Magnetic Expansion Control System Achieves Cost Savings Compared to Traditional Growing Rods over 5 Years : an Economic Analysis Model

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Background: growing implant systems are mainstay Tx for early-onset scoliosis

I. Traditional Growing Rods (**GR**): $ 6.5K
   A. spine growth with deformity control [1]
   B. 2x per year lengthening surgeries
   C. infection [2-4], stressful for children

II. MAGEC® System (**MG**): $ 36K
   A. no need for lengthening surgeries [5]

[1]Akbarnia+ *Spine* 2008;[2]Sankar+ *Spine* 2010;[3]Kabirian+ *JBJS-Am* 2014;[4]Bess+ *JBJS-Am* 2014,[5]Cheung+ *Lancet* 2012

Motivation

Direct cost of MG vs. GR is similar
4 yr. after index surgery (French) [6]

What about the direct costs in the US?

Hypothesis

MG reaches cost neutrality with GR
over a 5-year F/U after index surgery

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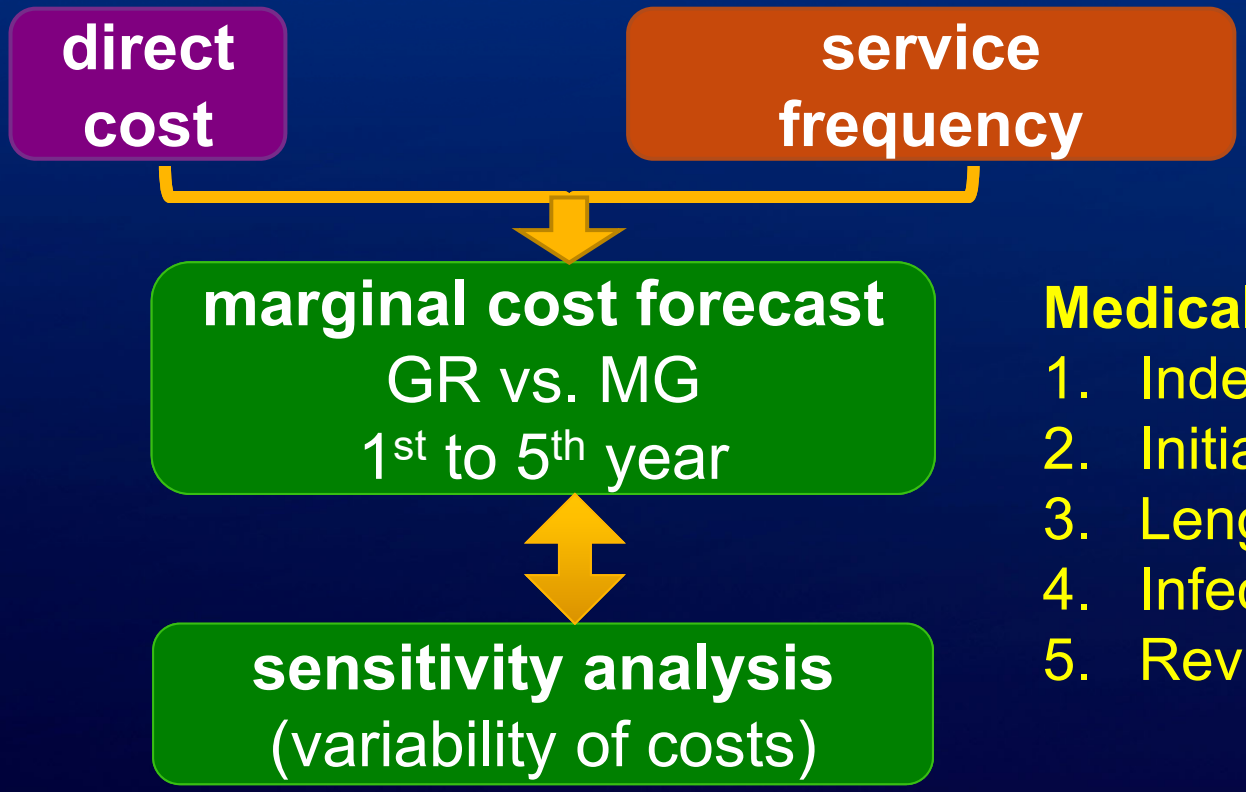
[6]Charroin+ *Orthopaedics&Traumatology: Surgery&Research* 2014

