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Bigger is Better: Larger Thoracic Height is Associated with Increased Health Quality of Life at Skeletal Maturity

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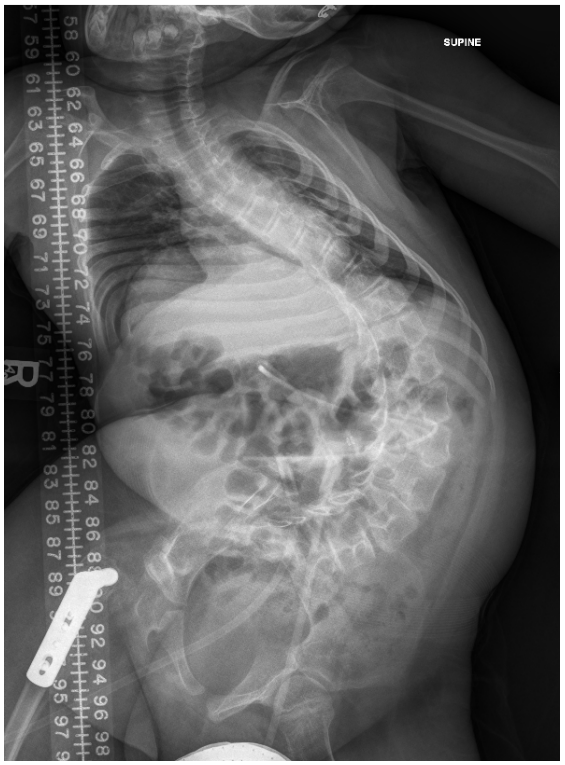
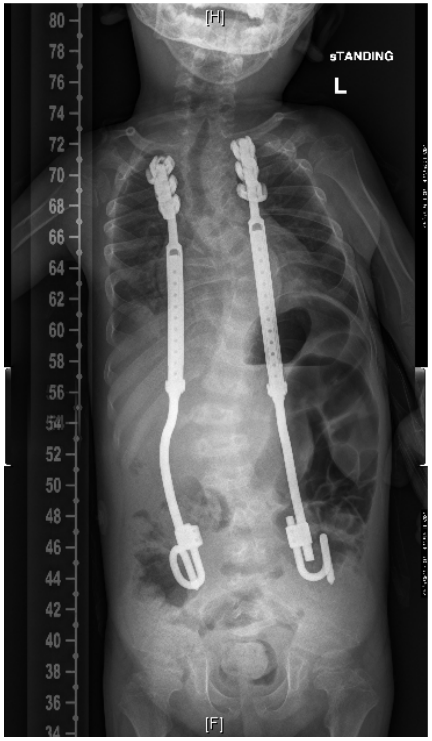
Background

- Severe spinal deformity limits the capacity of the spine and thorax to grow and results in reduced pulmonary function
- Literature suggests a minimum of 18-22cm to avoid pulmonary function impairment
  - Karol et al. 2008, Pehrsson et al. 1992
- Thoracic height predictive of FEV1
  - Glotzbecker et al 2014



Background

- Little data specifically associating thoracic dimensions and health related quality of life (HRQoL) in patients with early onset scoliosis
- Such data could provide support for the principle of achieving maximum attainable thoracic height in early onset scoliosis (EOS) patients



How Do Increases in Thoracic Height affect HRQoL?

The purpose of this study was to evaluate the association between thoracic height and HRQoL at skeletal maturity in patients with EOS

Study Design and Population

Cross Sectional Study

- Two international registries (CSSG and GSSG, now PSSG)
- 32 centers

Inclusion Criteria

- Patients with EOS
- Skeletal maturity
  - ≥13 years of age for females or ≥15 years of age for males AND no change in height on consecutive visits

Outcomes

HRQoL:

- EOSQ-24 scores at the first visit following skeletal maturity

Actual and Normalized Thoracic Height:

- Absolute T1-T12 thoracic height (cm)
- Percentage of expected T1-T12 thoracic height
  - Arm span was used to normalize thoracic height

