Cost analysis of a growth guidance system for EOS in the US: An integrated health care delivery system perspective

*Growing Rods vs SHILLA™*

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*Sponsored in part by Medtronic. Medtronic was not involved in data analysis or interpretation.*
Disclosures

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David B Bumpass MD- NASS, Medtronic, Acuity Surgical
Richard E McCarthy MD- Medtronic
Current operative treatment

- Current primary methods for operative treatment of EOS include:

  Traditional Growing Rods: *TGR*

  Magnetically Controlled Growing Rods: *MCGR*

  Growth Guidance System: *GGS*
Lengthenings

- **TGR** requires repeated invasive surgical lengthenings that risk complications.
- **MCGR** lengthens noninvasively using a hand-held external remote controller.
- **GGS** obviates the need for active, distractive lengthenings.
Goal of Study

• Perform a cost analysis of GGS compared with TGR and MCGGR for EOS
  – Taken from perspective of United States integrated health care delivery system
  – Over the complete 6-year episode of care from initial implantation (dual-rod construct) until final spinal fusion
Model methodology

- Based on established method of cost analysis by Polly et al. (2016) where MCGR was compared to TGR

- Considered direct medical costs:
  - Initial implantation
  - Revisions due to device failure
  - Surgical site infections
  - Device exchange
  - HCP visits (GGS every 6 months)
  - Rod lengthenings (MCGR every 3 and TGR every 6 months)
  - Removal and final fusion

- Parameters in the decision-analytic model were derived from the most recent peer-reviewed literature – published data.
- Medicare payments were used as a proxy for provider costs.
Model assumptions

• The model assumes that clinical effectiveness (curve correction, increased thoracic height) is equivalent across devices.

• Additional assumptions:
  • All devices exchanged at 3.8 years
  • Deep SSI require device replacement and intravenous antibiotics
  • Superficial infection requires oral antibiotics (paid by patient)
  • Components replaced in a partial revision are the same across devices
Results over the 6-year episode of care (per 1,000 patients)

1. Fewer invasive surgeries GGS vs TGR
2. Comparable # invasive surgeries GGS vs MCGR
3. Deep SSIs for GGS and MCGR substantially lower than TGR
4. Device failures (rod breakages) were least for TGR

<table>
<thead>
<tr>
<th>Parameter</th>
<th>GGS</th>
<th>MCGR</th>
<th>TGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive surgeries</td>
<td>3,436</td>
<td>3,406</td>
<td>14,395</td>
</tr>
<tr>
<td>Deep SSIs</td>
<td>83</td>
<td>75</td>
<td>652</td>
</tr>
<tr>
<td>Device failures</td>
<td>436</td>
<td>406</td>
<td>395</td>
</tr>
</tbody>
</table>
Cumulative costs per patient ($)

- GGS Year 1: $59,029
- MCGR Year 1: $72,012
- TGR Year 1: $52,388
- GGS Year 2: $61,731
- MCGR Year 2: $76,022
- TGR Year 2: $66,836
- GGS Year 3: $64,406
- MCGR Year 3: $79,957
- TGR Year 3: $80,959
- GGS Year 4: $96,708
- MCGR Year 4: $126,006
- TGR Year 4: $101,096
- GGS Year 5: $99,225
- MCGR Year 5: $128,032
- TGR Year 5: $114,385
- GGS Year 6: $128,032
- MCGR Year 6: $114,385
- TGR Year 6: $135,440

Total Costs:
- $165,356
- $160,666

Legend:
- Insertion
- Lengthening/scheduled visits
- Exchange
- Partial revision
- Complete revision
- Deep surgical site infection
- Removal and final fusion
Results: analysis

- Over a 6-year episode of care GGS had lower cumulative costs, saving an estimated **16% vs TGR** and **18% vs MCGR**
  - GGS initial insertion and exchange costs were offset by TGR lengthenings
  - MCGR had the highest initial insertion and exchange costs
  - Results were sensitive to changes in construct costs, rod breakage rates, months between lengthenings, and TGR lengthening setting of care.

Cost analysis to support decision-making
Limitations

• This is a cost analysis, not a cost-effectiveness analysis

• Not considered:
  – Family disruption for lengthenings
  – Psychological stress of children and parents
  – Effects of multiple anesthetics on children
  – Compromised health-related quality of life associated with lengthenings
  – MCGR rods that failed to lengthen

* If considered would lend more power to these findings
Conclusion

• From US integrated health care delivery system perspective,
  – **GGS** can provide a cost saving compared to **TGR** by obviating the need for repeated invasive surgical lengthenings that risk complications, such as deep SSIs
  – **GGS** can provide a cost saving vs **MCGR** due to reduced construct costs with a comparable rod fracture and deep SSI rate
Thank You
from Arkansas