

# Pediatric Suite User's Guide

Version 2.0.0

Last updated May 28, 2019

## Introduction to Pediatric Suite

The Pediatric Suite is an award winning EHR integrated suite of tools for pediatric care. Based on our original set of SMART pediatric apps (Boston Children's Growth Chart and BP Centiles Apps and Intermountain Healthcare's Bilirubin Risk Chart), we've redesigned it from the ground up to use modern and scalable technologies required for heavy commercial clinical use. In this new version we've included all the essential features from the original collection of apps and incorporated numerous new features identified by pediatricians and neonatologists using the legacy apps in the field.

## Introduction to the Growth Chart Module



Rewritten from the ground up, the updated, commercial version of the original award winning Growth Chart app, includes a modern and responsive touch-friendly interface for EHR embedded and tablet based usage and includes numerous improvements inspired by the many clinicians using the original growth chart. This App demonstrates a high-performance, concise, minimal-click presentation of a child's growth over time.

## Interactive Graphs, Data Table, Parent View:

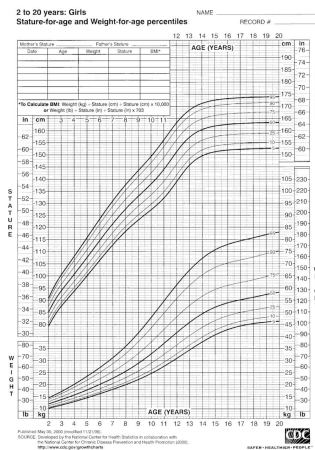
- Chart auto-select

Automatically display condition-specific growth charts based on customizable rules. For example, when a pediatric patient has a downs syndrome condition in their patient record, the application will automatically load a downs syndrome growth chart

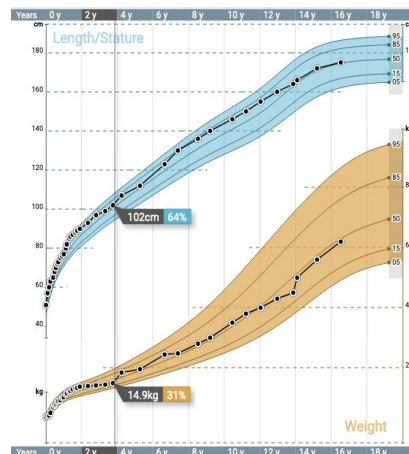


- CDC-like chart layout

### CDC



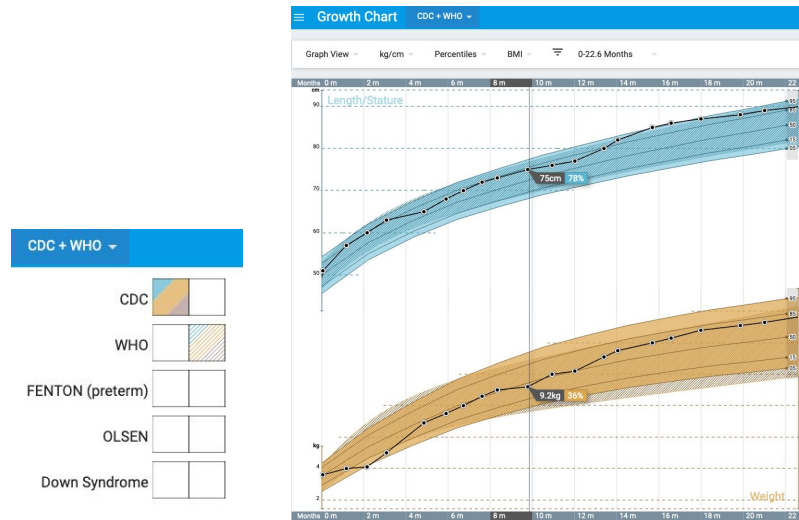
### Pediatric Suite



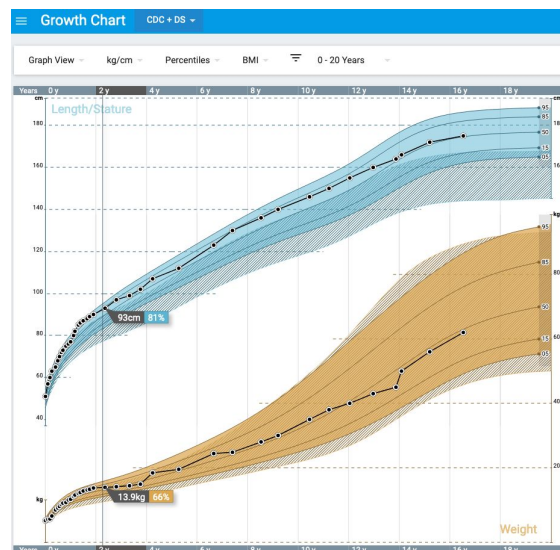
- Dual growth chart display

User-selectable primary and secondary charts can be displayed simultaneously on the screen to add depth to data interpretation.

For example, the user can choose to display the patient's data over the CDC and WHO growth curves at the same time:



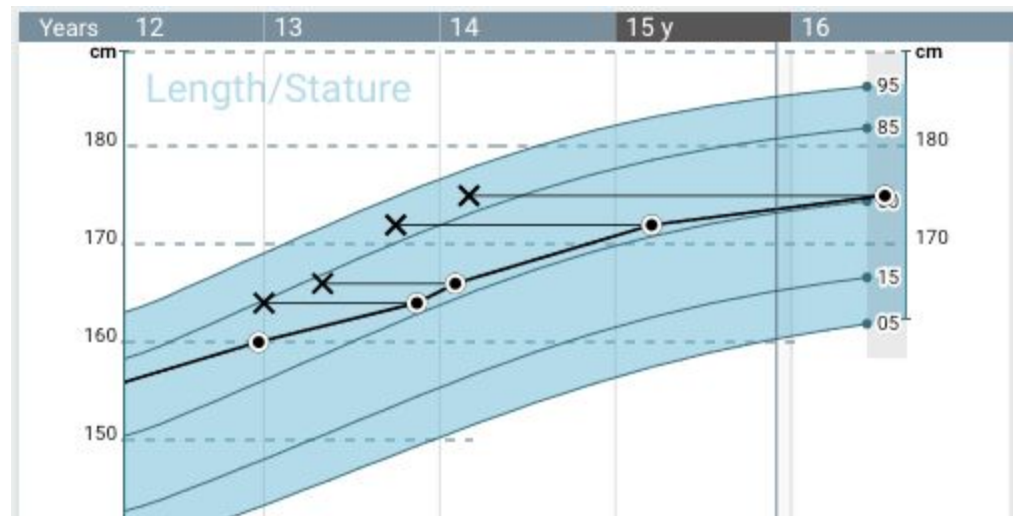
Here is another example of a Down syndrome growth chart displayed as secondary chart to the standard CDC growth curves



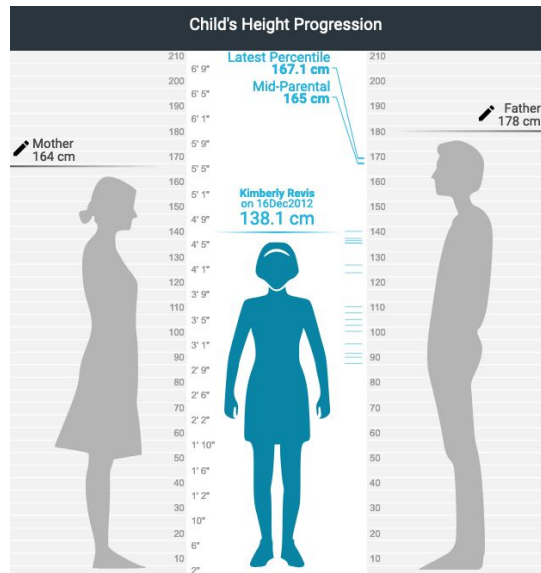
- Percentile/bone-age/mid-parental height estimates
  - The application provides multiple percentile driven chart displays



- Where bone age data is available, the app displays the results in an easy to comprehend format



- When parental height data is available in the patient record, the application calculates and displays estimated adult height projections based on multiple models in the parental view:



- Plug-and-play growth chart extensible

The application supports any growth chart data set when the data set is available and the chart licensed. By default, a starter set of public domain growth charts is included with the application:

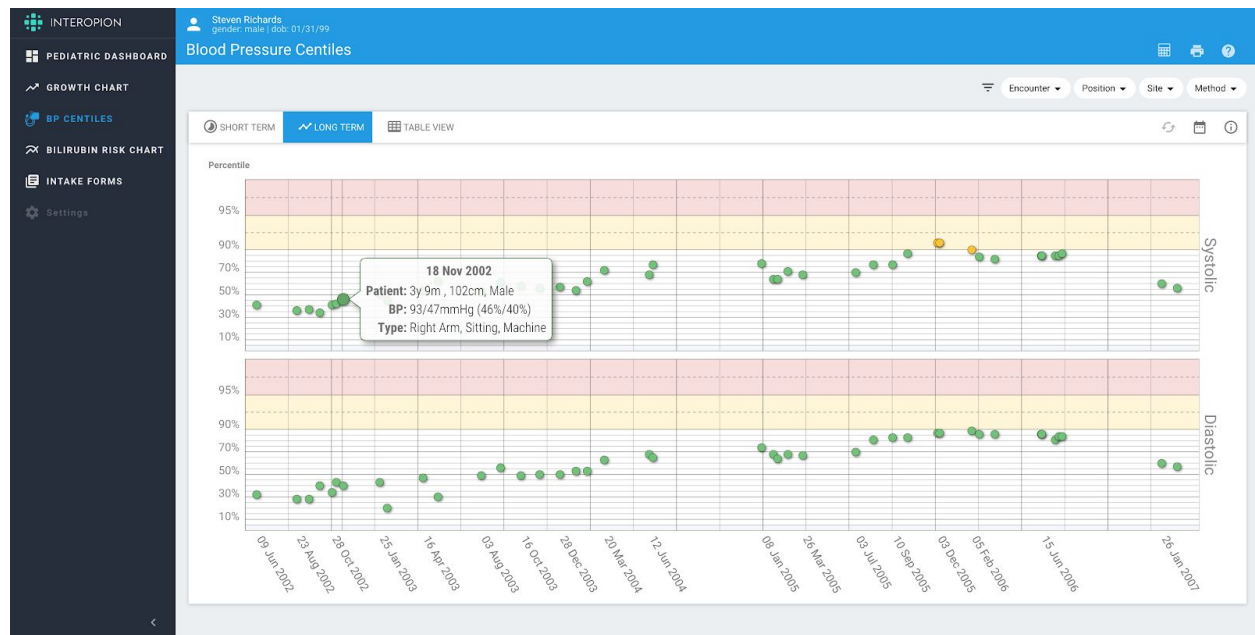
CDC	<input checked="" type="checkbox"/>	<input type="checkbox"/>
WHO	<input type="checkbox"/>	<input type="checkbox"/>
FENTON (preterm)	<input type="checkbox"/>	<input type="checkbox"/>
OLSEN	<input type="checkbox"/>	<input type="checkbox"/>
Down Syndrome	<input type="checkbox"/>	<input type="checkbox"/>

Additional charts can easily be enabled in the application by the end user hospital system.

#### Support for Ambulatory and NICU uses with:

- Gestation corrections
- Bone Age presentation
- Growth point comparison with velocity
- Print-out formats for Graphs, Data Table, and Parent View

# Introduction to the BP Centiles Module



Updated, commercial version of the original open source BP Centiles app, includes a modern and responsive touch-friendly interface for tablets with light and dark themes.

Interpreting blood pressure measurements for children is complicated by the need to account for a constantly changing body size. It is time-consuming to calculate and/or do data entry, yet assessment of blood pressure percentiles is medically recommended from the age of 3 onward because 75% of cases of pediatric hypertension and 90% of cases of prehypertension in children from 3 to 18 years of age go undetected.

The BP Centiles app reads a child's relevant vitals and calculates systolic and diastolic blood pressure percentiles normalized by age, sex, and height. The app also includes a pop-up calculator and a graphical history of the child's blood pressure percentile, enabling full screening at each visit.

Color coding reveals at a glance whether individual readings are normal (green), prehypertensive (yellow), hypertensive (red) or hypotensive (blue). Users can zoom in on a group of readings for more information and apply various filters to help them interpret the measurements—such as looking only at BPs measured in the legs, sitting down or by machine.

# Introduction to the Bilirubin Risk Management Module



Jaundice occurs in most newborn infants. Most jaundice is benign, but because of the potential toxicity of bilirubin, newborn infants must be monitored to identify those who might develop severe hyperbilirubinemia and, in rare cases, acute bilirubin encephalopathy or kernicterus. Although kernicterus should almost always be preventable, cases continue to occur. The focus of this app is to reduce the incidence of severe hyperbilirubinemia and bilirubin encephalopathy while minimizing the risks of unintended harm such as maternal anxiety, decreased breastfeeding, and unnecessary costs or treatment.

By overlaying bilirubin [Mass/volume] results over a time-based risk chart, clinicians are presented with a visual representation of the results and associated criticality zones. By viewing the results in this way, the clinician can determine the best course of action based on the recommended intervention for the criticality of the result.

## New Features Found In Pediatric Suite

### Growth Chart

### Clinical Features

- Introduced Weight for Length chart
- Introduced Down Syndrome chart



- Introduced SGA and LGA banners based on Fenton chart calculation:
  - Small for Gestational Age (SGA; below 10th percentile)
  - Large for Gestational Age (LGA; above 90th percentile)
- Added handling of unexpected/out of range data
  - Data points that are much lower or much higher than the currently selected growth chart will be marked as unexpected values and will not scale the growth charts
  - Behaviour of unexpected data points can be configured in the Growth Chart settings
- Enhanced gestational correction with an option to switch the places of actual data points with the gestationally corrected
- BMI measurements enhanced with calculated BMI based on Length/Stature and Weight measurements
- Parental view weight graphics can be disabled
- Parental view has capabilities to manually enter the parent's height
- Introduced support for intent parameters for picking the primary and secondary chart

## Usability and Technology

- Updated the look and feel of the application to use a modern and more user friendly Material Design paradigm
- Updated graphs engine with React + native browser SVG to greatly increase graphical performance of the app
- Application has better responsiveness to support tablets and personal computer displays
- Touchscreen friendly interface
- Substantially simplified the application settings
- Updated Table view to list data items vertically
- Combined the all controls into a common location
- Introduced new printing system where the user can:
  - Print one or more of the app pages
  - Order how the pages will be printed
  - Printing popup embedded in app to increase compatibility with EHR systems

## Blood Pressure Centiles

- Updated the look and feel of the application
- Updated graphs engine with React + native browser SVG
- Application has better responsiveness that support tablets and personal computer displays
- Touchscreen friendly interface
- Short term / Long Term Charts better fill the available screen space
- Changed filtering capabilities
  - Filtering is applied for all app screens
- Long term chart can be zoomed by interacting directly with the chart




- Redesigned Calculator page to a modal dialog with more intuitive input controls
- Printing popup embedded in app to increase compatibility with EHR systems

## Common Use of the Pediatric Suite


### Demo Mode

When launched without outside of an EHR Context the Suite presents the options to launch using integrated demo patients designed to help the user explore the features of the Pediatric Suite modules.