Steps to Normalize Thoracic Height

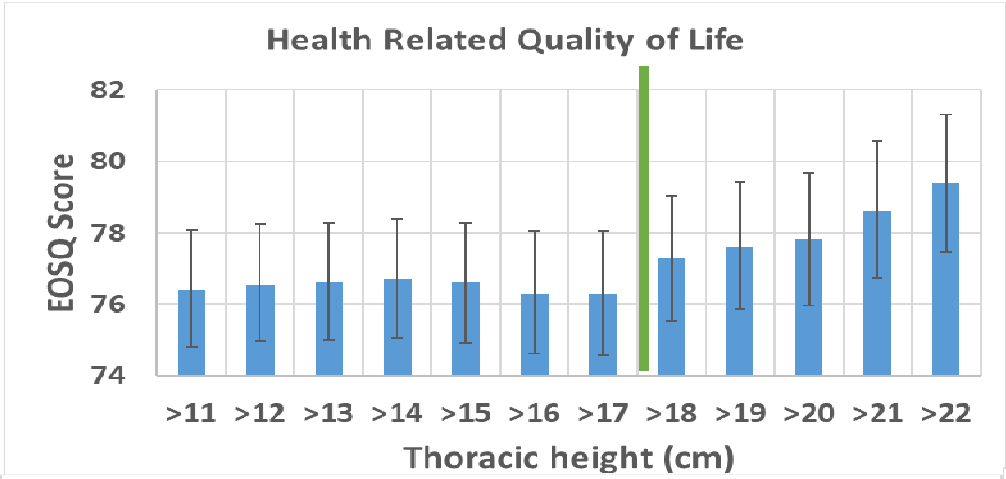
- **169 patients had arm span measurements**
- **No literature reported how to approximate thoracic height from arm span**
- Derived an equation based on arm span to height measurements, height to sitting height measurements, and sitting height to thoracic height measurements

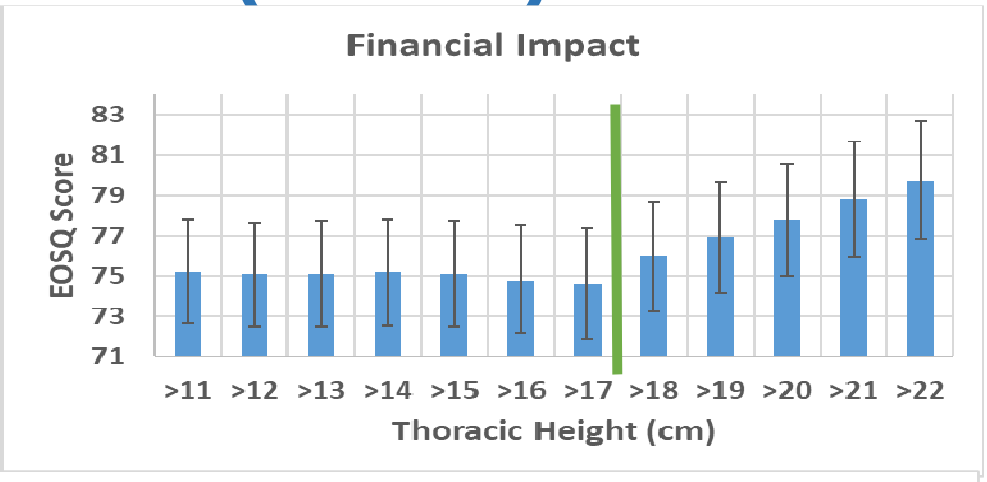
$$\left(\frac{\boldsymbol{Arm\ Span}}{\mathbf{1.01}\ (\boldsymbol{f})\ \boldsymbol{or}\ \mathbf{1.02}\ (\boldsymbol{m})}\right) \times \mathbf{.52}\ (\boldsymbol{m})\ \boldsymbol{or}\ \mathbf{.53}\ (\boldsymbol{f}) \times \mathbf{.3} = \boldsymbol{T1 - T12\ Thoracic\ Height}$$