Method: Medical economic model

from payer's perspective



Medical Service Events

1. Index surgery
2. Initial implants
3. Length. procedure
4. Infection management
5. Revision surgery

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Method: Direct cost estimation

literature & database

expert consultation

Medical Service Events

1. Index surgery = $45K
2. Implants = $7K (GR) vs. $36K (MG) (2 rods)
3. Lengthening = $10K (GR) vs. $100 dollars (MG)
4. Infection Mng. = $41K
5. Revision surgery = $45K (GR) vs. $60K (MG)
   (+ replace 1 rod)

[1]National Inpatient Sample (NIS-HCUP), Kids' Inpatient Database (KID) 2012
[2]Expert Consultation (hospital & industry); [3]Emohare+ *Spine* 2014

Method: Service frequency estimation

Annual frequency literature

1. Index surgery = 1x over 5 years
2. Implants = 1x over 5 years
3. Lengthening = 2x every year
4. Infection Mng. = 2.2% (GR) vs. 2.8% (MG)
5. Revision surgery = 4.6% (GR) vs. 13.0% (MG)

GR	Kabirian+ 2014; Watanabe+ 2013; Schroerlucke+ 2012; Bess+ 2010; Akbarnia+ 2005,2008; McElroy+ 2011; Yang+ 2011; Sankar+ 2010; Thompson+ 2007
MG	Cheung+ 2014; Wang+ 2012; Akbarnia+ 2013; Dannawi+ 2013; Hickey+ 2013

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Cumulative cost forecast

Example: GR Lengthening

direct cost

frequency

$10K x 2 times per year = $20K …. 1st year

$20K x2 = $40K …. 2nd year

x3 ..

x4 ..