**No FHIR context found**  
Pick a demo patient:




**Use blank newly born**




**Allen Demo**  
Gender: male | DOB: 2004-04-24 | MRN: 99912345




**Kimberly Demo**  
Gender: female | DOB: 2003-08-16 | MRN: 7777704




**Terrell Demo**  
Gender: male | DOB: 1999-12-31 | MRN: COREPATIENT4




**Sophia Demo**  
Gender: female | DOB: 2010-12-16 | MRN: 6666001




**Aaron Demo**  
Gender: male | DOB: 1989-10-26 | MRN: 9995679




**Steven Richards**  
Gender: male | DOB: 1999-01-31 | MRN: 777762778777770001



**Aaron Empty**  
Gender: male | DOB: 2017-10-26 | MRN: 9995680



**Steve Premature**  
Gender: male | DOB: 2011-09-16 | MRN: 7777701



**David Richards**  
Gender: male | DOB: 1999-01-31 | MRN: 777762778777770001

### Patient bar

When the app isn't launched embedded into an EHR frame the Patient bar will appear. This component contains basic demographic data for the patient in context.



## Title bar interface

The title bar includes the title of the currently selected module, additional controls for each module and a help drop down.

These controls include switching to alternative views, settings, printing. For the Growth Charts it also includes the **Chart Selector Widget**.



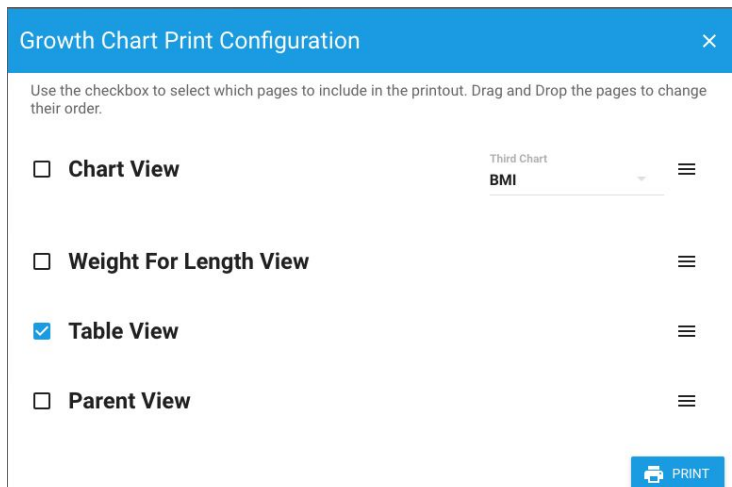
## Printing

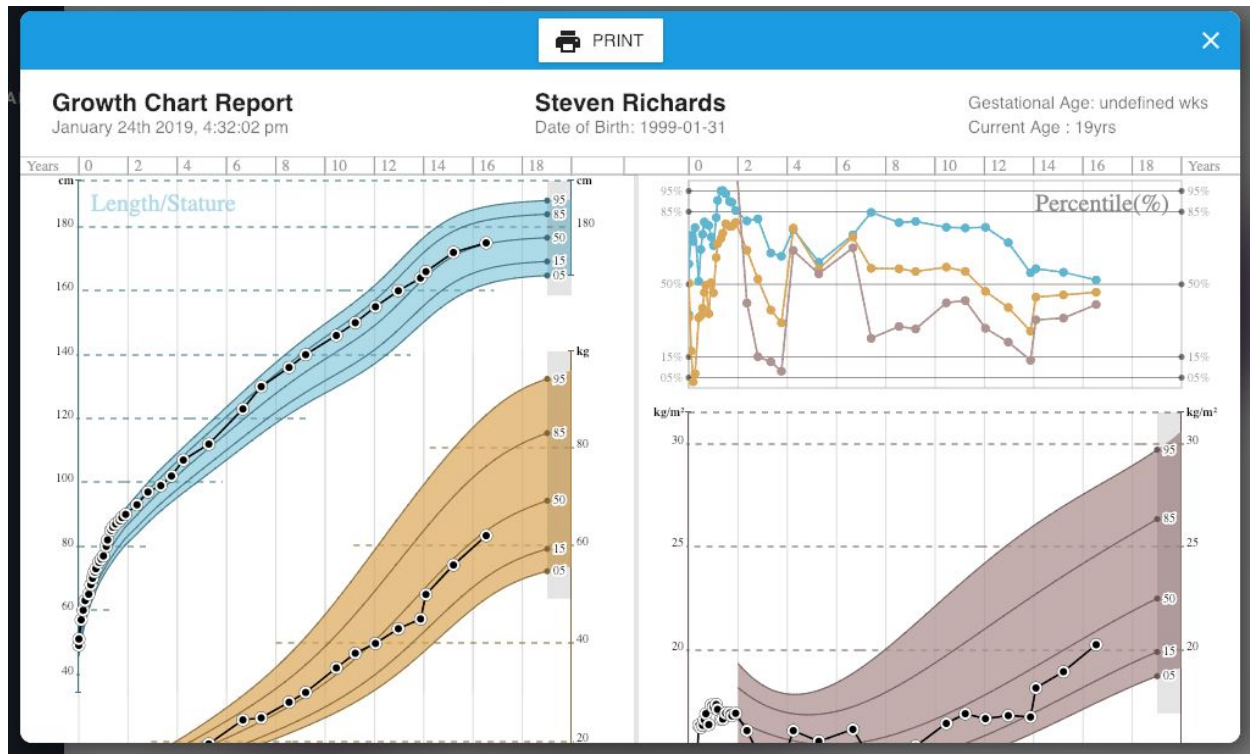


Each module includes printing capabilities, the print icons is located for each module in the **Title bar**.

Clicking on the print button will open a dialog that depending on the loaded module will contain:

- A number of selectable elements to be included in the print out
- Some elements may contain further settings for printing
- Each Element can be drag and dropped to change the order in the print out
- Clicking on the **Print** button will open a local print preview of the selected elements
- The print preview includes a print button on top, which will open the browsers print dialog





## Using the Pediatric Growth Chart Module

### Settings

1. Toggle **Gest Correction on/off** - display gestational correction on the chart by putting additional virtual values that correspond to the measured value but offset by a gestational correction value. The value of the gestational correction is determined by the **Gestational correction mode**. The virtual value is linked with the actual value with an arrow
2. Toggle **Reverse Gest Correction on/off** - when gestational correction is switched **on**, setting this switch to on will switch places of the actual measured values with the virtual gestationally corrected values. This

**Growth Charts Settings**

Gest Correction on/off ☒

Reverse Gest Correction on/off ☐

Gest Correction  
Fixed

Gest Correction Max Age  
2 years old

Deviation of unexpected values  
Large

Unexpected values prominence  
Normal

RESTORE DEFAULTS APPLY CANCEL

will bring the corrected values to more prominence, the hover on label will be activated on the virtual values, the displayed percentile will be for the virtual value. The growth line will turn purple to indicate that the viewed values aren't actual measurements.

3. **Gest correction mode** - Mode on how to display gestationally corrected data and arrows and how to calculate the gestational correction offset
  - a. Fixed - correction is a constant for all values
  - b. Variable - correction is calculated for each affected measurement
  - c. Mixed - display fixed and variable corrections at the same time
4. **Gest Correction Max Age** - apply gestational correction (if on) to data for measurements made before the selected age of the patient, values measured after the selected age of the patient will **NOT** be gestationally corrected
5. **Deviation of unexpected value**
  - a. Large - Values that are 1.21x or larger than the 0.99th percentile are considered unexpected and values that are 0.79x or smaller than the 0.01th percentile are considered unexpected
  - b. Normal - Values that are 1.11x larger than the 0.99th percentile are considered unexpected and values that are 0.89x or smaller than the 0.01th percentile are considered unexpected
  - c. Small - Values that are 1.02x or larger than the 0.99th percentile are considered unexpected and values that are 0.98x or smaller than the 0.01th percentile are considered unexpected
6. **Unexpected values prominence** - select how unexpected values should be displayed
  - a. Prominent - unexpected values will be marked with an opaque red arrow, values will be displayed as part of the chart
  - b. Normal - unexpected values will be marked with a red arrow which will be semi-transparent, the values will be linked with a dotted line with the rest of the values
  - c. Less visible - unexpected values will be marked in red and be almost invisible, the values will be linked with a dotted line with the rest of the values, the line will be almost invisible

## Data Visualization Control Panel

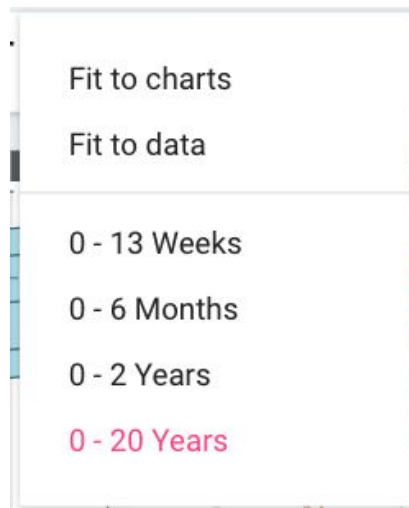


The Data Visualization Control Panel is located just below the **Title Bar Interface** and above the main view and allows the user to change the way the patients data is visualized and allows the user to filter which data is visualized. It includes the following controls:

1. View mode:
  - a. **Graph view** - displays growth charts
  - b. **Table view** - displays measurements in table form



- c. **Weight for Length View** - displays a growth chart with the relation between weight and height (valid only for patient data between birth and 2 years old)
- 2. Units picker - changes the display units across the module:
  - a. KG/CM mode
  - b. LB/IN mode
- 3. Value type picker: Percentile/Z-Score
  - a. Plots based on the percentile where average is 50%
  - b. Graphs plot based on z-score where mean is 0 (the standard deviation (SD) above or below the mean)
- 4. Time frame picker allows the user to filter the data to be viewed to common data ranges.



- 5. Third Chart picker allows the user to select which chart to show in the bottom right of the graph view.

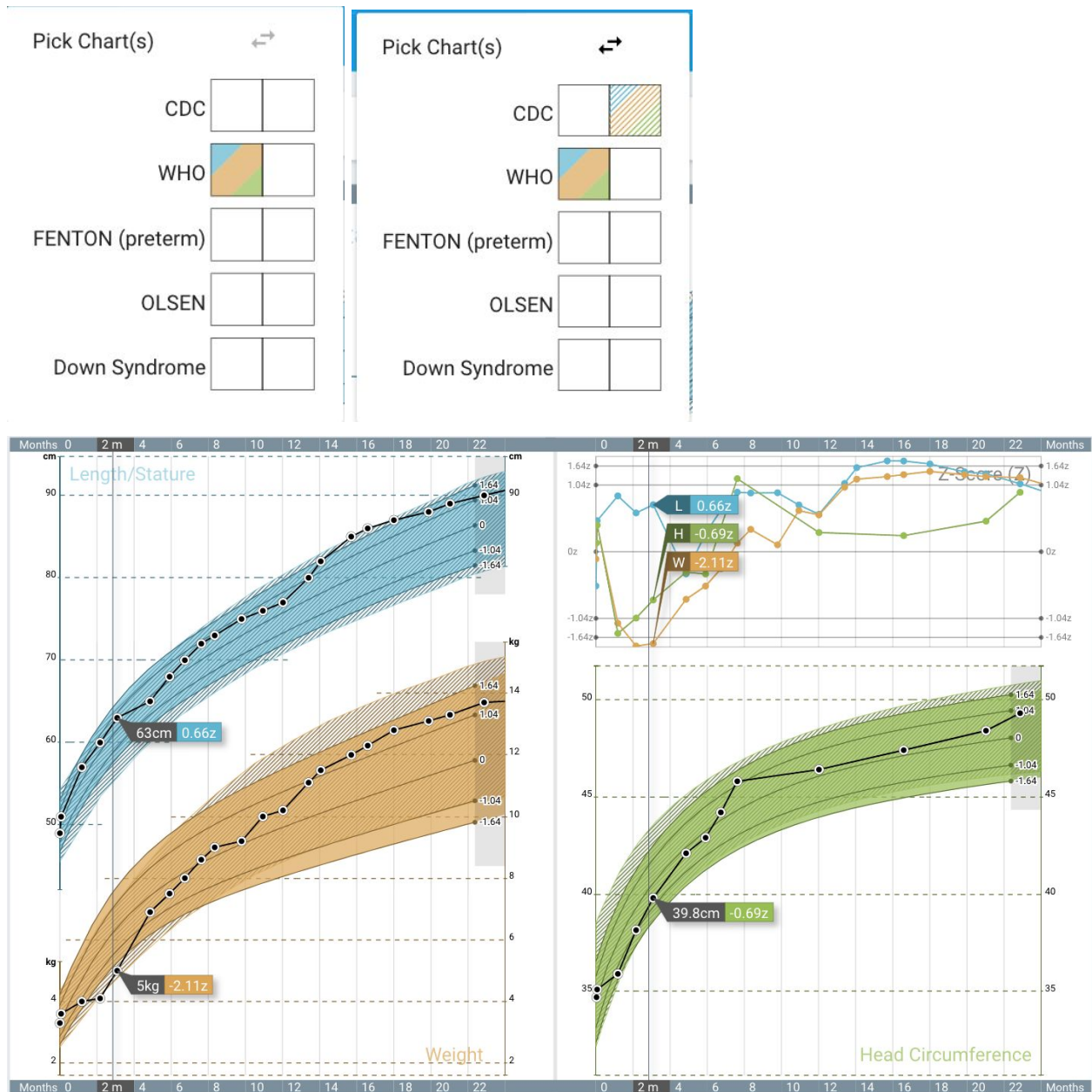


## Clinical views

### Chart picker widget

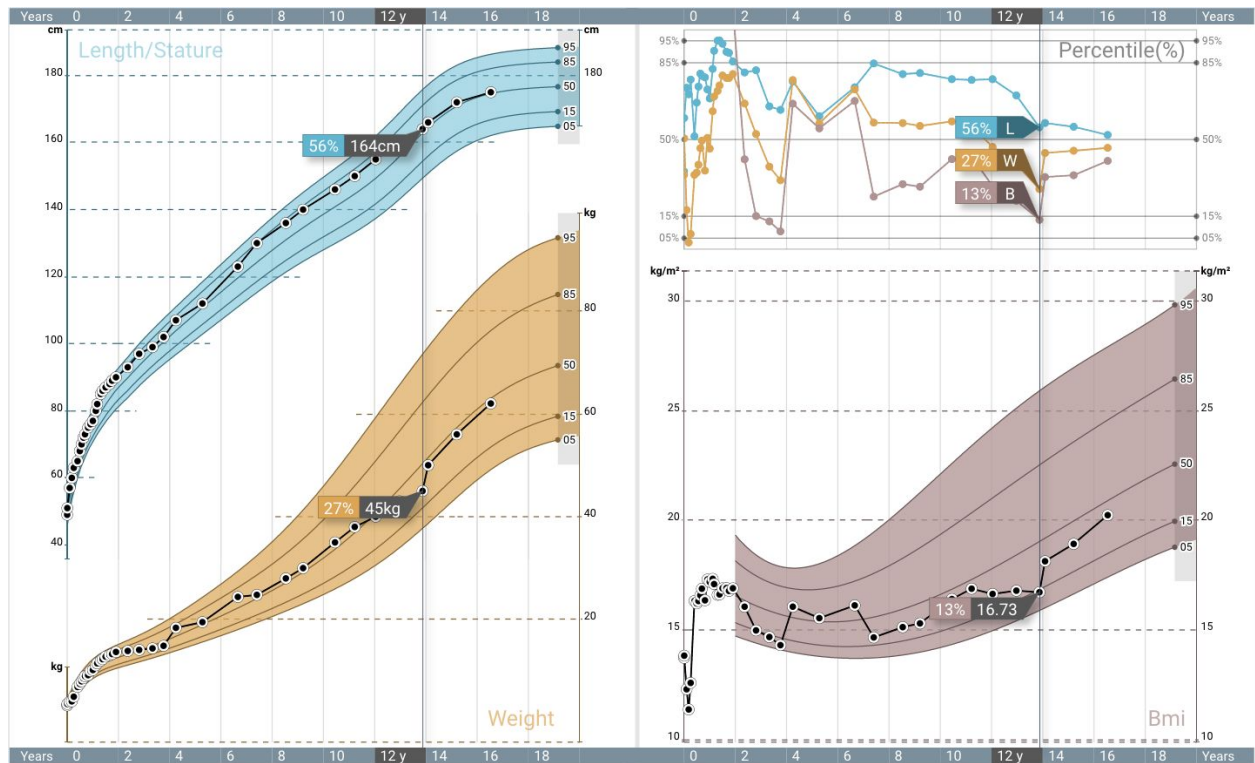
The **Chart picker widget** is located in the **Title Bar Interface**. From there the **primary** chart can be changed and a **secondary** chart can be selected. Using the **Swap** button will make the **primary** chart **secondary** and vice-versa.