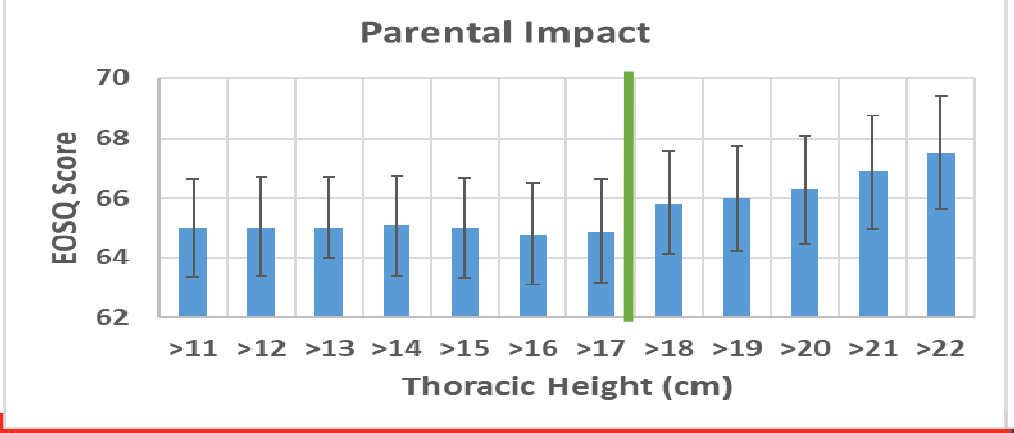
Results

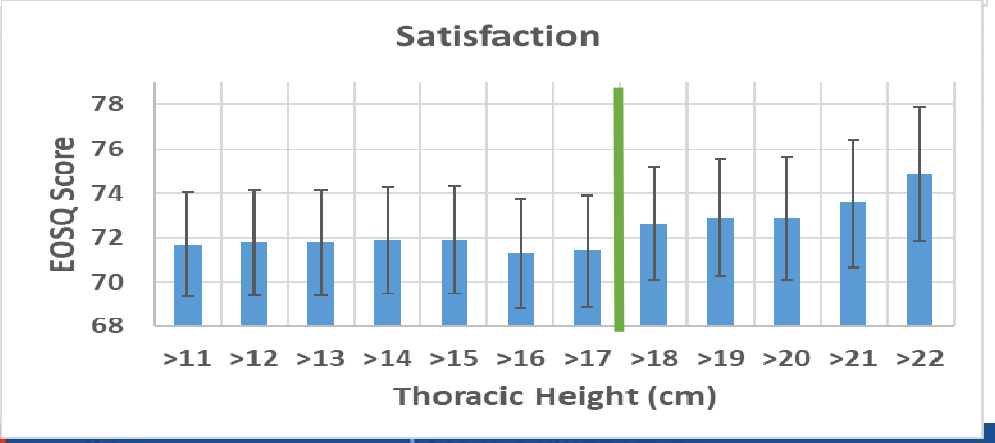
- **Demographics**
- 469 patients
  - 77% female
- **Etiology**
  - 35% idiopathic
  - 30% congenital
  - 21% NM, 14% syndromic
- **76% had surgery**
- **Average thoracic height**
  - 22.7cm (11-29)

EOSQ-24 Domains Increased After a Threshold of 18cm (N=469)



