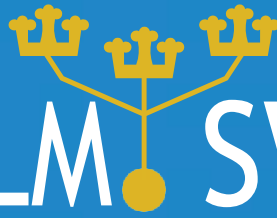




57TH ANNUAL MEETING



STOCKHOLM SWEDEN

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FINAL PROGRAM

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PODIUM PRESENTATION ABSTRACTS

95. PREDICTION OF FUTURE CURVE SEVERITY IN IDIOPATHIC SCOLIOSIS BETWEEN AGE 6 AND SKELETAL MATURITY WITHOUT TREATMENT: A VALIDATED NATURAL HISTORY MODEL

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Hypothesis
 Future curve severity can be predicted from coronal x-rays taken prior and at the first specialist consult before starting treatment.

Design
 Analysis of prospectively collected (n=22387) natural history data in a national clinical database since 2003.

Introduction
 Our understanding of the natural history is limited because most models predicting curve severity have not been validated, did not include all growth or included treated patients. The objective was to predict future curve severity at a future timepoint specified by clinicians using x-ray data from prior to and at the first consult before starting any treatment.

Methods
 We included patients with idiopathic scoliosis under age 26 previously untreated with an x-ray taken at their first specialist visit and with at least one prior spine x-rays. We excluded those with prior scoliosis-specific exercise, brace or surgery treatment. We extracted clinical variables for each x-ray: sex, age, triradiate, Risser, diagnosis (AIS or JIS), curve type, and max Cobb angle. Radiographs were re-measured blindly to ensure quality. Linear mixed-effect models with random effects and a variance components structure were used.

Results
 We included 2317 patients (83% were females) with 3255 total prior x-rays where 71% had 1, 21.1% had 2, 5.6% had 3, and 1.9% had 4 or more (Max 8). Mean age was 13.9±2.2yrs (6-25) and 81% had AIS. Curve type was: 50% Double, 26% TL-L, 16% Th, and 8% other. Cobb angle at first x-ray was 20±10 (0-80) degrees vs 29±13 (6-122) at the specialist visit. Time between first x-ray and the clinic visit was 28±22mths. The best model to predict future Cobb angle was $4.41 + 1.12 \text{ Prior Cobb} + 2.64 \text{ Time (in half-year)} - 0.12 \text{ Time}^2 + 0.002 \text{ Time}^3 - 1.04 \text{ Risser} - 0.3 \text{ age@consult} - 0.29 \text{ time} * \text{Risser@prior visit} - 0.18 \text{ time} * \text{Sex}$. (coefficients p<0.008). Cross-validation found a median error of 4.38 (interquartile range 2.1-7.6) degrees (63.2% within prediction interval).

Conclusion
 This is the first internally validated model to predict future Cobb angle in non-treated subjects. Our model can help clinicians predict how much curves would progress if offered no treatment at future timepoints of their choice using prior Cobb angle, Risser, sex, time to the prediction target and age at the target prediction time. This may help inform treatment prescription or reassure families not offered treatment.