**Primary** charts are displayed as translucent solid colors, while **secondary** charts are displayed in the same color, but using a striped fill instead.



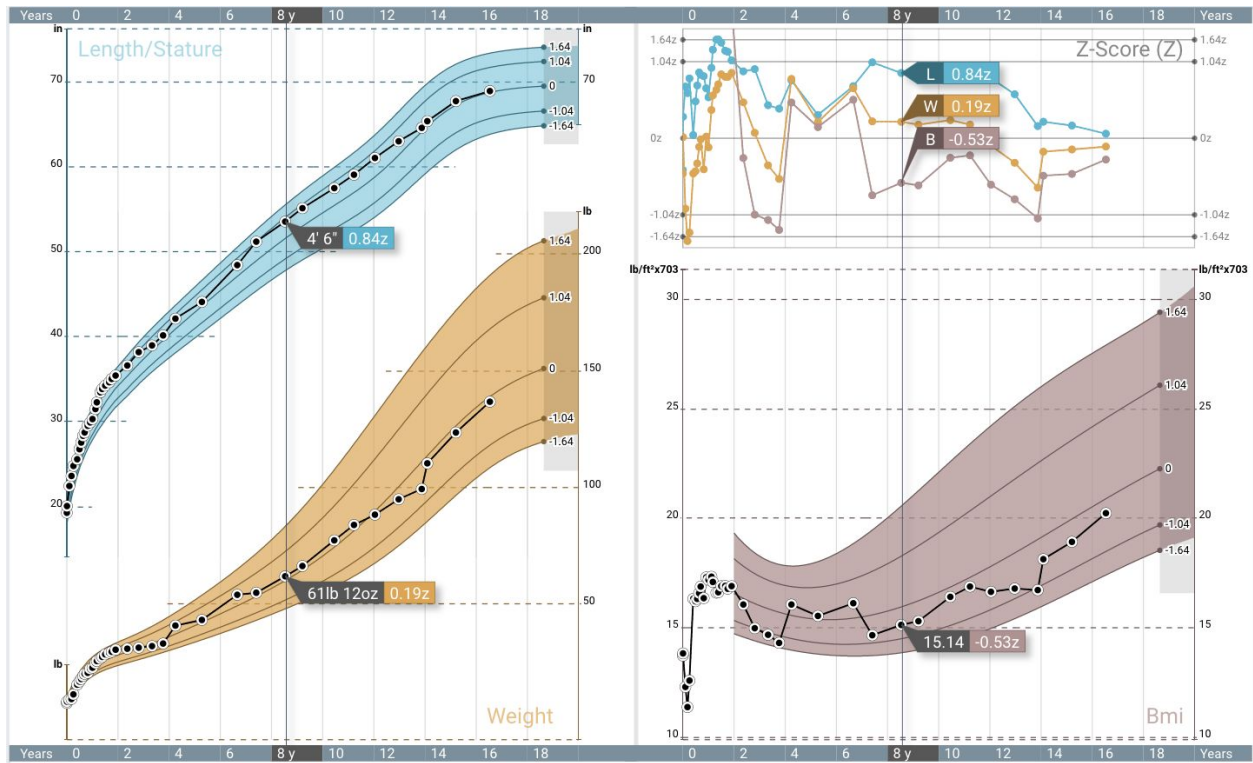
In this example, the primary chart is set to WHO, filtered to 0-2 years, with **CDC** as secondary chart.

## Chart view

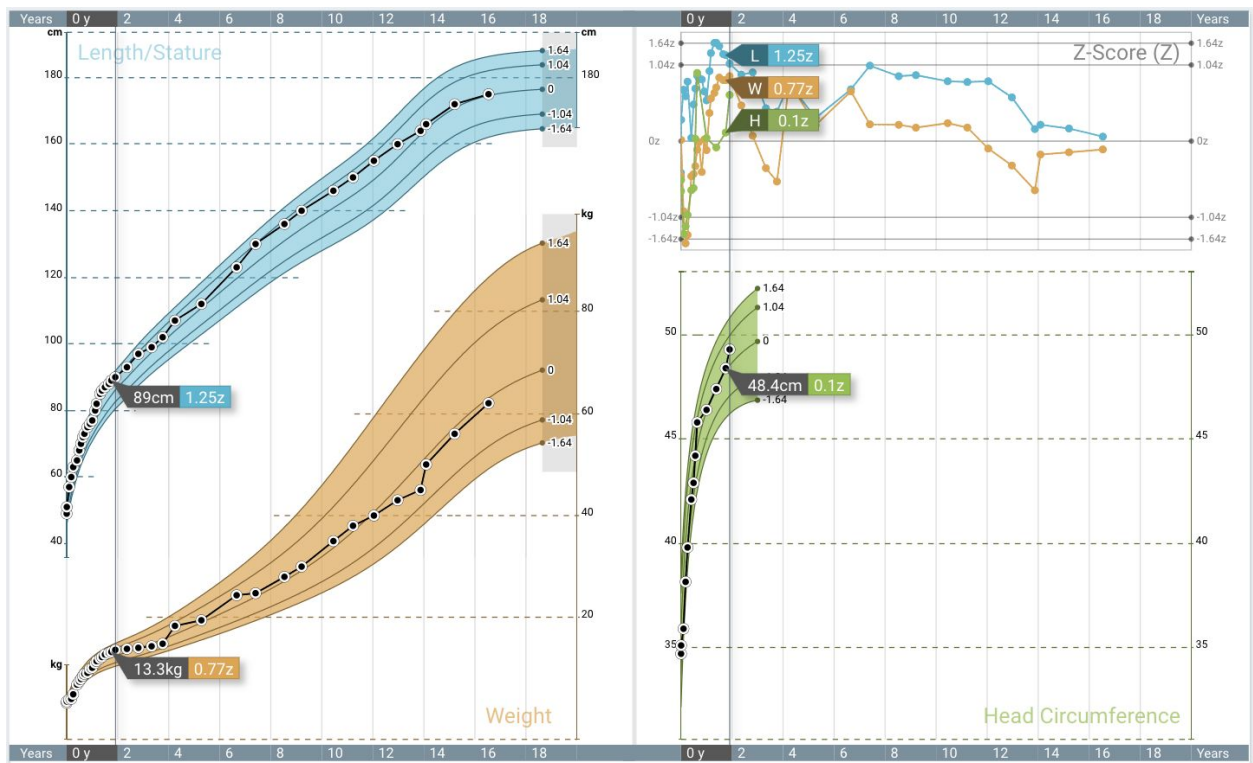


Length/Stature, weight, BMI and percentile Growth Charts with hovered over measurements for details, using metric units, percentiles and 0-20 years time range.

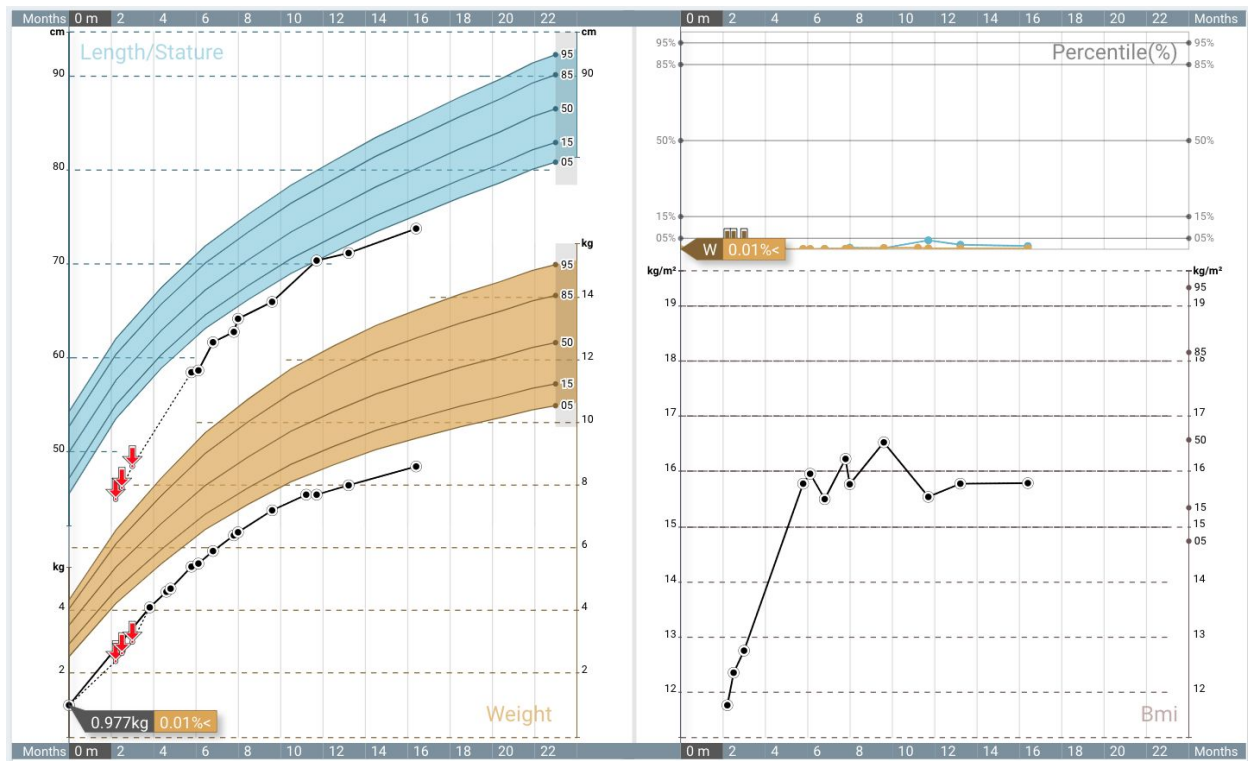




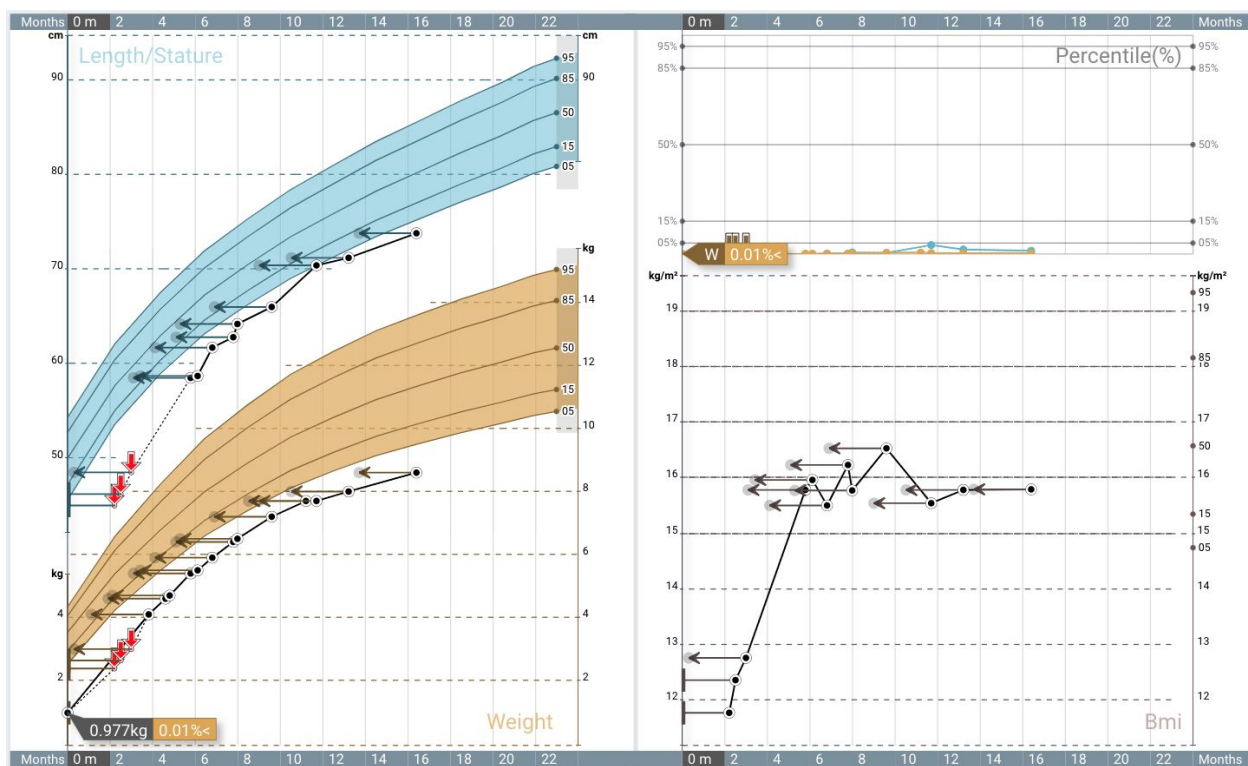
Length/Stature, weight, BMI and z-score Growth Charts with hovered over measurements for details, using imperial units, percentiles and 0-20 years time range.



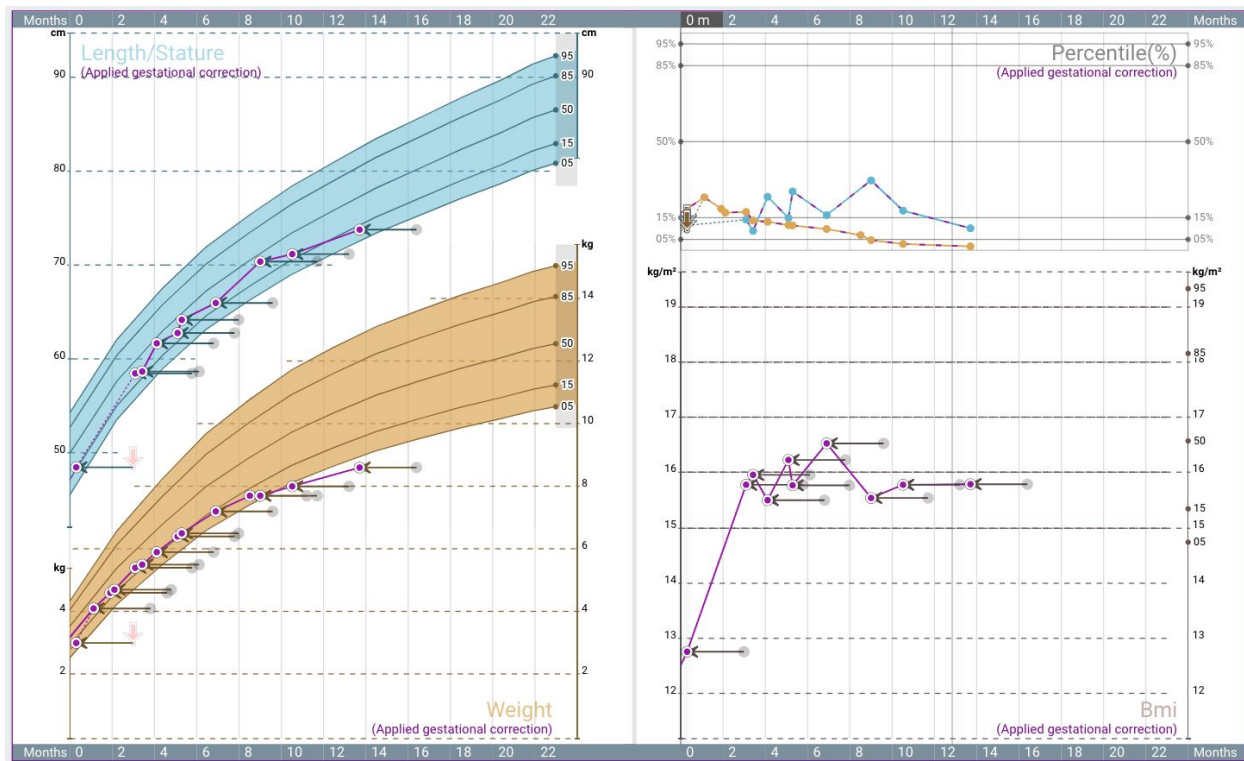
Switched Third chart to Head Circumference.