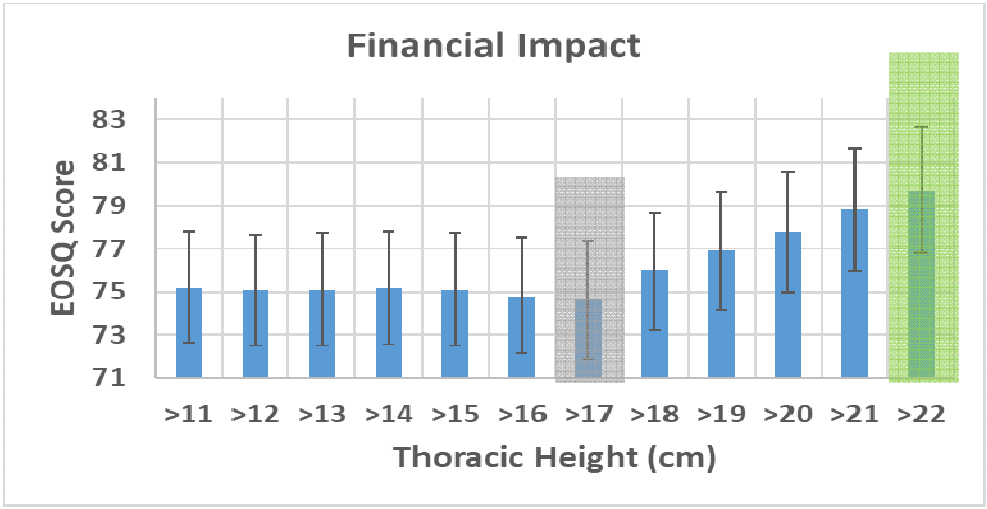




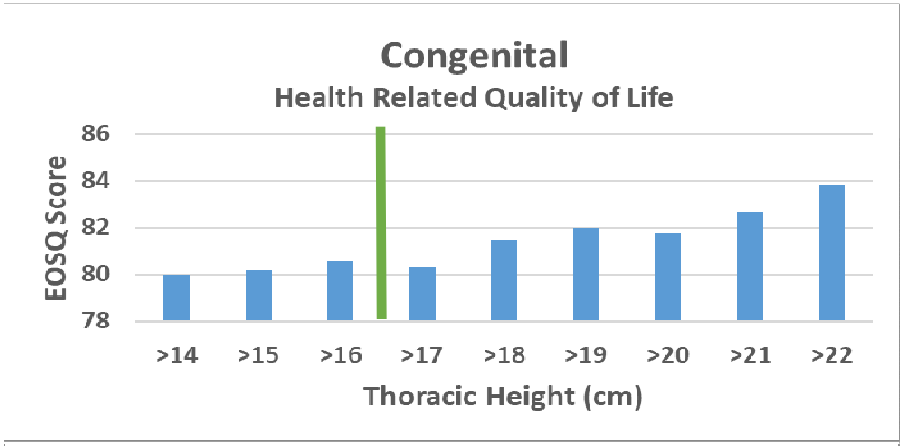


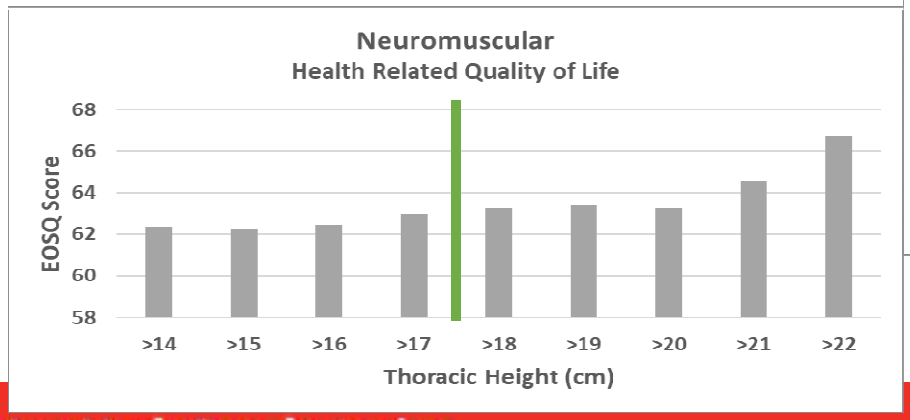
Results

