INTRODUCTION

- Approximately 5.7% of blunt traumas involve cervical spine (C-spine) injuries.1
- While spine fractures are often stable and treated non-operatively, lack of access to spine specialty care results in transfer to tertiary care facilities, placing substantial financial burden on both hospitals and patients.2 3
- Thus, identifying patient and injury characteristics associated with operative treatment of C-spine fractures may help reduce over-triage.

OBJECTIVES

The goal of this study is to identify factors and describe costs associated with operative versus non-operative treatment in the acute setting among patients transferred with isolated C-spine fractures.

METHODS

All patient transfers from January 1, 2015 to September 1, 2020 to the ED of our Level 1 trauma center were identified using the neurosurgery trauma and orthopaedic spine surgery consult records.

Dens fracture characteristics

Dens displacement and angulation were measured using a previously published technique (Figure 1).4

Figure 1. Standard measurement technique for dens displacement (red) and angulation (blue) established by the Spine Trauma Study Group.

RESULTS

<table>
<thead>
<tr>
<th>Injury Variable</th>
<th>OR 95% CI p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any neurological deficit</td>
<td>15.387 4.330-54.679 &lt;0.0001</td>
</tr>
<tr>
<td>Post transfer MRI</td>
<td>2.80 1.212-6.472 0.016</td>
</tr>
</tbody>
</table>

Table 1 shows final multivariate model results.

- Current smoking status was the only significant demographic associated with surgical treatment in multivariate modeling (OR = 5.397).
- Neurologic injuries including both spinal cord and isolated spinal nerve root injuries (OR = 9.52), as well as patients undergoing cervical spine MRI after transfer (OR = 2.68), were significantly associated with surgical treatment.

<table>
<thead>
<tr>
<th>Injury Variable</th>
<th>OR 95% CI p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated root injury</td>
<td>9.52 2.43-37.35 0.001</td>
</tr>
<tr>
<td>Post-transfer MRI</td>
<td>2.68 1.15-6.25 0.022</td>
</tr>
</tbody>
</table>

Table 2 shows cost analysis results.

- Patients treated surgically were charged a median of $380,890 and patients treated non-operatively were charged a median of $90,733.55.
- All patients accepted as trauma transfers incurred additional trauma transfer fees exceeding $20,000.

CONCLUSIONS

- Nearly 75% of patients transferred for C-spine fractures were subject to secondary over-triage, as they were treated non-operatively.
- Injury characteristics, such as the presence of neurologic deficits and dens fracture pattern, are the most important determinant of need for surgical intervention.
- Having complete pre-transfer workup, including imaging, may reduce unnecessary transfers.
- Over 97% of transfers were accepted by general surgery, 99% of which were managed non-operatively. Thus, involving a spine surgeon in pre-transfer patient assessment may better inform whether a patient actually needs to be transferred.
- Over-triaging of isolated C-spine fractures substantially increases hospital resource expenditures and financial burden on patients.

REFERENCES

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1 UC Davis School of Medicine, Sacramento, CA 2 Department of Orthopaedic Surgery, UC Davis Medical Center, Sacramento, CA