Potential of Telemedicine to Streamline Orthopedic Transfers to a Level 1 Pediatric Trauma Center

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**Background**

- Proportion of non-emergent transports via ambulance has increased from 1997 to 2007 (1)
- Pediatric orthopaedic trauma patients often require transfer to specialized centers for definitive care (2)
- Such transfers require various amounts of resources, such as ambulance transport and emergency department (ED) personnel evaluation
- In addition, waiting times in the referring facility, as well as at the receiving specialized center, can be a burden for families (3, 4)
- Research has shown that telemedicine might help streamline ambulance transports to an ED and reduce time to treatment (5, 6)

**Objectives**

- To retrospectively review orthopaedic trauma transport cases to Nemours – AIDHC and determine if the use of telemedicine could have facilitated the transfer of these patients
- To determine time and money spent executing these transfers, in efforts to highlight the need for a more streamlined process

**Materials and Methods**

- Retrospective chart review approved by Nemours IRB
- Subjects: orthopaedic trauma patients who were transferred to the Nemours-AIDHC ED from a referring hospital

- Transfers occurred between 01/2017 and 12/2017

- Patient demographics, injury details, and medical procedures completed at Nemours-AIDHC, mode of transport to Nemours-AIDHC, length of stay in the Nemours-AIDHC’s and referring facilities’ EDs, and ambulance transport time and charge were collected

- Patients were categorized into proposed referral method categories by an orthopedic surgeon based on the treatment they received at the specialized center (Fig. 1)

**Results**

- Almost 90% (219/244) of patients transferred to Nemours-AIDHC’s ED from another hospital in 2017 did not need to be transferred via ambulance after review by orthopaedic surgeons
- Just over half (110/219) of these patients could have followed up as an outpatient within a few days
- Nearly $3,000 in ambulance charges could have potentially been avoided per patient if telemedicine were utilized

**Table 1. Comparison of Patient Demographics by Group**

<table>
<thead>
<tr>
<th>Group</th>
<th># Boys</th>
<th>Average age at time of ED visit in years (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>11</td>
<td>10.07 (SD = 5.64)</td>
</tr>
<tr>
<td>Group 2</td>
<td>79</td>
<td>9.17 (SD = 4.32)</td>
</tr>
<tr>
<td>Group 3</td>
<td>55</td>
<td>7.26 (SD = 4.02)</td>
</tr>
</tbody>
</table>

**Table 2. Most Frequent Locations of Injuries By Group**

<table>
<thead>
<tr>
<th>Group</th>
<th>Top Five Injury Locations*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Head, shoulder, pelvis, abdomen</td>
</tr>
<tr>
<td>2</td>
<td>2. Lower leg, thoracic area</td>
</tr>
<tr>
<td>3</td>
<td>3. Shoulder girdle, upper arm</td>
</tr>
</tbody>
</table>

* Injury locations determined by second digit in ICD 10 code. Frequency represents the number of times an ICD 10 code for that injury location appeared in the diagnosis.

**Conclusion**

- Given the benefits of telemedicine, this existing technology might be utilized so that specialists can determine necessity of immediate ED transfer as well as appropriate mode of transportation

- Benefits of using telemedicine to facilitate transfers include:
  - Time savings and increased satisfaction for patients
  - Decreased cost related to ambulance transfer
  - Appropriate resource utilization and allocation to more severely injured patients
  - Prospective studies utilizing telemedicine to facilitate the transfer of these patients are warranted

**Limitations**

- Retrospective study design
- Referring orthopedists do telemedicine visits for potential transfers could be time-consuming and logistically challenging
- Ambulance cost data were only calculated for patients transferred by the AIDHC Transport Team and did not include cost of medical procedures performed on the ambulance
- Categorization of patients into transport groups was performed by a single orthopedic surgeon

**References**