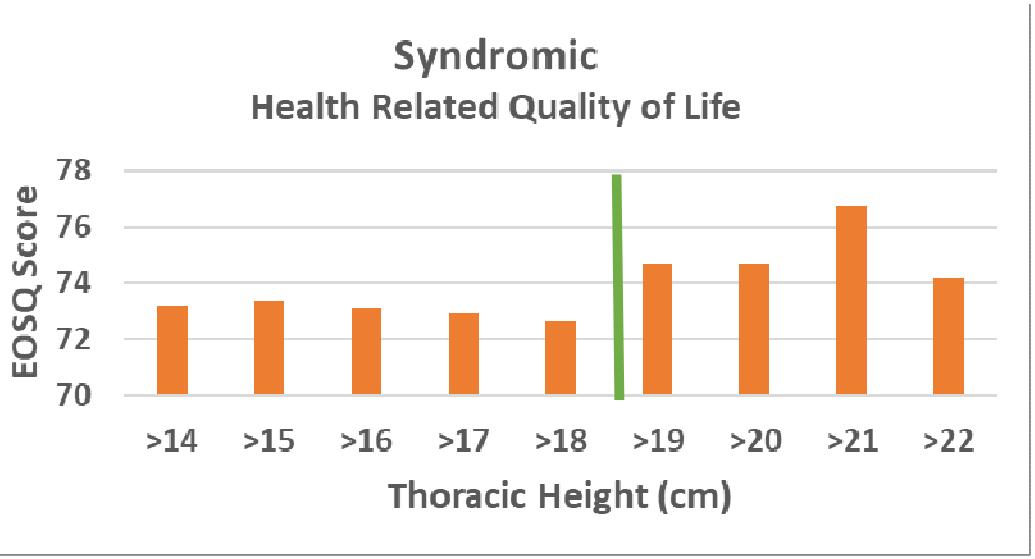
- Compare 17cm to 22 cm
  - About 2 inches
- EOSQ scores increased about 5 points in all domains



