An In Situ Simulation-Based Educational Outreach Project For Pediatric Trauma Care in a Rural Trauma System

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Disclosures

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Background

• Traumatic injury is the leading cause of death in children (0-17y)\(^1\)
• 90% of injured children will not receive care at a pediatric trauma center or children’s hospital\(^2\)
• Despite regionalization of trauma systems, outcome disparities between urban and rural trauma patients persist\(^3,4\)
• Existing standardized resuscitation courses offer minimal education in pediatric trauma care

Potential utility for in situ simulation-based training as an assessment and educational intervention tool in trauma care
• Partnerships between academic and community hospitals improve outcomes in pediatric trauma care\(^5\)

Aim

The aim of this study is to:

(1) identify targets for educational intervention at three referral community EDs serving rural Eastern North Carolina
(2) increase provider experience via pediatric trauma simulations and debriefings

Materials & Methods: Sample

• Prospective study of simulation-based pediatric trauma resuscitation
• Study location: Three highest volume referral hospitals out of the 22 that refer to this level one trauma center
Materials & Methods: Simulation

- In situ simulations using high fidelity mannequins (SimBaby, SimJunior) performed in the outreach hospital’s ED resuscitation bay
- SimView® was used to record the simulation and to perform the debriefing

Materials & Methods: Evaluation

- Pre and post-test surveys assessed provider comfort performing 13 specific skills
- Video recording and review of the simulations: scored for successful completion of 36 tasks essential to initial trauma stabilization care
- Second visit for reassessment

Materials and Methods: Analysis

- Independent t-test analysis of pre- and post-simulation mean survey responses
- Primary outcomes:
  – improved comfort performing skills
  – team performance during resuscitation
- Secondary outcome: focus group discussion

Results: Study Population

- N = 99
  – 19 MDs, 65 RNs, 5 RRTs, 10 other

Results: Survey

<table>
<thead>
<tr>
<th>Simulation Task</th>
<th>df</th>
<th>t-statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Airway</td>
<td>10</td>
<td>-1.872</td>
<td>0.046</td>
</tr>
<tr>
<td>Child Airway</td>
<td>10</td>
<td>-1.515</td>
<td>0.080</td>
</tr>
<tr>
<td>Infant IV</td>
<td>10</td>
<td>-1.911</td>
<td>0.043</td>
</tr>
<tr>
<td>Infant IO</td>
<td>10</td>
<td>-1.684</td>
<td>0.062</td>
</tr>
<tr>
<td>Child IV</td>
<td>10</td>
<td>-1.066</td>
<td>0.150</td>
</tr>
<tr>
<td>Blood Administration</td>
<td>10</td>
<td>-1.293</td>
<td>0.113</td>
</tr>
<tr>
<td>Fluid Selection/Administration</td>
<td>10</td>
<td>-2.010</td>
<td>0.036</td>
</tr>
<tr>
<td>Infant C-Spine Immobilization</td>
<td>10</td>
<td>-2.394</td>
<td>0.019</td>
</tr>
<tr>
<td>Pediatric Chest Tube Placement</td>
<td>10</td>
<td>-2.101</td>
<td>0.031</td>
</tr>
<tr>
<td>Obtaining Radiographic Images</td>
<td>10</td>
<td>-2.234</td>
<td>0.023</td>
</tr>
<tr>
<td>Initiating Transport</td>
<td>10</td>
<td>-2.925</td>
<td>0.042</td>
</tr>
<tr>
<td>Use of Broselow Tape</td>
<td>10</td>
<td>-2.341</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Results: Video Recordings

- Mean number of tasks that needed improvement per simulation:
  – 15.2 (initially) improving to 9.7 (second visit)
- Deficiencies most common among all simulations:
  – failure to obtain additional history (75%)
  – beginning secondary survey exam (58.33%)
  – log rolling appropriately and examining the back (66.67%)
  – calling for transport within 5 minutes (50%)
  – calculating appropriate medication dosages (50%)
### Results: Focus Groups

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sample Responses</th>
<th>Frequency (%)</th>
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</thead>
<tbody>
<tr>
<td>Participants used the simulation scenarios to improve teamwork</td>
<td>“Teamwork is very important and [simulation] has helped the team. The [simulation] reinforces that everyone needs designated roles.”</td>
<td>23.26</td>
</tr>
<tr>
<td></td>
<td>“Teamwork has improved, especially with people you haven’t worked with before.”</td>
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<tr>
<td>Participants’ confidence level has increased in handling pediatric traumas</td>
<td>“I feel more confident in pediatric trauma care. Some of the new things also feel the same.”</td>
<td>16.28</td>
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<td></td>
<td>“I can feel better about organizing patient care scenarios in real life.”</td>
<td></td>
</tr>
<tr>
<td>Participants changed behavior based upon reflection of their performance during simulation scenarios</td>
<td>“Pediatric imaging standards went out to all providers.”</td>
<td>13.95</td>
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<td></td>
<td>“I’ve been able to use the pediatric imaging study information.”</td>
<td></td>
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<td>Communication between Vidant Medical Center and regional hospitals has improved</td>
<td>“Putting a face to who we talk to really helps and is very beneficial. This helps build trust with the ER team and the trauma team.”</td>
<td>13.95</td>
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<td></td>
<td>“It’s made it easier and more comfortable to reach out.”</td>
<td></td>
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<td>Participants remembered their mistakes made during the simulation</td>
<td>“I made a mistake by not using the stylet with the ET tube and didn’t use a collar.”</td>
<td>4.65</td>
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<td></td>
<td>“I remember lack of communication and forgetting to talk to the patient.”</td>
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### Conclusions

- Simulation-based education improves both provider comfort and performance
- Community education and outreach improves relationships and communication with local healthcare providers
- Simulation-based training will improve future pediatric trauma patient care and potentially help reduce cost of this care in Eastern North Carolina

### Future Study

- Expansion to include remaining regional referral hospitals and additional simulation vignettes based on identified performance gaps
- Follow up study comparing patient outcomes and cost analysis, prior to and after implementation of this simulation project

### References