

GrowthXP

Enhanced Growth Charting *with* Full Electronic Health Record Integration

“The extensive catalogue of growth curves leaves nothing to be desired.”

Pediatrician



The Problem with Basic EHR Growth Charts...

Most current Electronic Health Record systems don't allow you to view different measurements all on a single page, such as:

- ◆ Height
- ◆ Weight
- ◆ Bone Age
- ◆ Parental Heights
- ◆ Target Height
- ◆ Puberty Stages

This lack of ability to combine data into a single comprehensive overview can make it more difficult to detect growth anomalies or underlying disorders.



“Although the adoption of EHR’s has increased, 80% of pediatricians are working with EHRs that lack optimal functionality ...”

The Journal of Pediatrics ❶

Introducing GrowthXP...

A comprehensive growth, analysis and decision support system with advanced features:



- ✓ Reading patient data directly from the patient's health record
- ✓ Providing reference charts for dozens of auxological parameters
- ✓ Displaying multiple parameters in the same chart
- ✓ Accurate, proportional representation of CDC and WHO growth charts
- ✓ Real-time calculation of percentiles and standard deviation scores, growth velocities, BMI, target height, and corrected age for prematures
- ✓ Over 50 disease specific growth charts overlaid on population references
- ✓ Automatic adult height predictions based on bone age
- ✓ Easily exportable to PDF, PNG and JPEG formats for inclusion in reports, billing, and other forms of communication
- ✓ Improving clinic management, payer authorization and richly enhancing decision making support
- ✓ Nearly 20% of the world's leading hospitals use PC PAL products

“Where has this been all my life?”

Nutritionist, Vermont Dept. of Health Nutrition Program

“Amazing, beautifully done software.”

Pediatrician

Common Needs Addressed...

THE ISSUE: DOWN SYNDROME

You're following a child with Down Syndrome and are plotting her height on a standard growth curve. Children with Down Syndrome grow slower than other children, and hypothyroidism, a common problem, will slow growth velocity even further, but it is difficult to detect this on standard growth charts.



THE SOLUTION

GrowthXP provides Down Syndrome-specific growth charts and can overlay them on the standard reference growth curve. GrowthXP also contains disease-specific growth curves for Turner Syndrome and Achondroplasia.² An optional Rare Disease Module provides charts for over 50 conditions.



“The American Academy of Pediatrics has recommended that EHR systems incorporate syndrome-specific growth charts where feasible.”

American Journal of Medical Genetics³

THE ISSUE: 1st GENERATION IMMIGRANT

You're seeing a child with a height well below the third centile on the CDC chart whose parents are from India and are now living in the United States and you are trying to determine if a child's height is appropriate compared to the parents' height.



THE SOLUTION

GrowthXP automatically calculates the target height and target range for the child using the parental height data and displays it on the height curve, and will also calculate the difference between the current SD position and the target height SDS.



"GrowthXP is an excellent application, I use it regularly in my clinic."

Consultant Pediatrician and Clinical Lead for Pediatric Diabetes

Common Needs Addressed...

THE ISSUE: MILD DISPROPORTION

Some short children have a mild genetic problem affecting the growth plates of the long bones in the legs. This can easily go unnoticed clinically, but it will become evident when you measure the standing height and sitting height and analyze the body proportions.



THE SOLUTION

Evaluate sitting height in relation to total height on appropriate growth charts. GrowthXP contains the 2020 US reference charts for sitting height, leg length and sitting height/height for different ethnic groups.¹



“The features of GrowthXP cover many needs that users don’t even know they have and is yet easy to use.”

Pediatrician, Karolinska Institute Stockholm

Communicating with Parents...

A study of 1,000 American parents found that most of those who thought they understood growth charts actually had trouble interpreting them.⁵

The study, published in the journal *Pediatrics*, found that 79% of the parents surveyed said they were familiar with growth charts, and yet only:

64% could identify a child's weight when shown a plotted point on a growth chart,

68% could identify the percentile of the plotted point, and

23% correctly interpreted charts containing height/weight measurements in tandem.

Charts and reports in GrowthXP provide comprehensive information for better conversations with parents and patients alike.

"A very important tool."