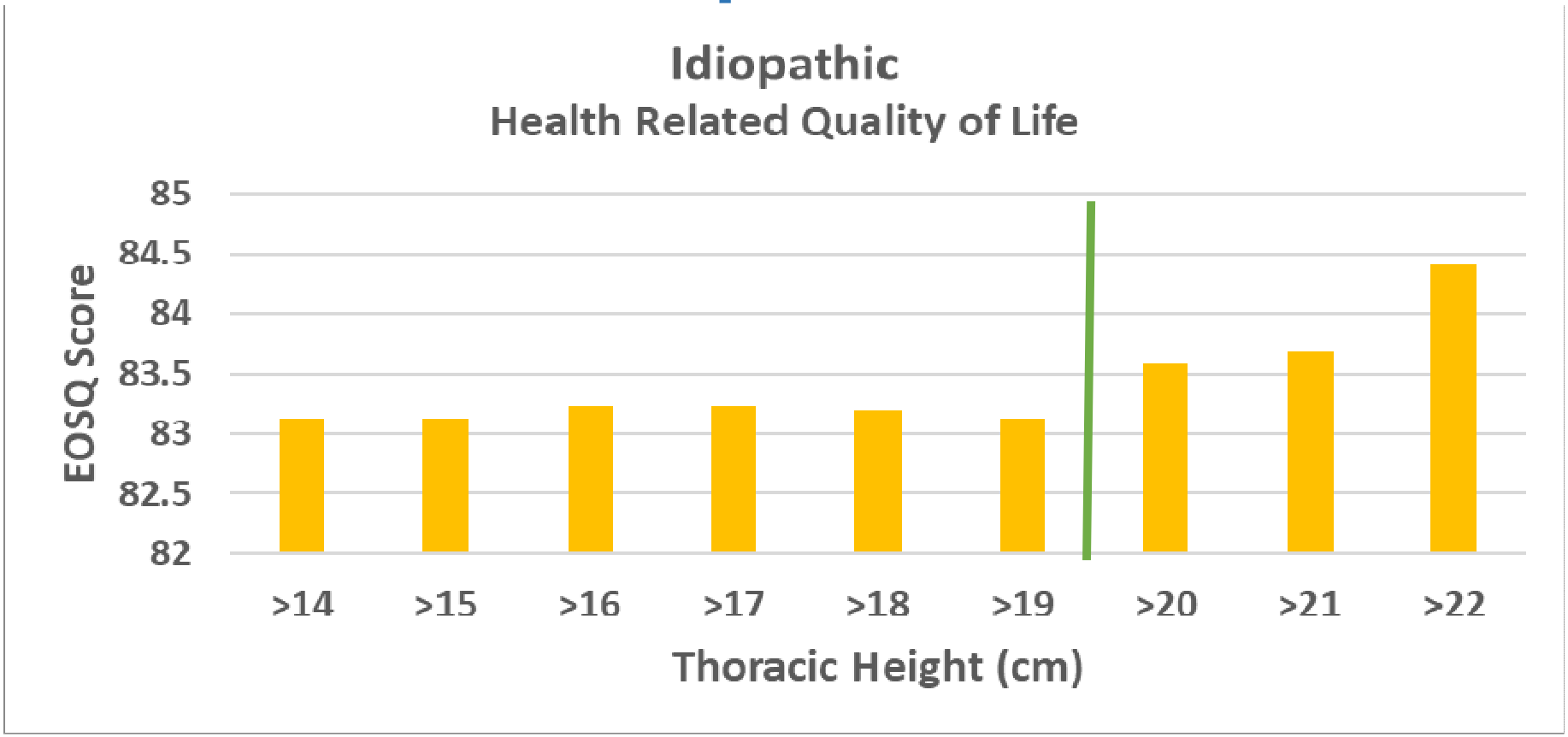
The 18cm Cutoff Held for Patients with Congenital and Neuromuscular EOS and the Cutoff for Syndromic Patients with 19 cm



