The required force to pull the modified stair chair up a set of stairs is 57.46% of the total weight of the patient and chair compared to lifting 100% of the total weight in current stair chairs.

**Market Analysis**

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Qty/Unit</th>
<th>Small Scale Unit Cost</th>
<th>Large Scale Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (Wheel Frames)</td>
<td>4</td>
<td>$23.08</td>
<td>$17.01</td>
</tr>
<tr>
<td>Polyurethane Wheel</td>
<td>10</td>
<td>$29.78</td>
<td>$5.00</td>
</tr>
<tr>
<td>Bearing Shelve Bearing</td>
<td>4</td>
<td>$7.52</td>
<td>$7.22</td>
</tr>
<tr>
<td>Steel Wheel Axle</td>
<td>10</td>
<td>$22.60</td>
<td>$22.60</td>
</tr>
<tr>
<td>Total Attachment</td>
<td></td>
<td>$111.88</td>
<td>$121.13</td>
</tr>
</tbody>
</table>

**Patentability**
- Potentially obvious combination of existing products (Mitchell Industry Dolly Innovations tires^4 and Stryker stair chair^5)
- Possible ornamental patent dependent on attachment design

**Reimbursement**
- Cost of patient extrication included in base cost of ambulance service, so our device incurs zero additional cost to patients
- Minimal cost increase for EMS, as Stair chair devices are replaced about once every 10 years

**Conclusion**
- Our device is:
  - Dual-purpose: can transport patient both up and down staircases
  - Safe: 5-wheel design decreases the force required for extrication by EMS providers by 43%
  - Unique: no other product on the market can manually transport a patient up a flight of stairs

**Future Work**
- The next step is to create and attach the physical 5-wheel design to a stair chair

**Acknowledgements**
We would like to thank Dr. Conrad Zapanta, Andrew Hudson, and Josh Worth for their guidance on this project, and we are grateful to the Undergraduate Research Office and BME Department for their financial support. We would also like to thank CMU TechSpark for their manufacturing capabilities.