$20K x5 = $100K …. 5th year

sum up $$ of all 5 medical events = cumulative cost

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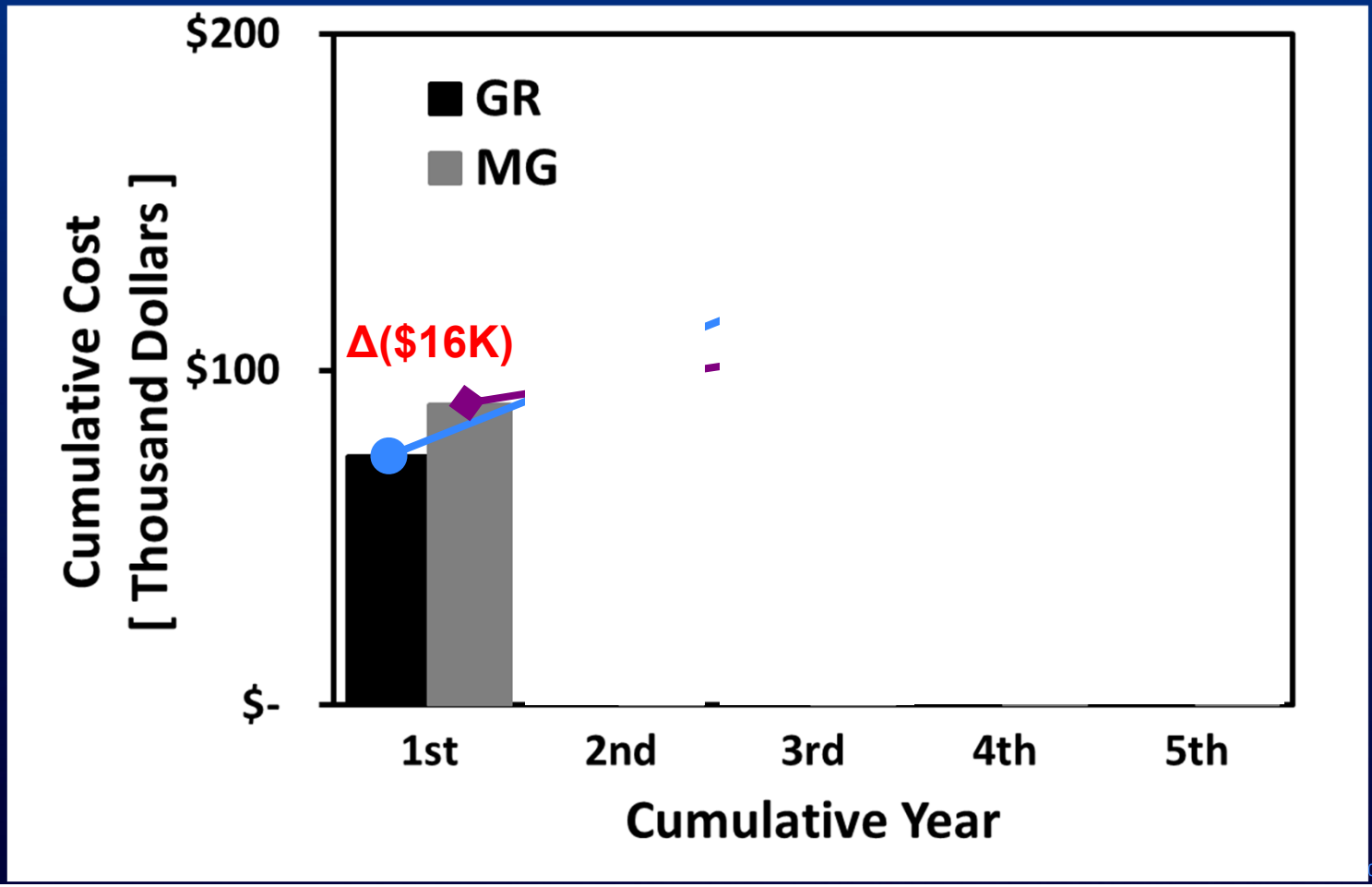
Results: GR costs more than MG after 3rd year



