Smart Back Brace for Scoliosis

Silver B
Product Vision

- Improve compliance
- Prevent corrective surgeries

<table>
<thead>
<tr>
<th></th>
<th>Traditional Scoliosis Back Brace</th>
<th>Smart Back Brace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tighten automatically during sleep</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Standardize back brace tightness</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Collect data on brace usage</td>
<td>×</td>
<td>✓</td>
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</tbody>
</table>
Pricing

- Traditional brace price: $2-6k
  - Braces fitted: 30k children/yr
  - Failure rate: 28%
- Surgery cost: $100-150k
- Smart Back Brace price: $8k
<table>
<thead>
<tr>
<th>Customer Need</th>
<th>Attribute</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply prescribed pressure to spine</td>
<td>Strap tightness</td>
<td>100 N peak load per strap</td>
</tr>
<tr>
<td>Minimize size of tightening component</td>
<td>Dimensions</td>
<td>&lt; 4” x 2” x 1”</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>&lt; 5 lbs</td>
</tr>
<tr>
<td>Remain asleep as brace tightens</td>
<td>Tightening rate</td>
<td>&lt; 1.5 N/s</td>
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Technical Risk: Force

Can we apply enough force in a compact manner?

Findings:

- Adequate force can be applied to tighten brace to prescribed pressure
- Max load required: **100N** (middle strap\(^1\))
- Mockup actuator was too large (900N)

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Technical Risk: Sleep Arousal

Would tightening wake up the user?

Findings:

● Subjects slept through an average increase of 38 N
● Slower tightening woke subjects up later
● Underestimation
Future Steps

- Incorporate manual override option to prevent dangerous tightening levels
- Include sensor to detect sleep
- Collect data (track usage for individual, send reports to doctor)

“I like the idea of your product being used to slowly tighten the straps during the night…Perhaps having a brace that slowly increases its force will help with compliance and get more correction.”

Jeffrey Thomson, MD
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Connecticut Children’s Medical Center