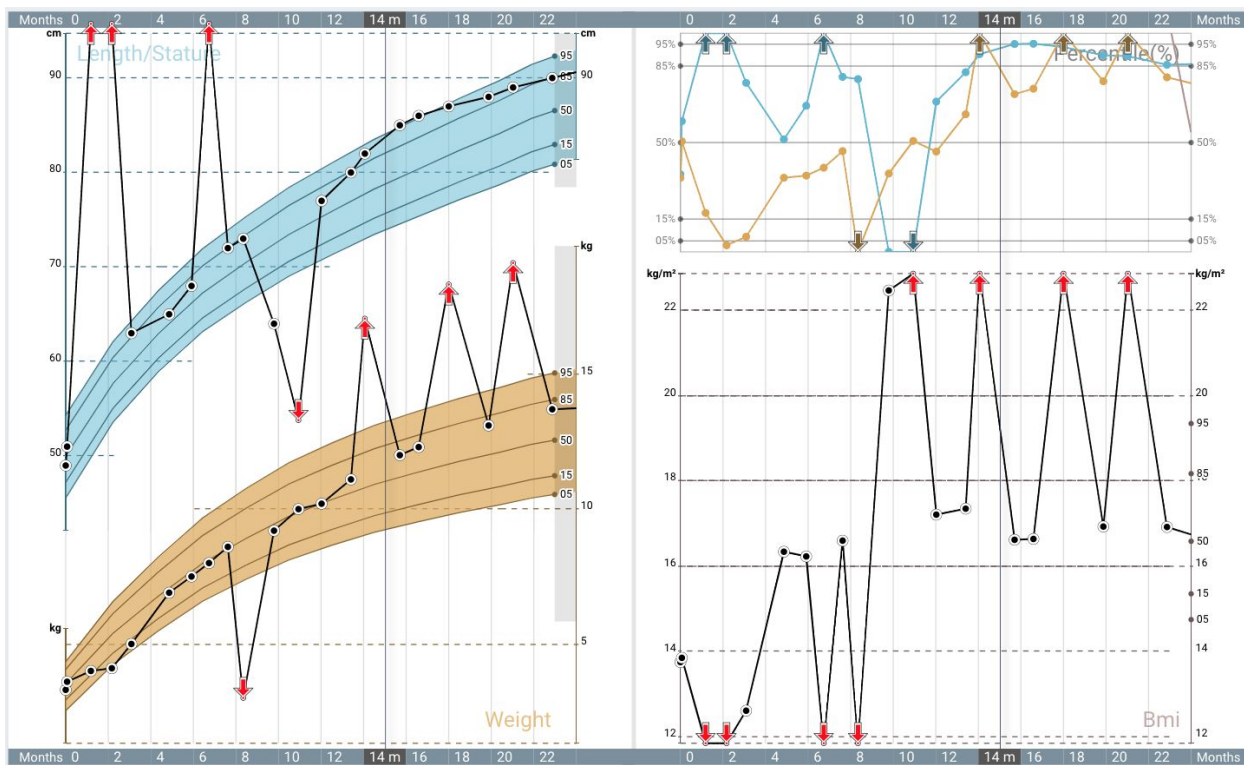
Zoomed to 0-2, displaying a prematurely born patient **without** gestational correction applied.



Zoomed to 0-2, displaying a prematurely born patient **with** gestational correction applied.

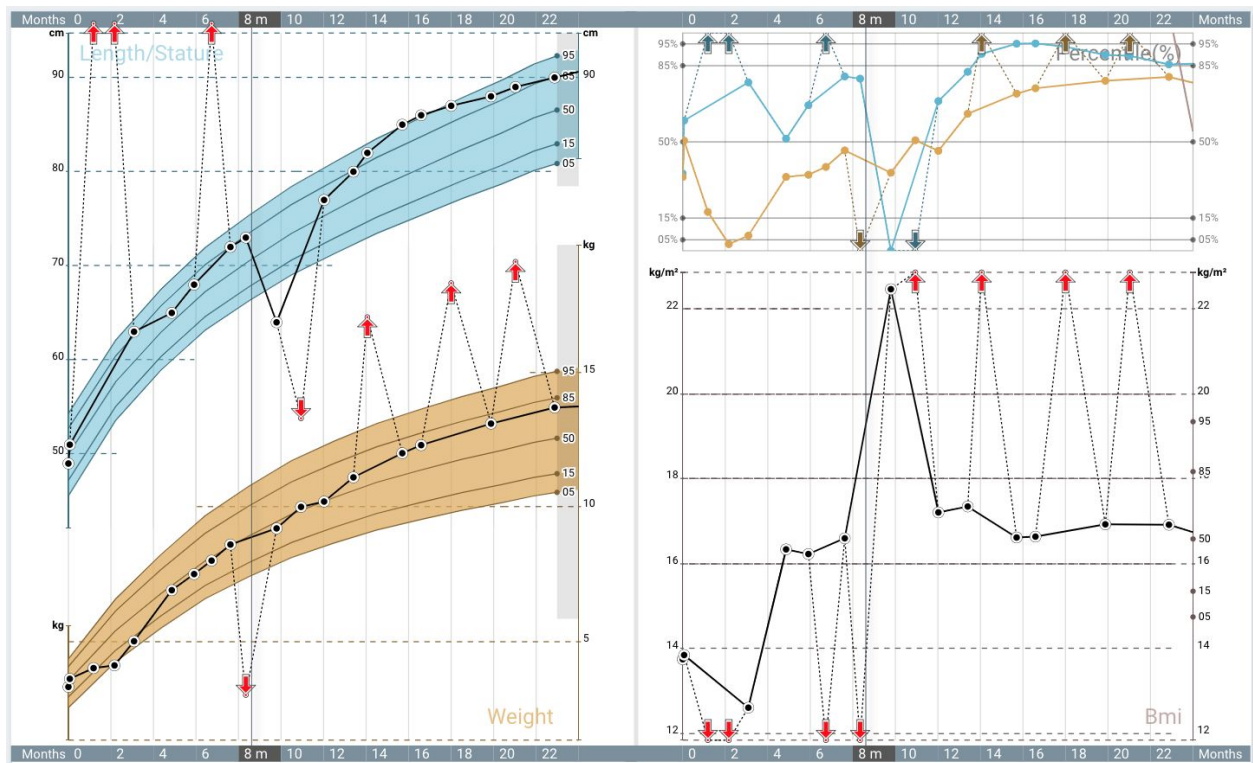


Zoomed to 0-2, displaying a prematurely born patient with gestational correction applied and reversed.

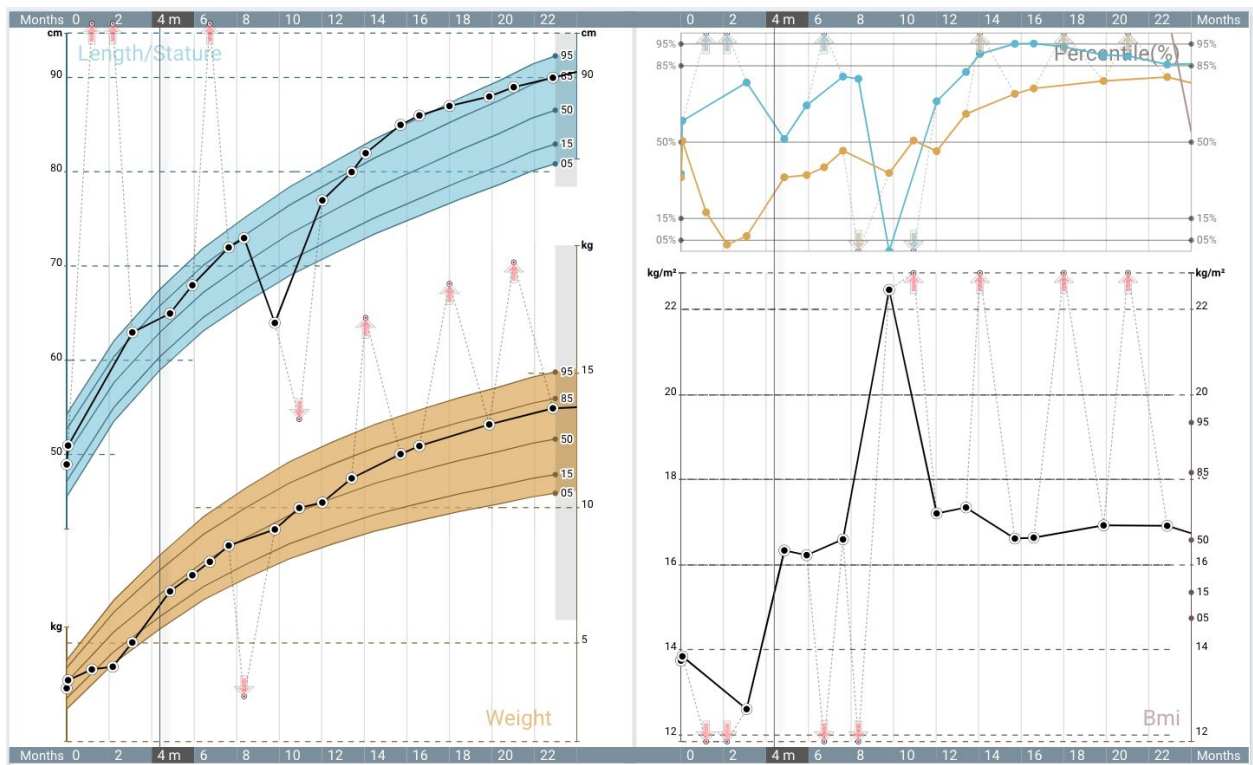


Zoomed 0-2, displaying patient with **unexpected data**. Unexpected data is prominent in the chart.





Zoomed 0-2, displaying patient with **unexpected data**. Unexpected data is in normal display mode in the chart.



Zoomed 0-2, displaying patient with **unexpected data**. Unexpected data is **less visible** in the chart.

## Table view

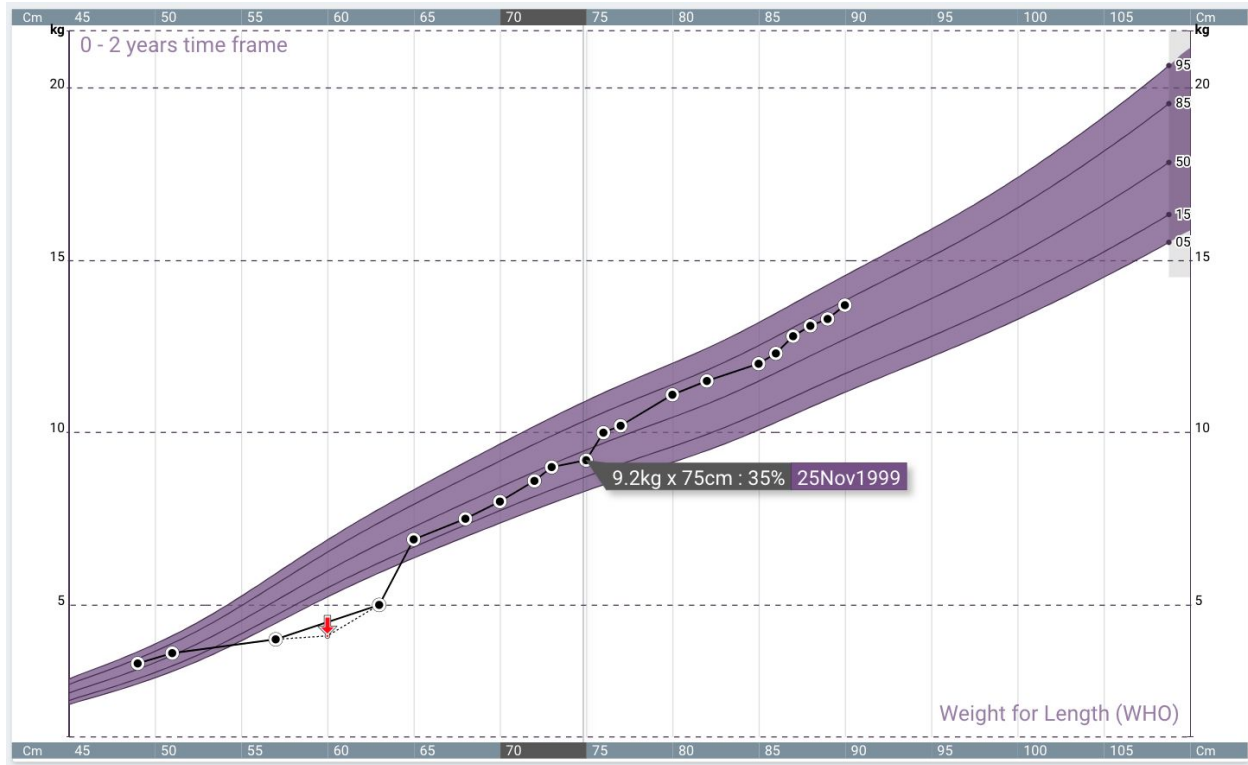
Date ↓	Age	Length	Weight	Weight x Length	BMI	Head C	Bone Age
Aug 14 2015, 12:00 AM	16y6m	175cm 2 cm/yr 52.1% 0.1 z	62kg 4.5 kg/yr 46.2% -0.1 z	62kg X 175cm	20.24 40.2% -0.2 z		18y9m
Apr 16 2014, 12:00 AM	15y2m	172cm 5 cm/yr 55.8% 0.1 z	56kg 5.4 kg/yr 44.9% -0.1 z	56kg X 172cm	18.93 33.7% -0.4 z		
Mar 04 2013, 12:00 AM	14y1m	166cm 9 cm/yr 57.5% 0.2 z	50kg 22.8 kg/yr 43.8% -0.2 z	50kg X 166cm	18.14 32.9% -0.4 z		
Dec 14 2012, 12:00 AM	13y10m	164cm 4 cm/yr 55.6% 0.1 z	45kg 2.2 kg/yr 27.4% -0.6 z	45kg X 164cm	16.73 13.4% -1.1 z		
Jan 20 2012, 12:00 AM	12y11m	160cm 5 cm/yr 70.1% 0.5 z	43kg 3.2 kg/yr 38.8% -0.3 z	43kg X 160cm	16.8 22.1% -0.8 z		
Feb 15 2011, 12:00 AM	12y	155cm 6 cm/yr 77.5% 0.8 z	40kg 2.4 kg/yr 46.6% -0.1 z	40kg X 155cm	16.65 28.8% -0.6 z		
Apr 22 2010, 12:00 AM	11y2m	150cm 5 cm/yr 77.2% 0.7 z	38kg 3.9 kg/yr 56.2% 0.2 z	38kg X 150cm	16.89 42.2% -0.2 z		
Jul 15 2009, 12:00 AM	10y5m	146cm 5 cm/yr 77.5% 0.8 z	35kg 4 kg/yr 58.3% 0.2 z	35kg X 146cm	16.42 41.1% -0.2 z		
Apr 16 2008, 12:00 AM	9y2m	140cm 6 cm/yr 80.3% 0.9 z	30kg 3 kg/yr 56.2% 0.2 z	30kg X 140cm	15.31 28.5% -0.6 z		
Aug 14 2007, 12:00 AM	8y6m	136cm 5 cm/yr 79.8% 0.8 z	28kg 2.8 kg/yr 57.5% 0.2 z	28kg X 136cm	15.14 29.6% -0.5 z		
		9 cm/yr	0.5 kg/yr				