Pediatrician, University Hospital,
Rouen



Body Mass Index (BMI)

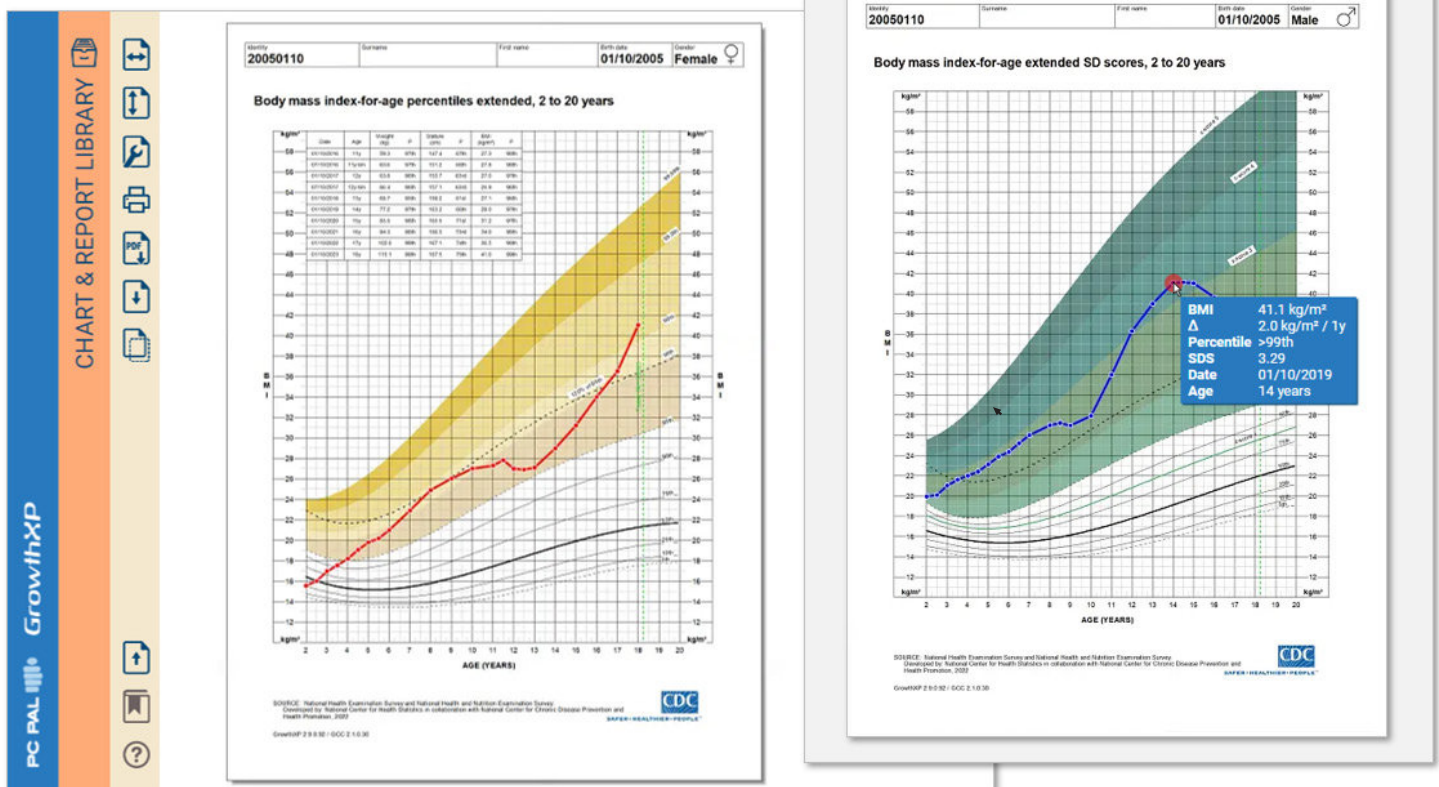
New CDC extended charts for children and adolescents available with GrowthXP

The original BMI growth charts released in 2000 suffered from data weakness above the 97th percentile because they relied on data extrapolation rather than real data. As a result, above this level the charts could not reliably differentiate significant differences in BMI. For this reason, the CDC has released new BMI charts for 2-18-year-olds, which provide curves above the 97th percentile (98th, 99th, 99.9th and 99.99th) based on real measurements rather than extrapolation.⁶

The new curves accurately cover individuals up to a BMI of 60 and BMI z-score of 5, greatly improving on the previous limit of values beyond the 97th percentile. The CDC emphasizes that the threshold for severe obesity has not changed and that the 2000 BMI-for-age growth charts are applicable to growth monitoring of children without obesity. For severely obese children, clinicians are advised to use the new 2022 charts to replace the growth charts found in Electronic Health Chart systems.

