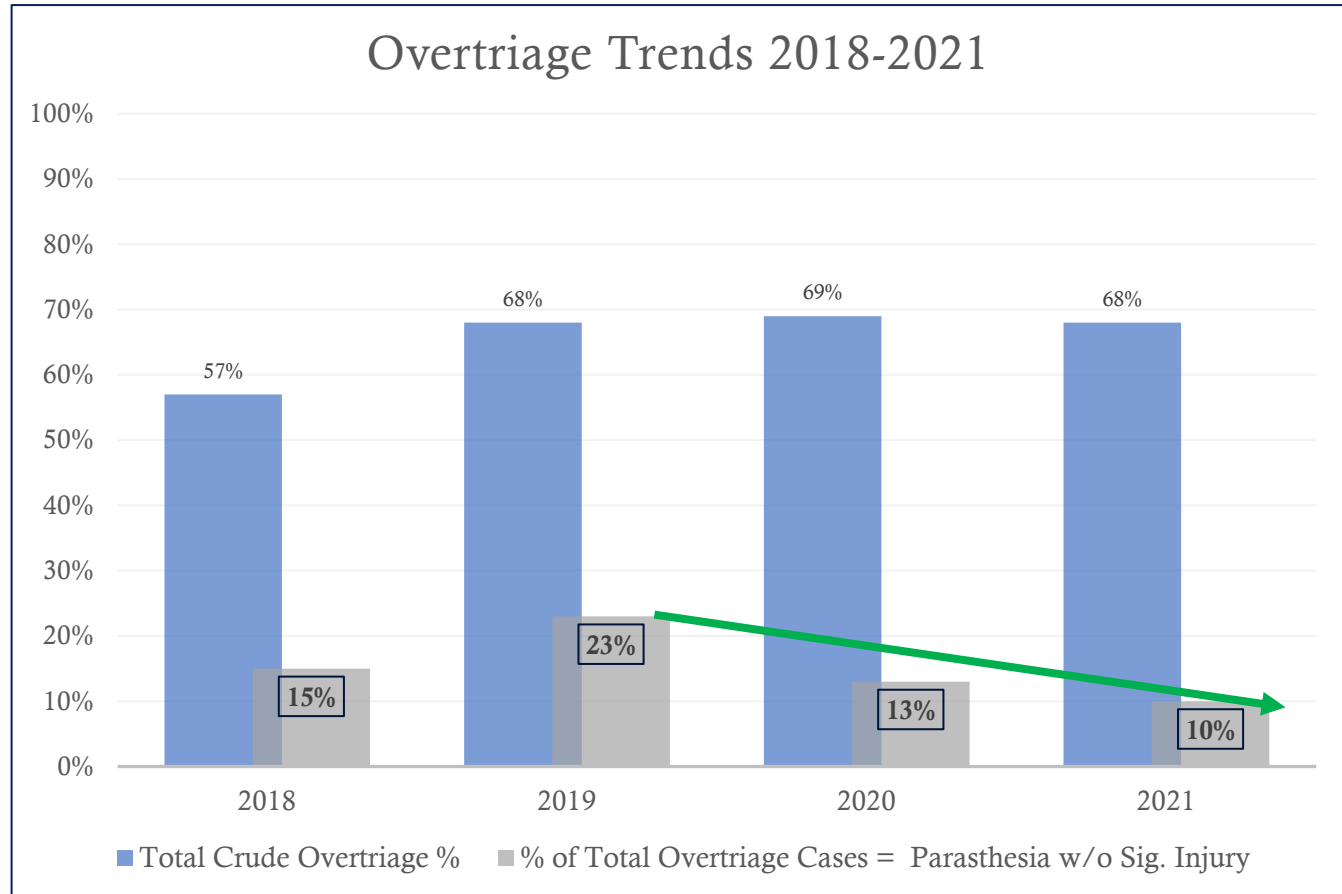
Phase 2 Methods

- Continued to monitor our over/undertriage rates monthly
- Utilize our triage outlier case review process

| | ISS < 15 | ISS 15-25 | ISS > 25 | Died W/ Injuries Unk | Total | AJUDICATED |
|-------------|----------|-----------|----------|-------------------------|-------|------------|
| Level 1 | | | | | | |
| Level 2 | | | | | | |
| Consult | | | | | | |
| | Crude | Adjusted | | | | |
| Overtriage | #DIV/0! | #DIV/0! | | | | |
| Undertriage | #DIV/0! | #DIV/0! | | | | |

Phase 2

1. Crude overtriage rates did not substantially decrease post-implementation
2. Number of overtriage cases attributed to patient presenting with paresthesia without significant injury (ISS > 15) decreased, seeing lowest rate in prior 3 years
3. There were no undertriage cases pertaining to spine injuries who presented with unilateral neurologic deficits (no “misses” due to criteria change)



Discussion/Implications

- Imperative to incorporate a process for further review of overtriage cases to identify commonalities



Discussion/Implications

- Imperative to incorporate a process for further review of overtriage cases to identify commonalities
- In-depth triage review process will allow an institution to adjust their TTA to fit the evolving needs of their patient population
 - Provide safe care
 - Utilize the appropriate resources
 - Reduce number of overtriage cases



Discussion/Implications

- Imperative to incorporate a process for further review of overtriage cases to identify commonalities 
 - In-depth triage review process will allow an institution to adjust their TTA to fit the evolving needs of their patient population
 - Provide safe care
 - Utilize the appropriate resources
 - Reduce number of overtriage cases
 - In continuing our work in decreasing our overall overtriage rates:
 - Utilize this workflow across various patient injury characteristics to further improve the accuracy of our triage criteria in predicting injury
 - Amend our triage criteria annually to reflect review findings
- 

Looking to the Future

- Further study is warranted to evaluate the diagnostic predictive ability of paresthesia in spine injuries
 - *Expanding our data set within our own institution to continue our studies in sensitivity and specificity of various neurologic deficits as a predictor for SCI*
 - *Plan to work in collaboration with other centers to initiate a multicenter study in the near future*





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Thank you!

Questions?