Displays a detailed view for measurements, including:

1. Date - date of measurements
1. Age - age of patient when vitals were measured
2. Length - Actual value, percentile and z-score
3. Weight - Actual value, percentile and z-score
4. Weight x Length - - Actual value, percentile and z-score
5. BMI - Actual value, percentile and z-score
6. Bone Age - Actual value

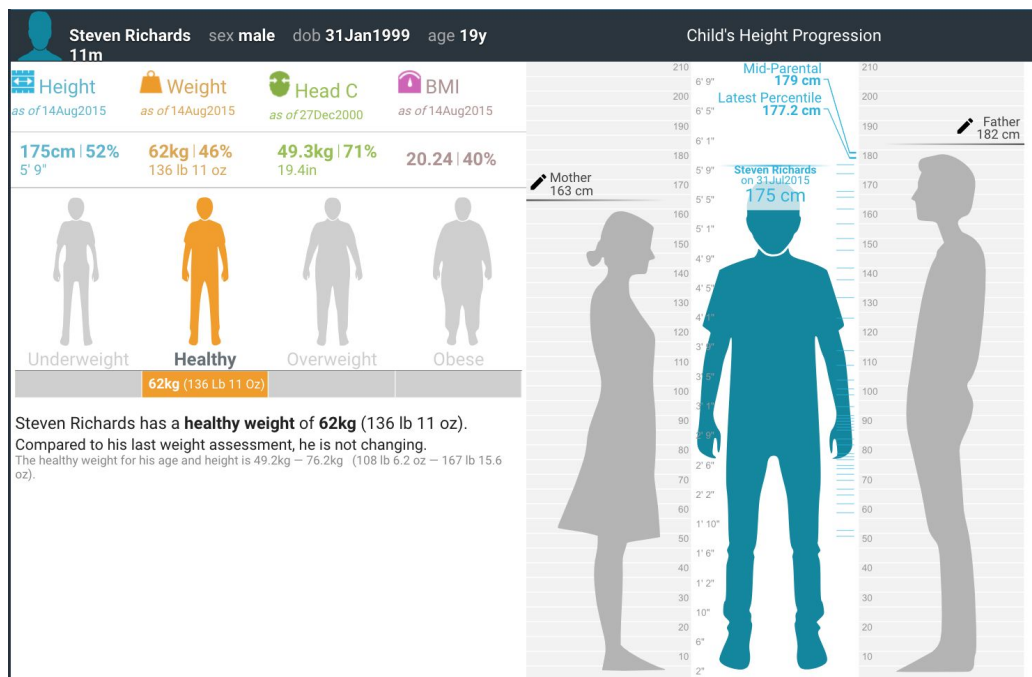
## Weight for Length

Displays a WHO growth chart for Weight X Length which uses data measured between the ages of 0 and 2 years old.



## Parent view

Open using the patient view icon in the top right corner. The parent view includes two columns of data:

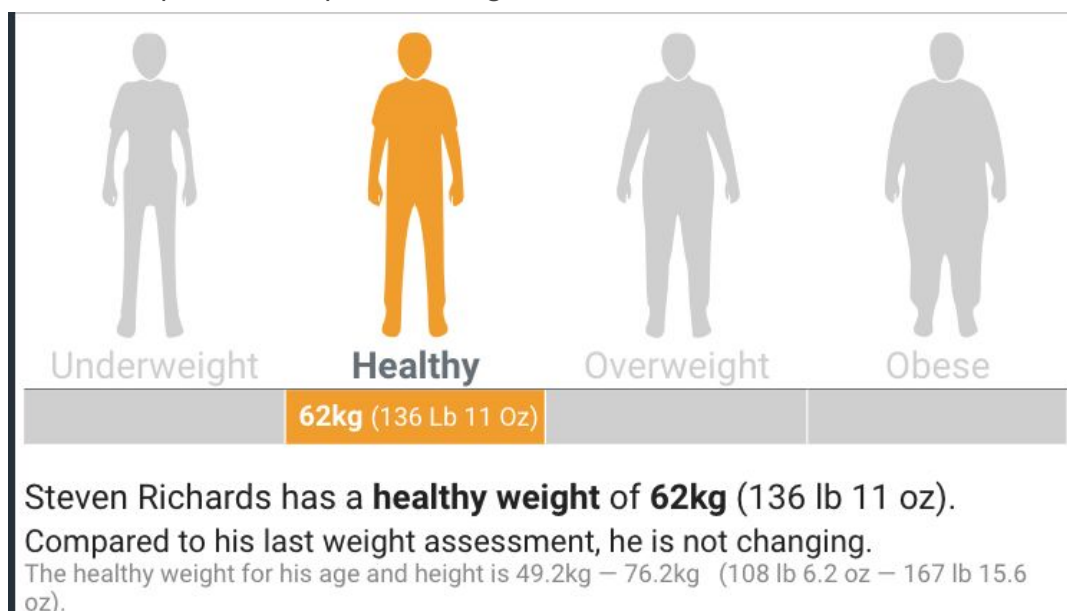


## Patient data column, includes:

1. Latest measurement for height, weight, head circumference and BMI



2. Weight health status of patient
3. Comparison with previous weight measurements



## Parent heights column, includes:

### Set parent heights (Imperial)

Metric ☐

Mother's Height  
5 ft | 4 in

Father's Height  
5 ft | 12 in

RESET

### Set parent heights (Metric)

Metric ☒

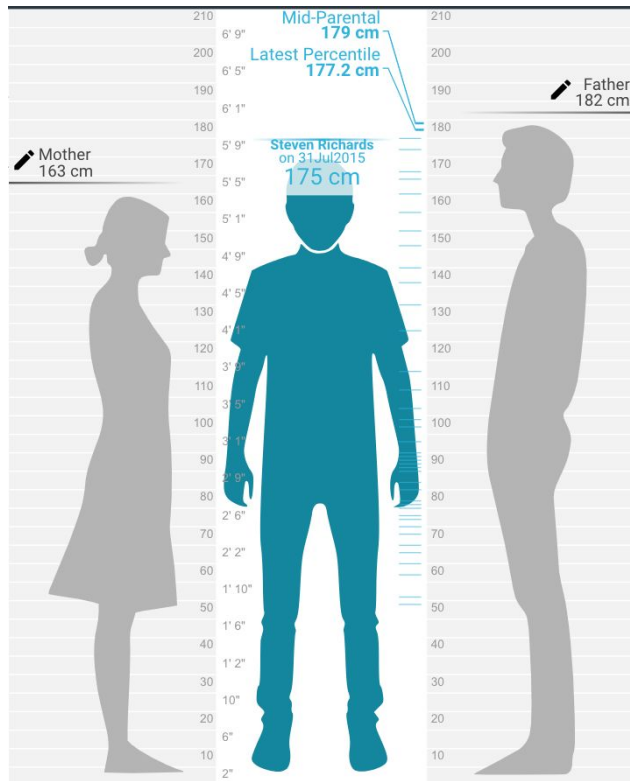
Mother's Height  
163 cm

Father's Height  
182 cm

RESET

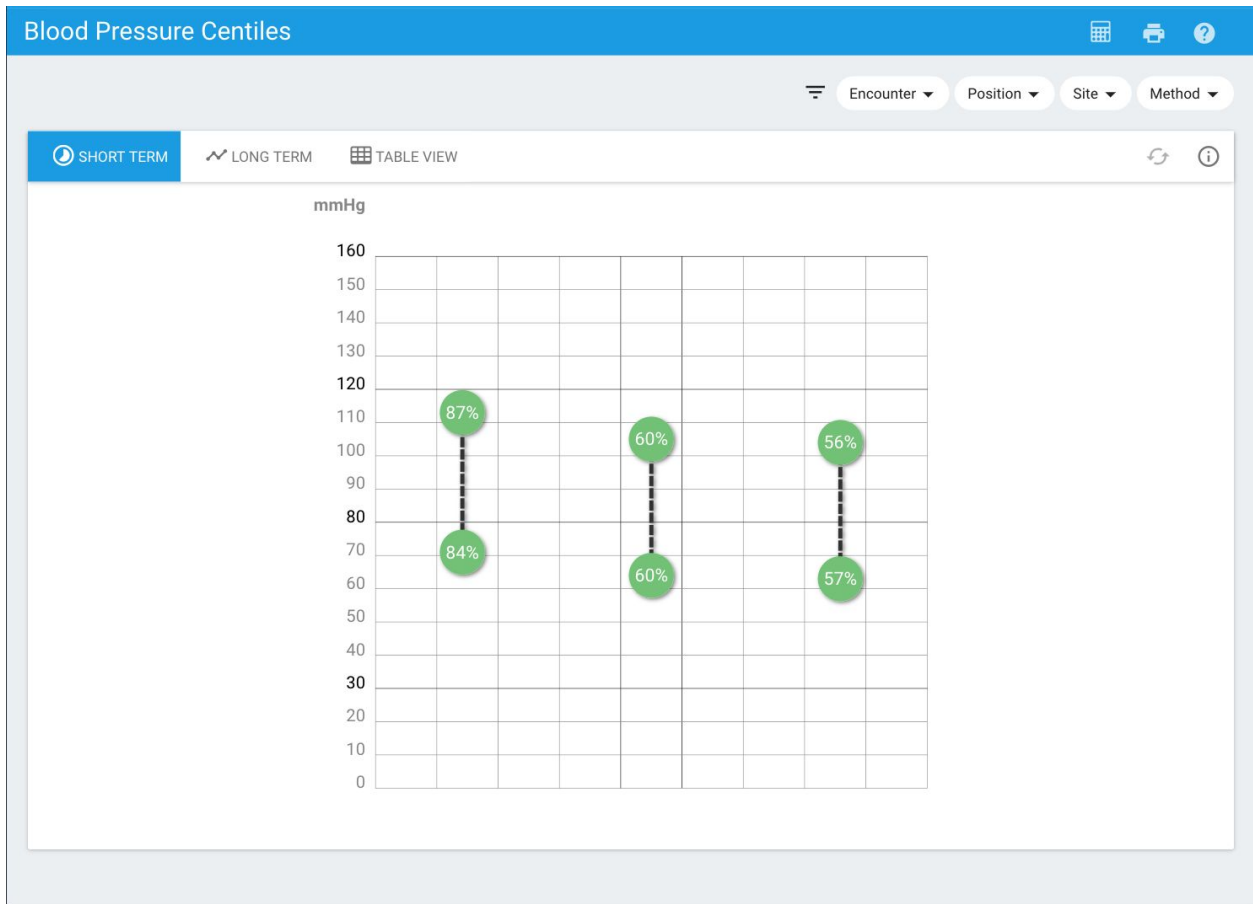


1. Mother height and Father height, if available
2. Parent's heights can be edited using the pencil next to the current height
3. Patient's current height
4. Notches next to the patient image that represent the height measurements
5. Predicted height, based on:
  - a. Mid-parental height
  - b. Latest percentile projection

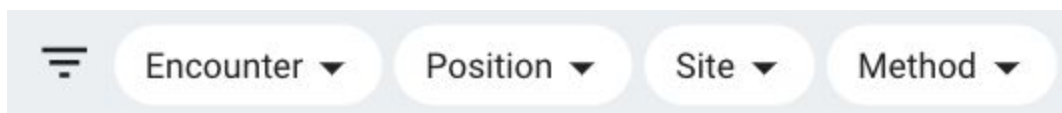


## Using the Pediatric BP Centiles Module

The Pediatric BP Centiles module of Pediatric Suite displays the blood pressure measurements of a patient and calculate the percentile based on age and sex.

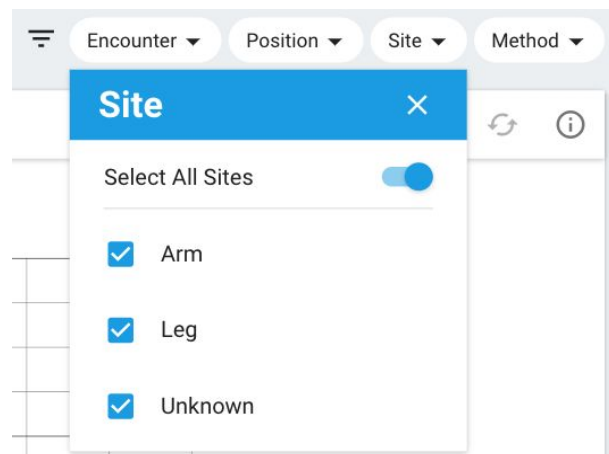


## Filters



The filters are located above the app - affects long term and table view.

1. **Encounters** - Display measurements made at inpatient or ambulatory encounter
2. **Position** - Display measurements made with the patient standing, sitting or other
3. **Site** - Display measurements taken on the patient's arm, leg or other site
4. **Method** - Display measurements taken using a machine, auscultation or other method

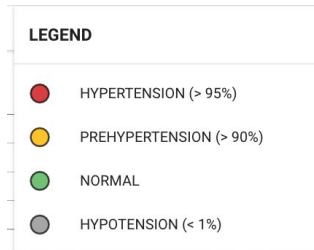


# Data Visualization Controls



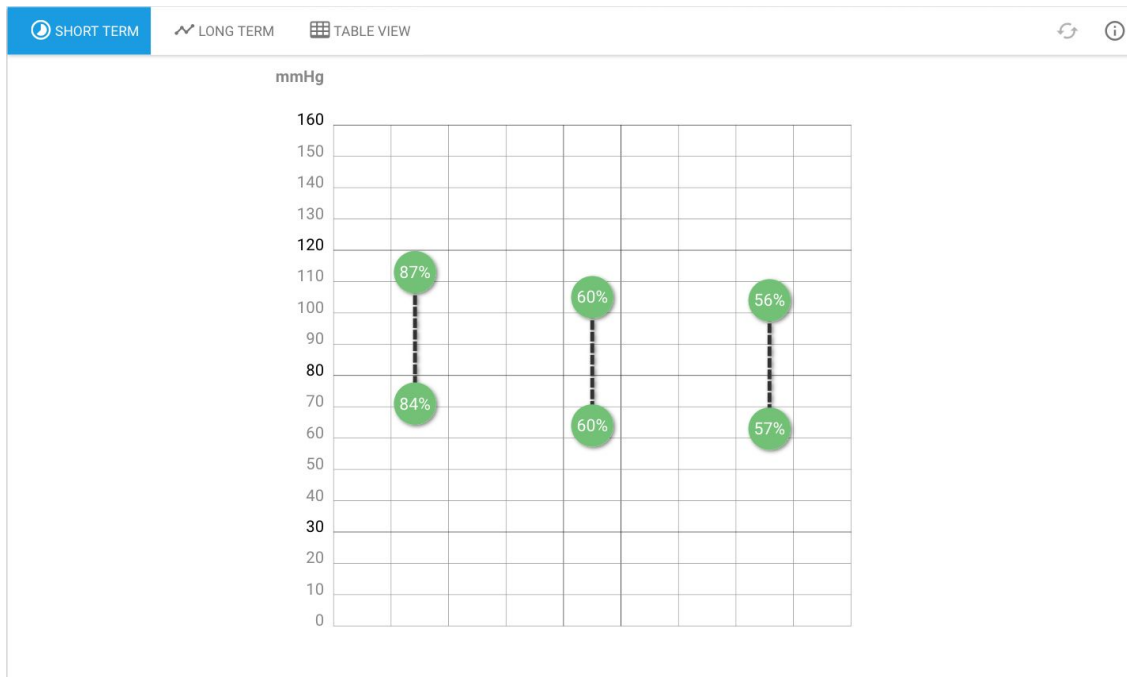
Located right of the tabs and include:

1. Tabs interface
  - a. Short Term
  - b. Long Term
  - c. Table View
2. Reset - reset filters
3. Legend

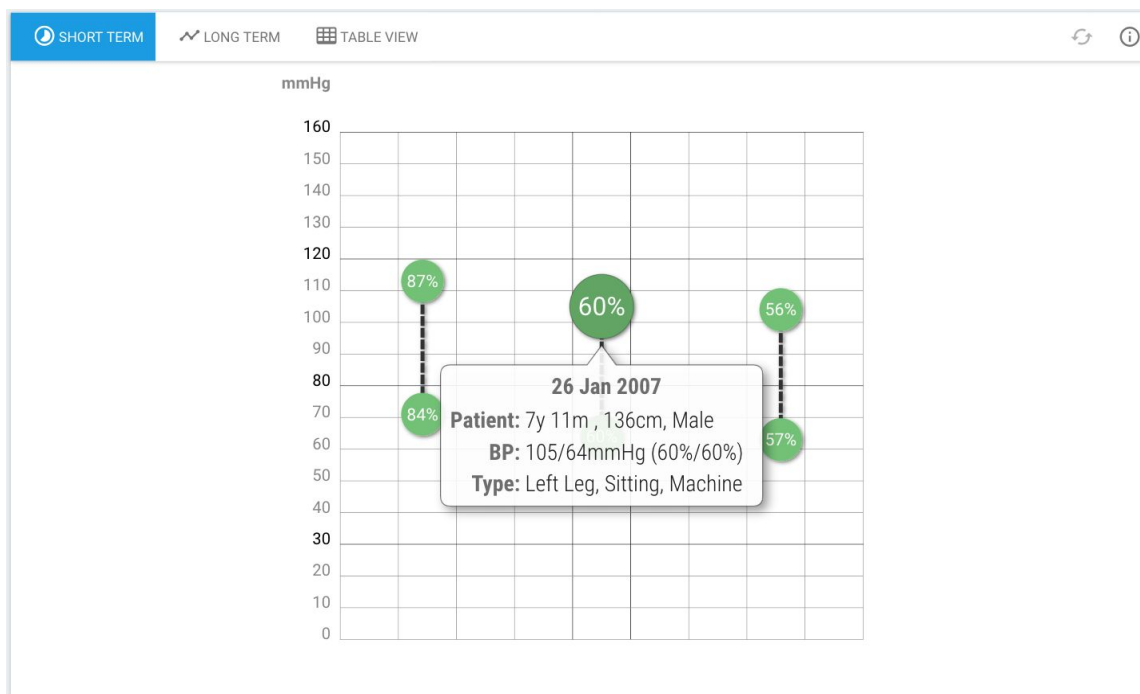


## Short Term

The short term screen displays the last three blood pressure measurements. Each blood pressure record is visualized on a grid with two colored bubbles that correspond to the systolic and diastolic blood pressure. The colors of the circles indicate whether that measurement is indicative of normal, prehypertension, hypertension and hypotension bp component. Measurements taken before the patient was 18 years old contain the calculated percentile, while any measurements taken afterwards will display only icons. Hovering over a circle will display additional information. Clicking on Help will provide additional information about the page and the Legend button will display a legend for the colors used in the graphic.



Short term view for a patient with normal blood pressure.



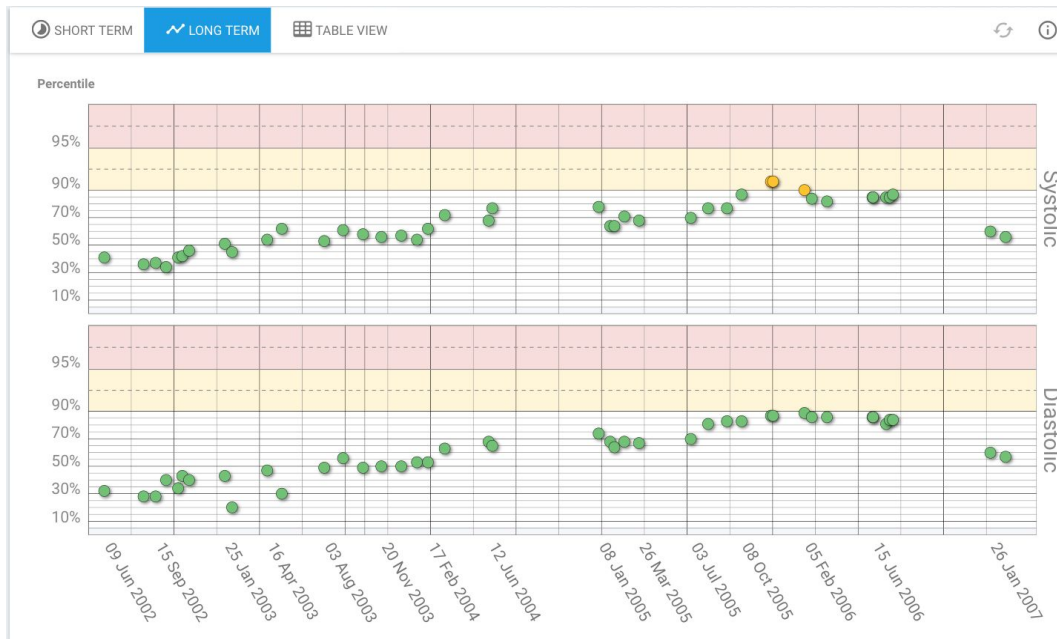
Short term view for a patient with normal blood pressure and a value hovered over for details.



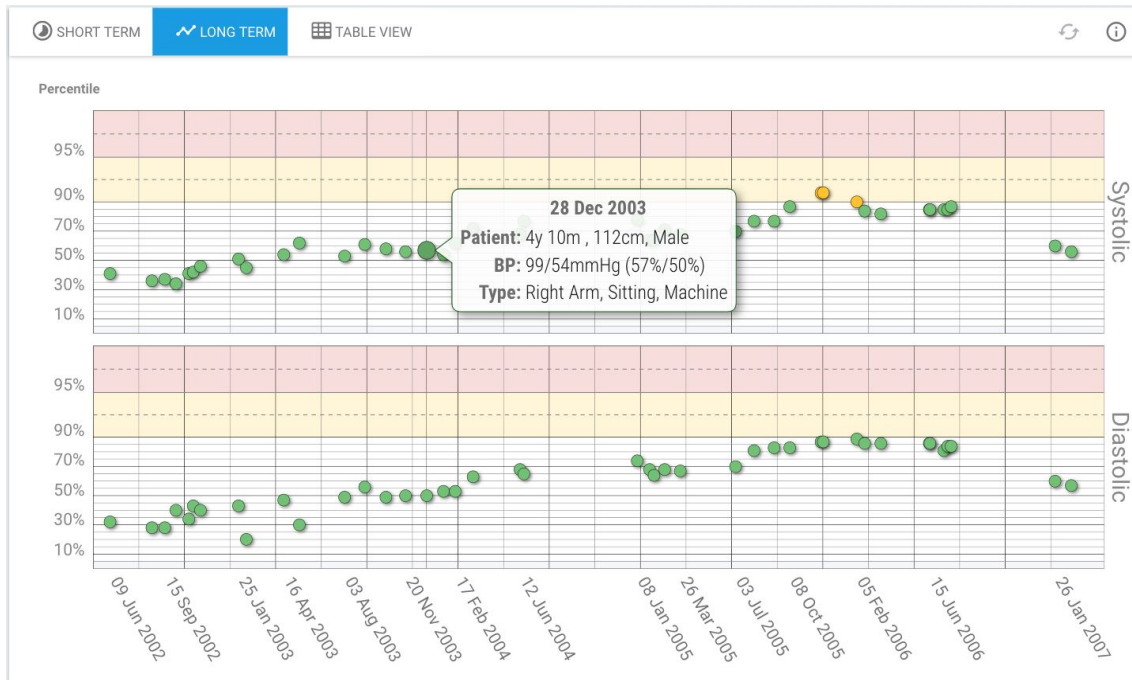
Short term view for an adult patient with high blood pressure.

## Long Term

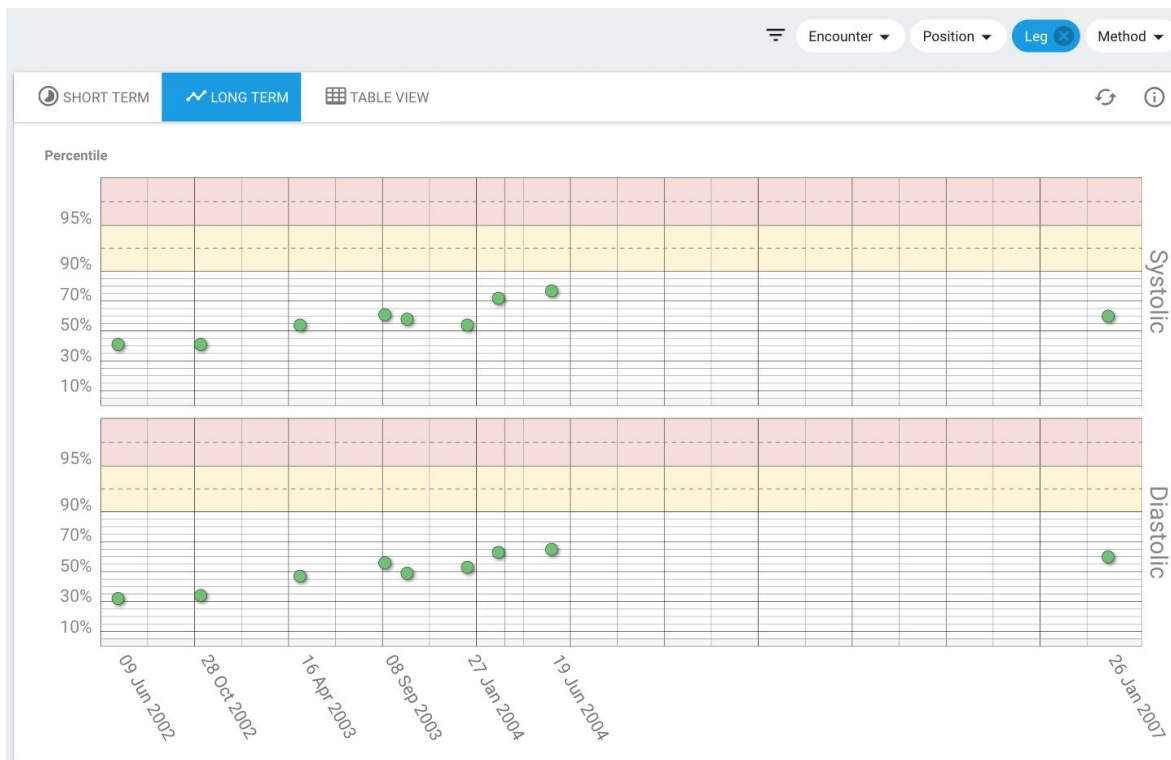
The long term chart displays the full blood pressure history of the patient and the associated percentile of the measurement for date of measurement. By dragging the mouse on the graph, the data can be zoomed in. Clicking the reset button will restore the view to the complete chart; Chart that displays the full blood pressure history of the patient, percentile of measurement for date of measurement.



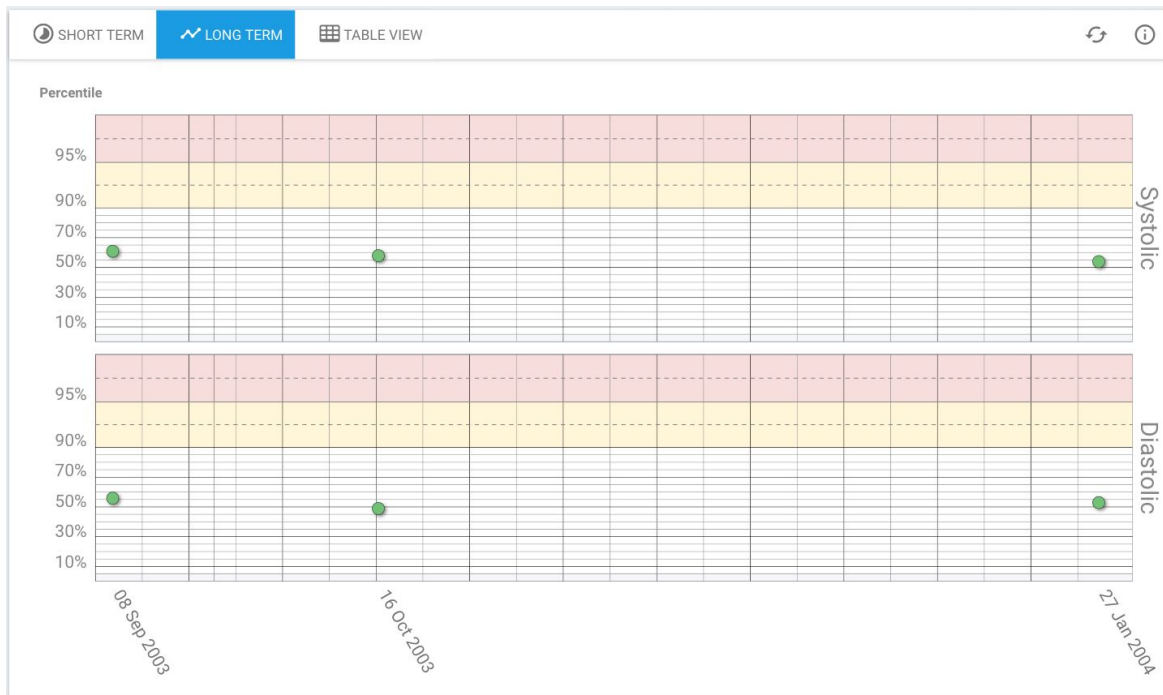
Long term view for a patient with consistently normal blood pressure.



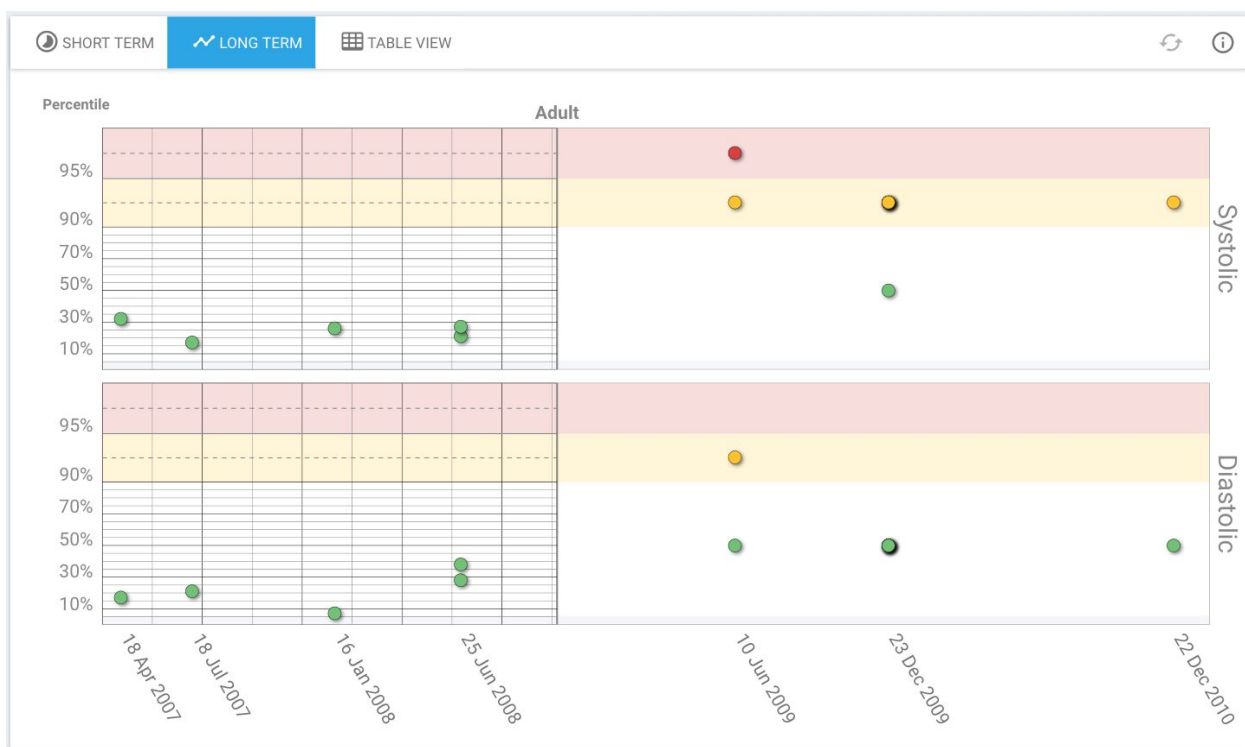
Long term view for a patient with consistently normal blood pressure and a value hovered over for details.