Clinicians now have access to the CDC's new extended BMI charts in GrowthXP

Using BMI percentiles to visualise results of weight loss might not reveal the significance of the outcome on weight. GrowthXP users can easily switch showing BMI SDS values, which do correlate linearly with the change in BMI.



Illustrative BMI charts in GrowthXP based on the new, 2022 CDC reference. (Left: female percentile chart; Right: male z-score chart). New bands are shaded to facilitate discussion with patients. Based on Hales et al, 2022.

GrowthXP

Rare Disease Module

An Extensive Collection of Growth Charts For Over 50 Rare Diseases

In addition to normal population standards, currently GrowthXP contains charts to track the growth of children with achondroplasia and selected syndromes, Turner and Down. By licensing the new rare diseases module, **users can have access to growth charts for over 50 rare disorders in a consistent digital format.**

Until now charts for conditions including Noonan, Prader-Willi, Silver Russel, Kabuki, were only available in paper form in the original publication, and in a variety of sizes, formats and graphic presentations restricting access for routine clinical practice. At the same time, health-care providers are demanding growth charts in digital format and integrated with the patient health record.

Using the latest technology, PC PAL has rendered published growth curves for over 50 disorders into a consistent digital format. For these conditions, references can be selected for height, weight, BMI and other parameters.

ACCURATELY TRACKING THE GROWTH OF A CHILD WITH A SPECIFIC DISEASE ON THE APPROPRIATE CHART CAN:

- ✓ Provide parents with a growth chart based on references for their child's rare condition
- ✓ Highlight deviation from the growth curve not explained by the underlying condition
- ✓ Support treatment decisions and authorization
- ✓ Monitor treatment or other intervention effects

The GrowthXP Rare Disease Module is available as an add-on for GrowthXP. Contact us to obtain a quote.

Comprehensive Technical Features...

◆ CHART GROUPS / CHARTS

- 1) Individual:** Length 0-2 years (WHO), Weight 0-2 years (WHO), Head circumference 0-2 years (WHO), Weight for length 0-2 years (WHO), Stature 2-20 years, Weight 2-20 years, BMI 2-20 years
- 2) Clinical:** Length and weight 0-2 years (WHO), Head circumference and weight for length 0-2 years (WHO), Weight and Stature 2-20 years, Weight for stature, BMI 2-20 years, BMI 2-20 years (extended), BMI 2-20 years (% above the 95th)
- 3) 0-36 months:** Length 0-3 years, Weight 0-3 years, Head circumference 0-3 years, Weight for length 0-3 years, Length and weight 0-3 years (WIC), Head circ. and weight for length 0-3 years (WIC), Length and weight 0-3 years, Head circ. and weight for length 0-3 years
- 4) Measurement:** Height, Weight, Head circ., Sitting height, Arm span, Foot length, Waist circ.
- 5) Calculated:** Leg length, Height velocity, Sitting height velocity, Leg length velocity, Rel. sitting height, BMI, IOTF BMI
- 6) SD scores:** Height SDS and BMI SDS, Height SDS and Relative Sitting Height % SDS, BMI SDS and Waist SDS, Height SDS and Height Velocity SDS
- 7) Lists:** Visit list, Visit list (SDS or Percentile), Corrected age list (SDS or Perc), Bone age list, Predicted Adult Height list, Calculated list, Complete patient data extract list
- 8) Premature/Neonatal:** 22-44 weeks, 22-52 weeks, Birth summary report, Bilirubin
- 9) Turner syndrome:** Height and weight 0-2 years, Height and weight 2-5 years, Height and weight 2-20 years, Weight for length 0-2 years, BMI 0-18 years, Height velocity 0-18 years
- 10) Down syndrome:** Height and weight 0-2 years, Height and weight 2-5 years, Height and weight 2-20 years, Head circ. 0-5 years
- 11) Achondroplasia:** Length/height, weight and head circ 0-48 months, Height and weight 4-20 years, BMI and Waist circumference 0-20 years, Sitting height and height/height ratio 2-20 years, Arm span and leg length 2-20 years, Head circumference and foot length 0-20 years