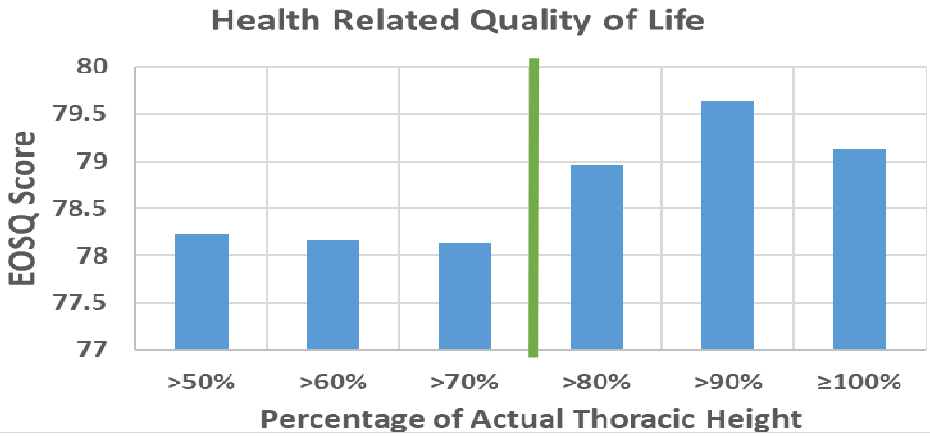


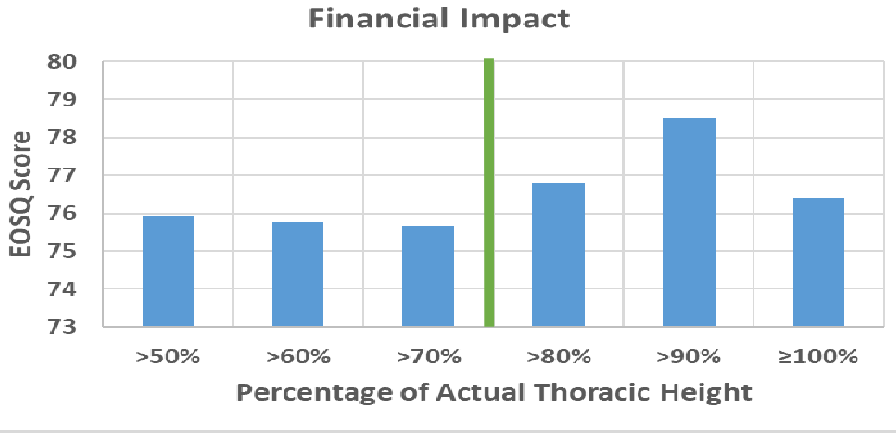


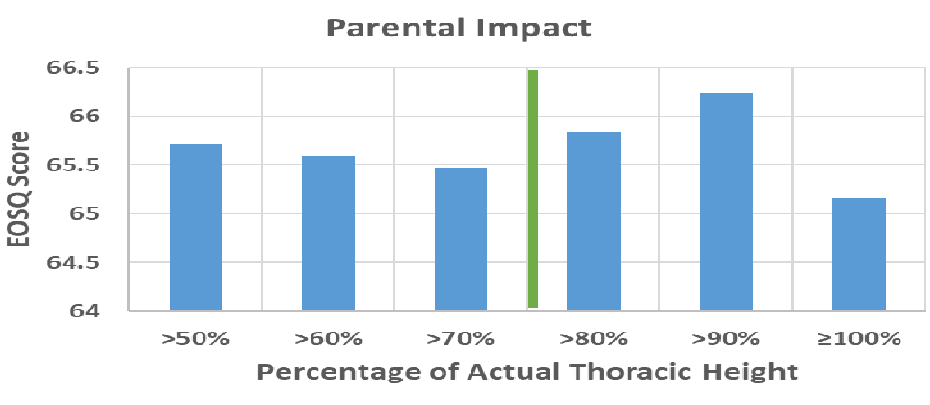
The Cutoff for Idiopathic EOS was 20cm

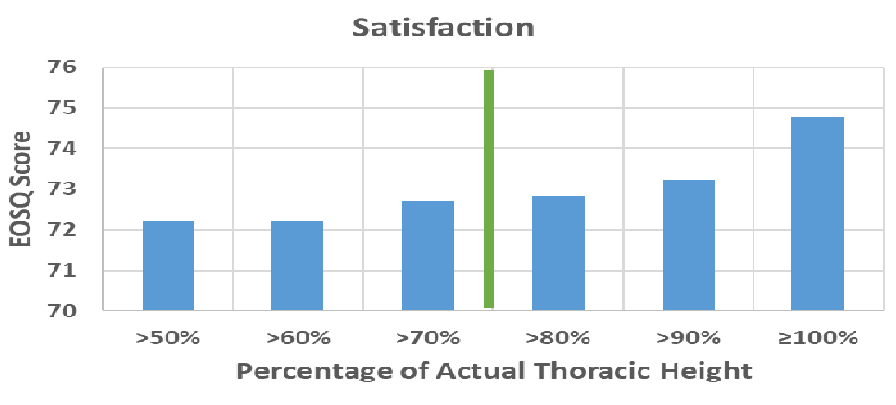


HRQoL Increases When Patients Achieve 80% of Expected Thoracic Height (N=169)









Limitations

- Minimal clinically important difference of EOSQ-24 is not (yet) available
- Larger thoracic height may simply be a marker for healthier patients at baseline
- Did not correct for curve magnitude

Conclusions: Larger Thoracic Height is Associated with Higher HRQoL

- **Once 18cm of actual thoracic height or 80% of expected thoracic height is achieved in skeletally mature patients, HRQoL continues to improve**
- **Relationship held true for all EOS etiologies**
  - Not driven by the generally healthier idiopathic patients
- **Our findings support the principle of maximizing thoracic height in EOS patients**

- Thank You !

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AMAZING THINGS ARE HAPPENING HERE for KIDS

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