Long term view for a patient with consistently normal blood pressure and a Leg only filter applied.



Long term view for a patient with consistently normal blood pressure and a **Leg** only filter applied and zoomed in.



Long term view for a patient that has blood pressure measurements before and after the age of 18 years old.



## Table View

Table that displays the full blood pressure history of the patient, including details for each measurement, including:

1. Date taken
2. Age of patient when taken
3. Height of patient when taken
4. Blood pressure values
5. Blood pressure percentiles
6. Site where the measurement was taken
7. Position of the patient when the measurement was taken
8. Method of how measurement was taken
9. Type of Encounter when the measurement was taken

SHORT TERM

LONG TERM

TABLE VIEW

	Date	Age	Height	Blood Pressure	Percentiles	Site	Position	Method	Encounter
	24 Feb 2007	8y 0m	136cm	104/63mmHg	56%/57%	Right Arm	Sitting	Auscultation	-
	26 Jan 2007	7y 11m	136cm	105/64mmHg	60%/60%	Left Leg	Sitting	Machine	-
	24 Jul 2006	7y 5m	130cm	113/71mmHg	87%/84%	Right Arm	Sitting	Machine	-
	18 Jul 2006	7y 5m	130cm	112/71mmHg	85%/84%	Right Arm	Sitting	Auscultation	-
	11 Jul 2006	7y 5m	130cm	112/70mmHg	85%/81%	Right Arm	Sitting	Auscultation	-
	16 Jun 2006	7y 4m	130cm	112/72mmHg	85%/86%	Right Arm	Sitting	Auscultation	-
	15 Jun 2006	7y 4m	130cm	112/72mmHg	85%/86%	Right Arm	Sitting	Machine	-
	20 Mar 2006	7y 1m	130cm	111/72mmHg	82%/86%	Right Arm	Sitting	Machine	-
	19 Feb 2006	7y 0m	130cm	112/72mmHg	84%/86%	Right Arm	Sitting	Auscultation	-
	05 Feb 2006	7y 0m	123cm	112/72mmHg	90%/89%	Right Arm	Sitting	Auscultation	-
	07 Dec 2005	6y 10m	123cm	113/71mmHg	91%/87%	Right Arm	Sitting	Machine	-
	03 Dec 2005	6y 10m	123cm	113/71mmHg	91%/87%	Right Arm	Sitting	Machine	-
	08 Oct 2005	6y 8m	123cm	111/69mmHg	87%/83%	Right Arm	Sitting	Auscultation	-
	10 Sep 2005	6y 7m	123cm	107/69mmHg	77%/83%	Right Arm	Sitting	Auscultation	-
	05 Aug 2005	6y 6m	123cm	107/68mmHg	77%/81%	Right Arm	Sitting	Auscultation	-
	02 Jul 2005	6y 5m	122cm	105/64mmHg	70%/70%	Right Arm	Sitting	Machine	-

Table view for a patient with consistently normal blood pressure and a value hovered over for details.

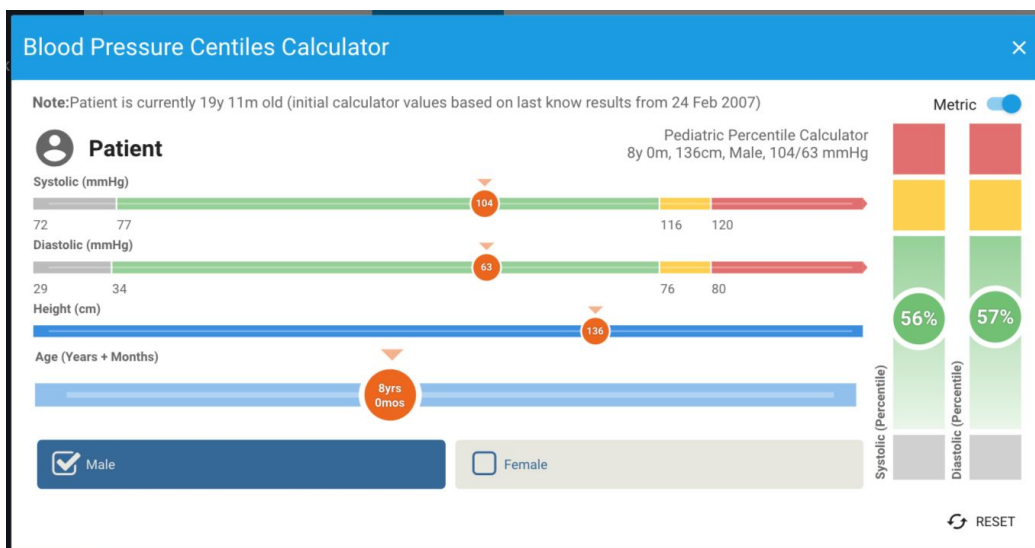
<div> <div>Encounter</div> <div>Position</div> <div>Leg</div> <div>Method</div> </div>									
<div> <div>SHORT TERM</div> <div>LONG TERM</div> <div>TABLE VIEW</div> </div>									
Date	Age	Height	Blood Pressure	Percentiles	Site	Position	Method	Encounter	
26 Jan 2007	7y 11m	136cm	105/64mmHg	60%/60%	Left Leg	Sitting	Machine	-	
19 Jun 2004	5y 4m	112cm	104/59mmHg	77%/65%	Left Leg	Sitting	Machine	-	
20 Mar 2004	5y 1m	112cm	103/58mmHg	72%/63%	Left Leg	Sitting	Auscultation	-	
27 Jan 2004	4y 11m	112cm	98/55mmHg	54%/53%	Left Leg	Sitting	Auscultation	-	
16 Oct 2003	4y 8m	107cm	97/52mmHg	58%/49%	Left Leg	Sitting	Auscultation	-	
08 Sep 2003	4y 7m	107cm	98/54mmHg	61%/56%	Left Leg	Sitting	Auscultation	-	
16 Apr 2003	4y 2m	107cm	97/51mmHg	54%/47%	Left Leg	Sitting	Machine	-	
28 Oct 2002	3y 8m	102cm	92/45mmHg	41%/34%	Left Leg	Sitting	Auscultation	-	
09 Jun 2002	3y 4m	99cm	91/43mmHg	41%/32%	Left Leg	Sitting	Machine	-	

Table view for a patient with consistently normal blood pressure and a **Leg** only filter applied.

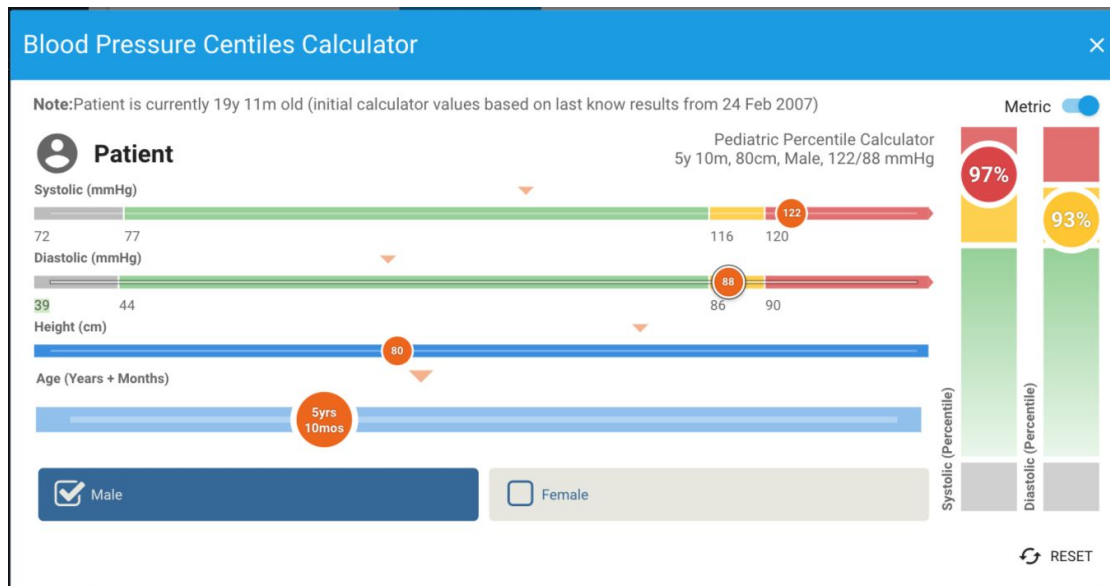
## Calculator

### Blood Pressure Centiles

The BP Calculator can be accessed by clicking on the calculator icon in the top right corner of the BP Centiles module. The purpose of the calculator is to allow the user to change various values and see the resulting effect on the blood pressure percentile. By default it is populated with the latest data from the patient.



Calculator with default values for the patient



Calculator with changed values, the default values are marked with notches above each slider.

## Results



1. Systolic percentile slider
2. Diastolic percentile slider
3. Rest button - restores sliders and toggles to patient's data

## Using the Bilirubin Risk Management Module

The Bilirubin Risk Management module of Pediatric Suite displays the patient's bilirubin measurements, relevant conditions, suggestions for measurements and/or assessments to be made, risk factors present for patient, and associates measurements with risk.



Bilirubin Risk Chart clinical view for a newly born patient with no data.

## Settings

1. Toggle **Transcutaneous Bilirubin** display on chart/table
2. Toggle **Total Serum Bilirubin** display on chart/table
3. Toggle **Show Phototherapy on Chart** display on chart/table
4. Toggle **Show Transcutaneous Bilirubin margins of error** display on chart
5. **Gestational Age Range** picker
  - a. Toggle is part of decision making process for determining risk factors. For infants with gestational age < 38wks the risk factors are greater for developing hyperbilirubinemia and require closer surveillance and monitoring.

**Lab Feed Settings** ×

Transcutaneous Bilirubin ☒

Total Serum Bilirubin ☒

Show Phototherapy on Chart ☒

⚙ Show Transcutaneous Bilirubin margins of error ☒

Gestational Age Range  
38+ wks

APPLY CANCEL

## Main information

The **Main information** component is common throughout the **Bilirubin Risk Chart** module.

1. Suggestion for next action to be performed
2. Bilirubin measurements trend
3. Current risk and suggested treatment

**⚠ Assess for jaundice as soon as possible!**

Trend: -  
NO PREVIOUS MEASUREMENTS

Default Suggestions for newly born

**Assess for jaundice every 8-12 hours. (Last assessed 1.35h ago)**

Trend: -  
NO PREVIOUS MEASUREMENTS

Suggestion after refuted jaundice assessment

**Measure TSB or TcB and interpret by age in hours**

Trend: -  
NO PREVIOUS MEASUREMENTS

Suggestion after confirmed jaundice assessment

**Assess for jaundice every 8-12 hours. (Last assessed 0.85h ago)**

Trend: -  
⚠ HIGH INTERMEDIATE RISK: No Treatment

Suggestions after **High Intermediate Risk** Bilirubin Measurement

**Assess for jaundice every 8-12 hours. (Last assessed 6.35h ago)**

Trend: No Change →  
⚠ HIGH INTERMEDIATE RISK: No Treatment

Suggestions after **High Intermediate Risk** Bilirubin Measurement and **No Change** trend

**1. Evaluate cause; 2. Treat if criteria for treatment met (Fig 3,4) 3. Repeat TSB in 4-24 hours**

Trend: Worsening ↗  
⚠ HIGH RISK: Phototherapy

Suggestion after **High Risk** Bilirubin Measurement and rapidly **Worsening** trend

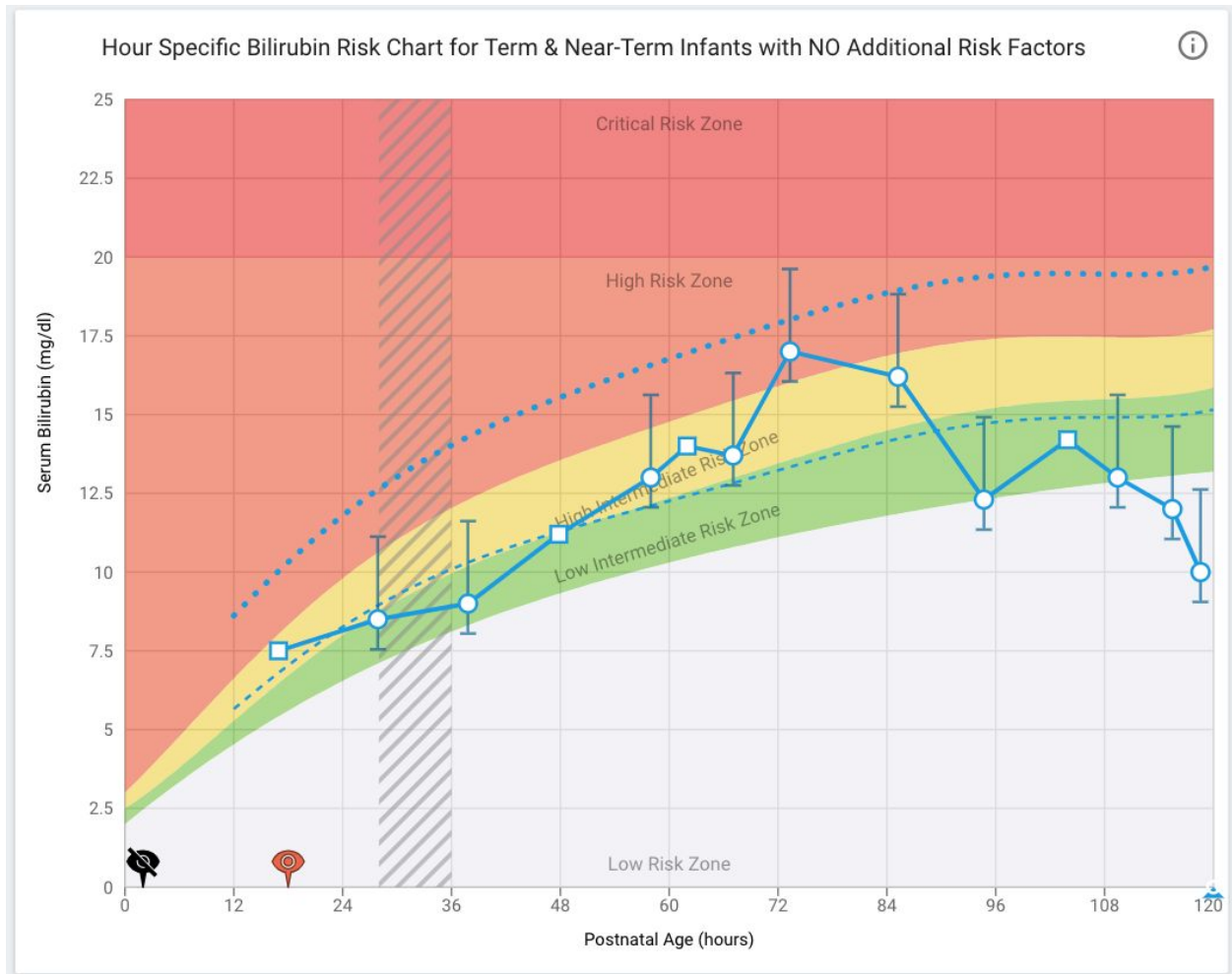
**Assess for jaundice every 8-12 hours. (Last assessed 1.69h ago)**

Trend: Rapidly Improving ↓  
LOW RISK: No Treatment

Suggestion after **Treatment** and **Low Risk** Bilirubin Measurements and **Rapidly Improving** trend

## Clinical mode

The clinical mode includes the **Main Information** component, the chart and information column to the right of the chart.