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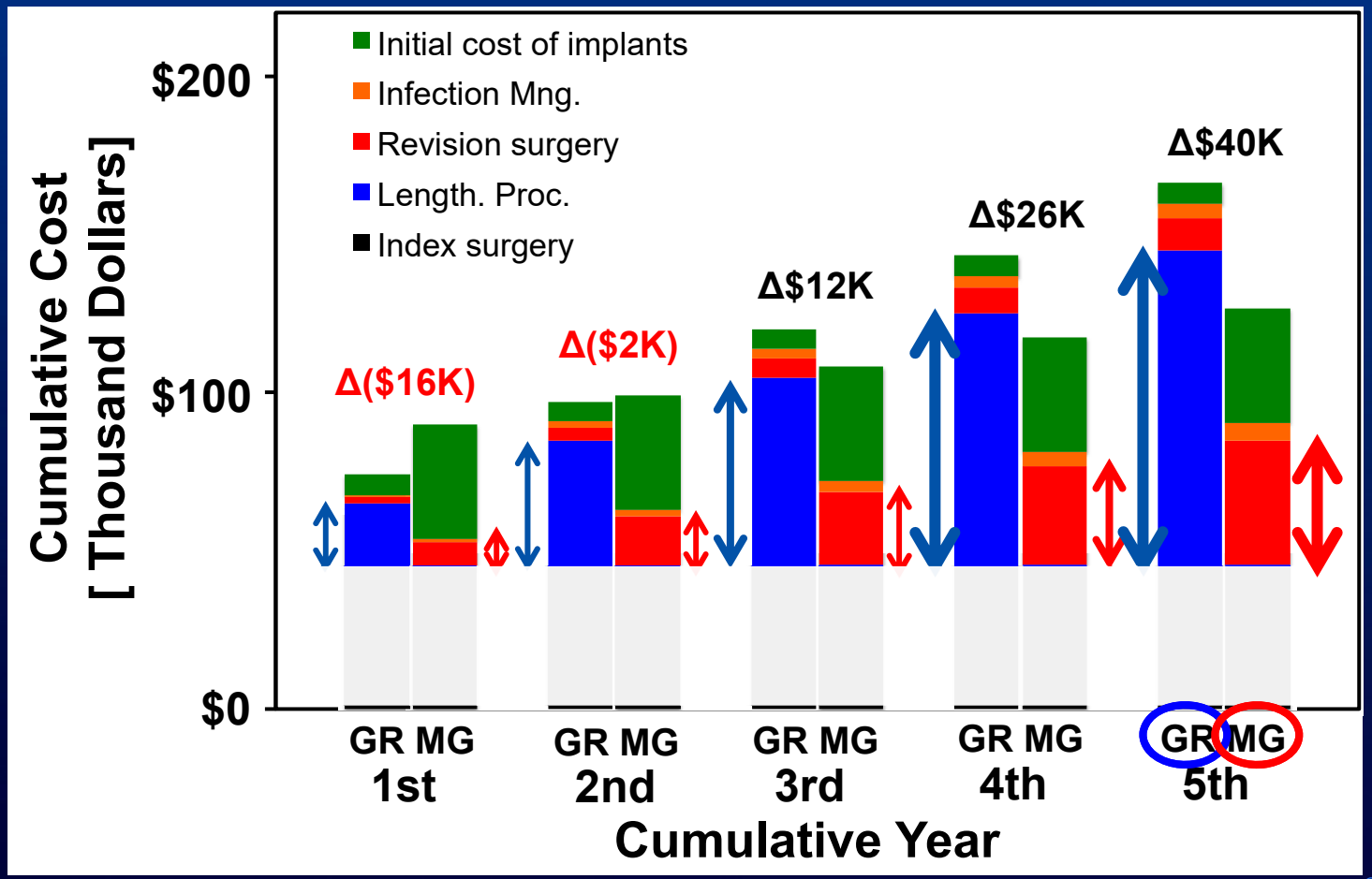
Cost growth: lengthening for GR, revision for MG



3-way sensitivity analysis

We predicted GR costs $40K more than MG at 5th year

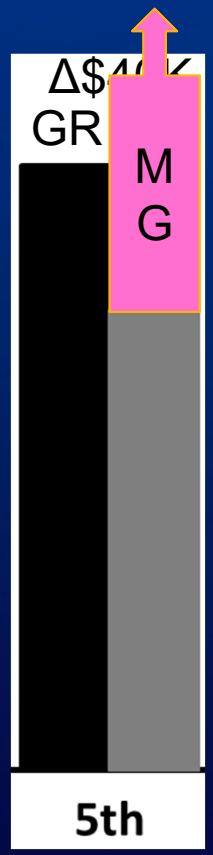
Aim: to address the "swing" of costs

extreme case scenario

the "swings"

- **$(42K)** 1. (MG) Infection management
- **$(3K)** 2. (GR) Revision surgery
- **$(20K)** 3. (GR) Lengthening

MG costs $26K more than GR in extreme case



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Limitation of the present model

- Estimated costs & incidences of medical events
  - high variability among literature reports
  - lack of published data for certain costs
  - limited evidence on MG complications (small *n*, short FU)
- Thus, we did a sensitivity analysis to cover high – low range
- No Markov modeling
- Payer's perspective did not cover society costs
  - children's days missing school, parents day off, travels, etc.

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Discussion: MG can save costs after 3 yr FU

- MG spares the costs of lengthening surgeries
- Avoids stress of multiple surgeries on patients & family
- Institutions can take our results into consideration
- In certain scenarios MG can be more expensive

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Significance

US medical economic study providing new information of long-term direct cost of GR vs. MG on health care reimbursement policies & surgeon's decision making

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Thank you

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