◆ CALCULATIONS

- 1) Relation to statistical dispersion:** Percentile and Standard deviation score for every variable
- 2) Age:** Chronological age, Gestational corrected age
- 3) Basic:** BMI, Leg length, Relative sitting height, Weight for height %, Age for height, Body Surface Area, Arm span/Height ratio, Sitting height/Leg length ratio
- 4) Target height:** Target height, Target height SDS and percentile, Target height range, Height SDS corrected for target height
- 5) Velocity:** Delta (any variable), Height velocity, Sitting height velocity, Leg length velocity
- 6) Adult height predictions:** BoneExpert, Bayley-Pinneau, TW2, TW3, including SDS and percentiles as well as confidence intervals

◆ MEASUREMENTS / DATA SUPPORTED

Medical Record Number, First name, Surname, Birth Date, Gender, Visit Date, Height, Weight, Height measure type, Sitting height, Head circumference, Arm span, Foot length, Waist line, Pubic hair stage (1-5 according to Tanner), Breast (girls) or genital stage (boys) (1-5 according to Tanner), Testicular volume left and right (for boys only), Evaluation method (self-estimated or observed), Menarche (for girls only), Menarche date (for girls only), Bone age (methods: BoneExpert, G&P, TW2, TW2 RUS, TW3), Gestational age weeks, Gestational age additional days, Birth weight, Birth length, Birth head circumference, Bilirubin (serum/transcutaneous), Light therapy, Blood exchange, Mother's height, Mother's weight, Mother's head circumference, Father's height, Father's weight, Father's head circumference

◆ CHART FEATURES

- Zoom / Detail: Page width, Page height, Free form zoom, Return to previous zoom state
- Detailed Hints/Tooltips in all charts
- Save image as: PDF, JPEG, PNG, RTF
- Save data as: JSON
- Briefcase PDF, Briefcase RTF
- All charts are printable
- Chart display settings (varies according to chart/report): Language (English, Spanish & French), Make chart anonymous, Hide patient data, Show Today line,
- Draw line between measurements, Different line between distant points, Show corrected age curve for premature children (GA <37 weeks), Show bone age, Show pubertal section, Show target height and parental heights, Show visit table, Show visits in descending order, Show Comments in visit table, Show shadow reference, Switch age range 1yr / 20 yrs, Switch reference type (percentile/SD), Use metric system, Ethnicity

◆ TECHNICAL INTEGRATION

- Integrated with Cerner (App Gallery) and Epic (App Market / App Orchard)
- Also compatible with other FHIR-compliant EHRs
- HIPAA compliant (USA), and PIPEDA compliant (Canada), with no external data storage
- Cloud-hosted by PC PAL in USA and in Canada
- Pure HTML 5 and JavaScript application
- No use of 3rd party libraries or frameworks
- Responsive application design suitable for all devices
- Comprehensive technical support and maintenance
- Listing of references used

“A successfully simple and impressive product.”

Microsoft Engineer



GrowthXP is the leading Growth Chart Module used across Maternity, Neonatology, Pediatrics, Endocrinology, Gastroenterology, Nephrology, Nutrition and all other services requiring the most accurate monitoring tools of growth and development today.

Discover GrowthXP Yourself...

Contact us at the links below to schedule your own personally guided experience of GrowthXP to see for yourself why healthcare providers all over the world have made PC PAL and GrowthXP their choice for advanced Growth Analysis Software.



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FURTHER READING

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- Harvard Business Review, ["It's Time For a New Kind of Electronic Health Record"](#) John Glaser, June 2020
- Washington Post, ["Pediatric growth charts often leave parents confused and concerned"](#) Marlene Cimons, June 2012.
- Clinical Growth Charts for Achondroplasia. <https://www.achondroplasia-growthcharts.com>
- CDC Extended BMI-for-age Growth Charts 2022 <https://www.cdc.gov/growthcharts/Extended-BMI-Charts.html>