The “Idiopathic Scoliosis Graphical Representation Of Worsening Trend of natural History” (IS-GROWTH) communication tool provides a reliable prediction useful to manage long-term treatment during growth

Negrini Stefano (1,2), Negrini Francesco (3,4), Francesca Febbo (5), Greta Jurenaite (5), Carmelo Pulici (5), Fabio Zaina (5), Negrini Alberto (5)*

1. Department of Biomedical, Surgical and Dental Sciences, University of Milan “La Statale, Milan, Italy
2. IRCCS Galeazzi S.Ambrogio Hospital, Milan, Italy
3. Department of Biotechnology and Life Sciences, University of Insubria, Varese, Italy
4. IRCCS Maugeri Institute, Tradate (Varese), Italy
5. ISICO (Italian Scientific Spine Institute), Milan, Italy

Purpose

Effective communication with patients for long-term conservative treatment of idiopathic scoliosis requires understanding its natural history. Existing predictive models have limitations for this scope. Our study aimed to develop and assess the reliability and utility of the Idiopathic Scoliosis Graphical Representation Of Worsening Trend of Natural History (IS-GROWTH) communication tool.

Methods

IS-GROWTH development and validation included consecutive untreated patients with radiographs at and before the first consultation. To build the model, we calculated the minimum and maximum progression of patients grouped by 10 °Cobb range and growth phases. IS-GROWTH is developed for each patient, adding the expected progression of each growth phase to the previous.

For temporal validation, we included patients with data acquired after the development of IS-GROWTH, comparing IS-GROWTH predictions with natural history. We calculated the percentage of correct predictions and applied the chi-square test. We also looked at the distribution of natural history within IS-GROWTH.

Results

To develop IS-GROWTH, we analyzed 3,184 radiographs from 1,818 participants, spanning from infancy to adolescence. For validation, we included 552 patients and found an accuracy of 95% (95% Confidence Interval, 93-97%) adjusting for the 5° radiographic measurement error. Nineteen physicians (7.3±5.8 years’ experience) reported using IS-GROWTH in 30% of their patients (range 5-95%) and found it most useful during follow-up (84%) to motivate patients (79%).

Conclusion

IS-GROWTH is reliable and useful. We now regularly use it to deepen our understanding of individual natural history and enhance communication with patients.