Sample chart with **Jaundice assessments, Transcutaneous and Total Serum Bilirubin Measurements, Phototherapy indicator and therapy thresholds.**

1. Transcutaneous Bilirubin as circles
2. Total Serum Bilirubin as squares
3. Jaundice assessment as an eye
4. Black with a strike - Refuted jaundice
  - a. Yellow - Mild jaundice
  - b. Light Orange - Moderate Jaundice
  - c. Dark Red - Severe Jaundice
5. Other assessment as circles
  - a. Black - Refuted



- 
- Hour Specific Bilirubin Risk Chart for Term & Near-Term Infants**
- LEGEND**
- Transcutaneous Bilirubin
  - Total Serum Bilirubin
  - Transfusion Recommended
  - Phototherapy Recommended
  - Transcutaneous Bilirubin margin of error
  - Jaundice Confirmed
  - Jaundice Refuted
  - Condition Assessment
  - ▲ Current age

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## Additional information with the following tabs

The image displays three panels of a clinical decision support system interface, each with three tabs: RESULTS, GUIDELINES, and RISK FACTORS.

**Left Panel (RESULTS tab):** Shows a list of bilirubin measurements and assessments. Each entry includes a severity icon (HIR, LIR, or a red eye icon for confirmed jaundice), the measurement type, the age in hours, and the value in mg/dl.

Severity	Measurement	Age in hrs	Value (mg/dl)
HIR	Total Serum Bilirubin	61.98	14
HIR	Transcutaneous Bilirubin	57.97	13
LIR	Total Serum Bilirubin	47.83	11.2
LIR	Transcutaneous Bilirubin	37.82	9
LIR	Transcutaneous Bilirubin	27.88	8.5
Confirmed (Moderate)	Neonatal jaundice confirmed (Moderate)	18.00	-
HIR	Total Serum Bilirubin	16.93	7.5
Refuted	Neonatal jaundice refuted	2.00	-

**Middle Panel (GUIDELINES tab):** Shows a sequence of steps. Step 2 is currently active and expanded, displaying a message and rationale for assessing jaundice.

**Right Panel (RISK FACTORS tab):** Shows a list of risk factors, some of which are active (indicated by a red triangle icon) and others are inactive (indicated by a circle icon).

Risk Factor	Status
TSB/TcB in high-risk zone	Active
Jaundice in first 24 hours	Active
ABO incompatibility with positive direct Coombs, known hemolytic disease, or elevated ETCO	Inactive
Cephalohematoma or bruising	Inactive
Gestational age 35-36 weeks	Inactive
Prior sibling had phototherapy	Inactive
Exclusive breastfeeding, esp. with poor feeding or weight loss	Inactive
East Asian Race	Inactive

The right info column includes three tabs:

1. Results tab - compact table view of the bilirubin measurements and conditions assessments
2. Guidelines - Interface to review the suggested steps:
  - a. Which steps have been passed
  - b. On which step is the patient currently
  - c. Future steps
3. Risk Factors
  - a. Displays a list of Risk factors and which apply to the patient

Additionally this area contains the **Add** button. This button opens a dialog where:

1. New bilirubin measurements can be added
2. New assessments added

New bilirubin measurements or new condition assessments can be added only for the first 120h after birth of the patient.

Conditions assessments can be **confirmed** or **refuted**. Confirmed conditions should have an associated severity included.

New Data ×

BILIRUBIN

CONDITIONS

Age in Hours

Up to 120 hrs after birth

Result

Valid results: 0-25

Measurement Type

Transcutaneous Bilirubin

Risk Zone

Low Risk Zone (<40%)

CREATE CANCEL

New Data ×

BILIRUBIN

CONDITIONS

Neonatal jaundice

Age in Hours

Up to 120 hrs after birth

Verification Status

Confirmed

Refuted

Severity

Moderate

Severe

Mild

CREATE CANCEL

New Data ×

BILIRUBIN

CONDITIONS

Neonatal jaundice

Cephalhematoma due to birth trauma

Fetal cephalhematoma

Deficiency of glucose-6-phosphate dehydr

Glucose-6-phosphate dehydrogenase defic

Hemolytic disease

Confirmed

Refuted

Severity

Moderate

Severe

Mild

CREATE CANCEL

New Data ×

BILIRUBIN

CONDITIONS

Deficiency of glucose-6-phospha...

Age in Hours

24

Verification Status

Confirmed

Refuted

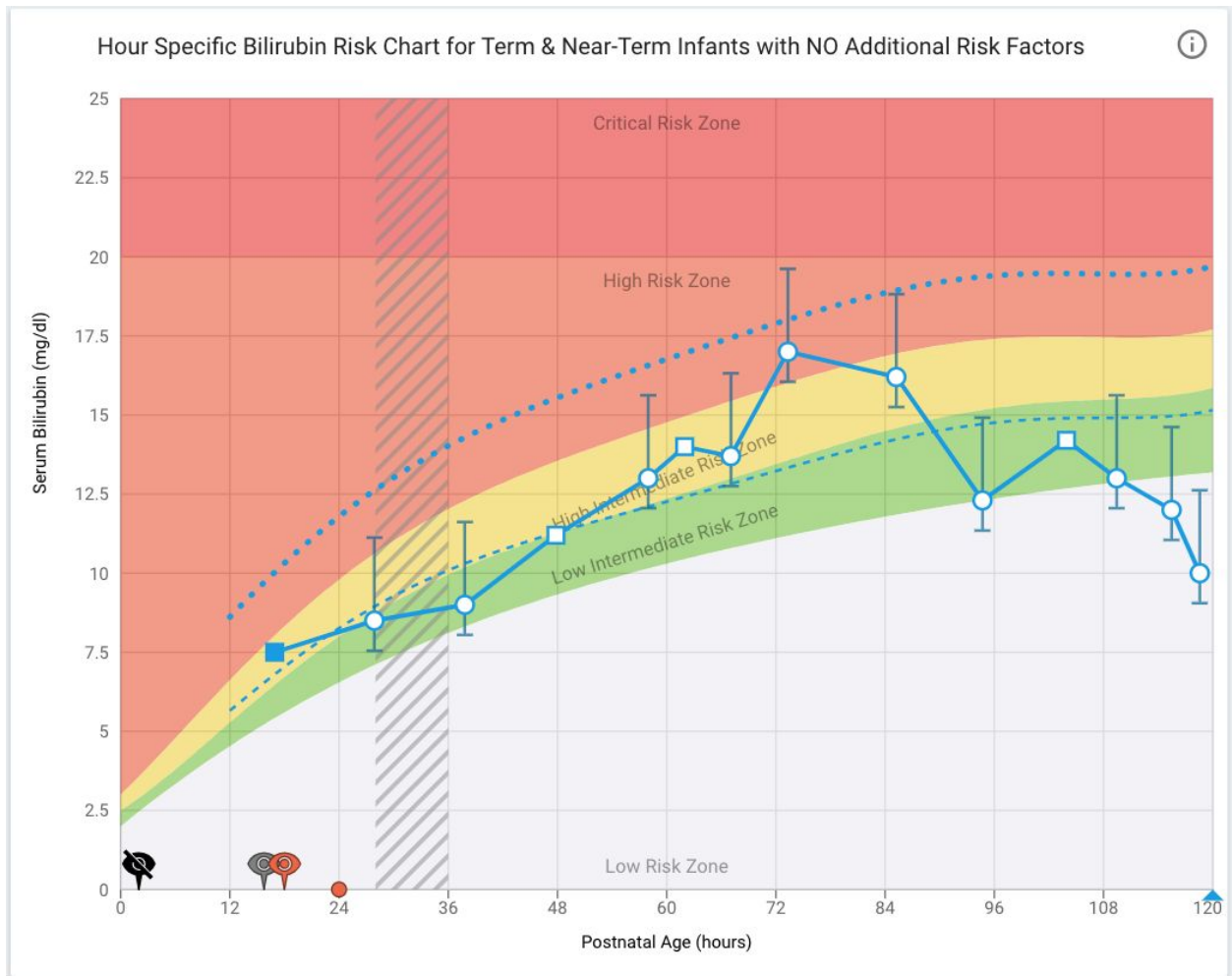
Severity

Moderate

Severe

Mild

CREATE CANCEL



Sample chart with a new **Condition Assessment** added.

## Table Mode

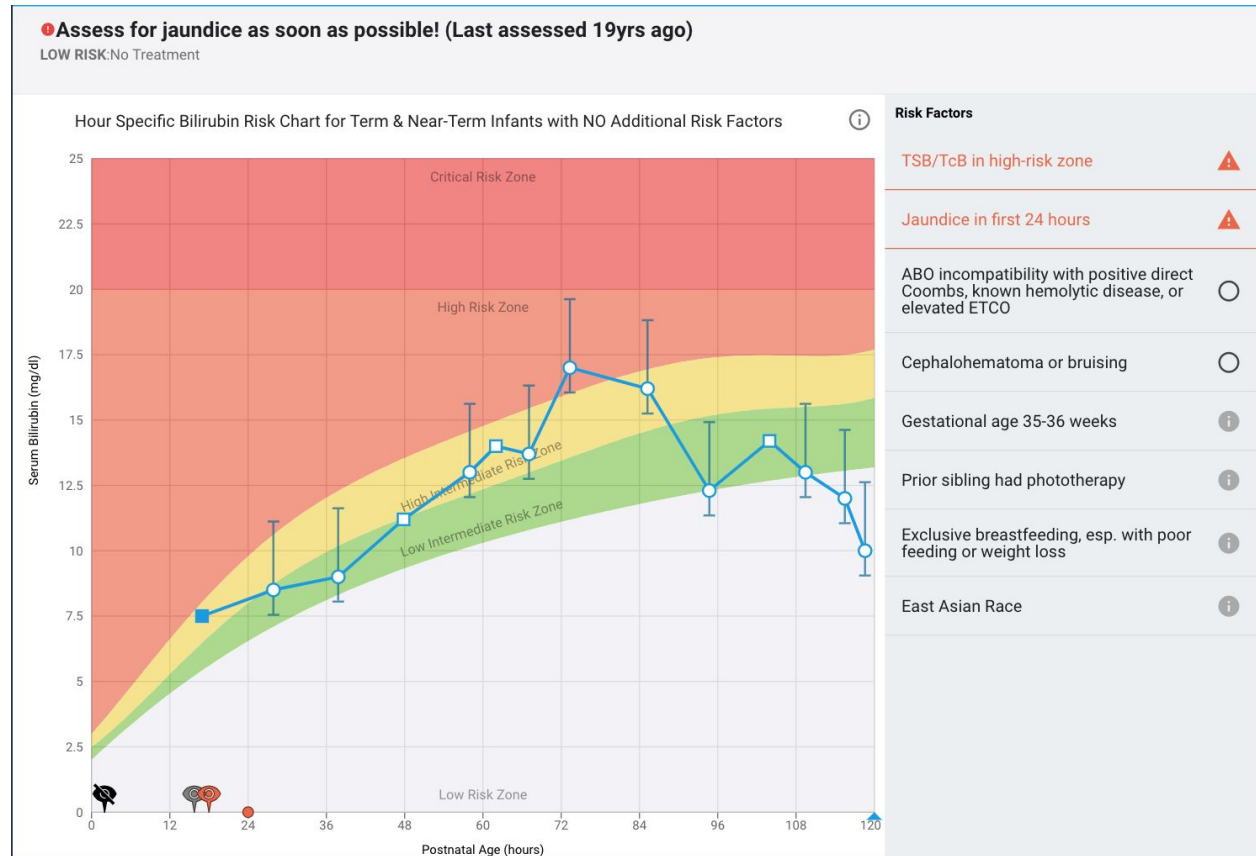
GUIDELINES		RISK FACTORS	
<div>1 Step 1</div> <div>2 Step 2</div> <div>Step 3</div> <div>Step 4</div> <div>Step 5</div> <div>Step 6</div>	<div> <b>Message:</b> Assess for jaundice as soon as possible! (Last assessed 19yrs ago)         </div> <div> <b>Rationale:</b> Jaundice assessment is required to monitor and to verify the patient's current health. The indication of jaundice may trigger additional care requirements.         </div> <div> <b>Next:</b> 3         </div>		
<div>1 Step 1</div> <div>2 Step 2</div> <div>Step 3</div> <div>Step 4</div> <div>Step 5</div> <div>Step 6</div>	<div> <b>Message:</b> Assess for jaundice as soon as possible! (Last assessed 19yrs ago)         </div> <div> <b>Rationale:</b> Jaundice assessment is required to monitor and to verify the patient's current health. The indication of jaundice may trigger additional care requirements.         </div> <div> <b>Next:</b> 3         </div>		
<div>1 Step 1</div> <div>2 Step 2</div> <div>Step 3</div> <div>Step 4</div> <div>Step 5</div> <div>Step 6</div>	<div> <b>Message:</b> Assess for jaundice as soon as possible! (Last assessed 19yrs ago)         </div> <div> <b>Rationale:</b> Jaundice assessment is required to monitor and to verify the patient's current health. The indication of jaundice may trigger additional care requirements.         </div> <div> <b>Next:</b> 3         </div>		
<div>1 Step 1</div> <div>2 Step 2</div> <div>Step 3</div> <div>Step 4</div> <div>Step 5</div> <div>Step 6</div>	<div> <b>Message:</b> Assess for jaundice as soon as possible! (Last assessed 19yrs ago)         </div> <div> <b>Rationale:</b> Jaundice assessment is required to monitor and to verify the patient's current health. The indication of jaundice may trigger additional care requirements.         </div> <div> <b>Next:</b> 3         </div>		

Each row Includes detailed information for its measurement or assessment.

Guidelines, risk factors and the **Add** button are also available in this mode.

GUIDELINES	RISK FACTORS
1 Step 1	TSB/TcB in high-risk zone
2 Step 2	Jaundice in first 24 hours
<b>Message:</b> Assess for jaundice as soon as possible! (Last assessed 19yrs ago)	ABO incompatibility with positive direct Coombs, known hemolytic disease, or elevated ETCO
<b>Rationale:</b> Jaundice assessment is required to monitor and to verify the patient's current health. The indication of jaundice may trigger additional care requirements.	Cephalohematoma or bruising
<b>Next:</b> 3	Gestational age 35-36 weeks
Step 3	Prior sibling had phototherapy
Decision: Is jaundice present	Exclusive breastfeeding, esp. with poor feeding or weight loss
Yes: 12	East Asian Race
No: 4	

## Educational Mode



The educational mode is very similar to the clinical view. It contains:

1. The **Main information** component
2. The **Bilirubin Chart** which contains bilirubin measurements, conditions assessments, but doesn't display phototherapy or **Treatment thresholds**

The right info column includes only the **Risk Factors** tab.