Use and Interpretation of the CDC Growth Charts

www.cdc.gov/growthcharts/

Purpose

This guide instructs health care providers on how to use and interpret the CDC Growth Charts to assess physical growth in children and adolescents. Using these charts, health care providers can compare growth in infants, children, and adolescents with a nationally representative reference based on children of all ages and racial or ethnic groups. Comparing body measurements with the appropriate age- and gender-specific growth chart enables health care providers to monitor growth and identify potential health- or nutrition-related problems.

During routine screening, health care providers assess physical growth using the child's weight, stature, length, and head circumference. Although one measurement plotted on a growth chart can be used to screen children for nutritional risk, it does not provide adequate information to determine the child's growth pattern. When plotted correctly, a series of accurate weights and measurements of stature or length offer important information about a child's growth pattern, which may be influenced by such factors as gestational age, birth weight, and parental stature. Parental stature, for example, is considered before assuming there is a health or nutrition concern. Other factors, such as the presence of a chronic illness or special health care need, must be considered, and further evaluation may be necessary.

STEP 1

Obtain accurate weights and measures When weighing and measuring children, follow procedures that yield accurate measurements and use equipment that is well maintained. See the *Anthropometry: Accurately Weighing and Measuring Infants, Children and Adolescents* module for information about accurate weighing and measuring procedures. http://depts.washington.edu/growth/

STEP 2

Select the appropriate growth chart Select the growth chart to use based on the age and gender of the child being weighed and measured.

- *Enter the child's name and the record number, if appropriate.*

Use the charts listed below when measuring boys and girls in the recumbent position (should be limited to those less than 36 months old):

- Length-for-age
- Weight-for-age
- Head circumference-for-age
- Weight-for-length

Use the charts listed below when determining the stature (standing height) of boys and girls aged 2 to 20 years:

- Weight-for-age
- Stature-for-age
- BMI-for-age

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Record data After selecting the appropriate chart and entering the patient's name and record number, if appropriate, complete the data entry table.

First, record information about factors obtained at the initial visit that influence growth.

- *Enter mother's and father's stature as reported.*
- *Enter the gestational age in weeks.*

The next line is reserved for recording the child's birth data. (*Omit this step when using growth charts for children aged 2 to 20 years.*)

- *Enter the date of birth.*
- *Enter birth weight, length, and head circumference.*
- *Add notable comments (e.g., breastfeeding).*

Record information obtained during the current visit.

- *Enter today's date.*

Determine age to the nearest month for infants and 1/4-year for children 2 to 20 years.

- *Enter the child's age.*

Example of how to calculate the child's age: To calculate Sam's age, subtract his birth date from the date of the visit or measurement. To subtract, it will be necessary to convert months to days and years to months if either the month or day in the birth data is larger than in the date of measurements. When converting one month to days, subtract 1 from the number of months in the date of measurement, then add 28, 30, or 31, as appropriate, to the number of days. When converting one year to months, subtract 1 from the number of years in the date of measurement, then add 12 to the number of months.

	Year	Month	Day
Date of Measurement	1998	4	4
Convert one month to days		*(-1)*	*(+30)*
	1998	3	34
Convert one year to months	*(-1)*	*(+12)*	
	1997	**15**	**34**
Birth Date	1994	9	15
Child's Age	3	6	19

Sam is aged 3 years, 6 months, and 19 days.

Days →	Month	Months →	Year
0–15	0	0–1	0
16–31	1	2–4	1/4
		5–7	1/2
		8–10	3/4
		11–12	1

Using the guide above, 3 years, 6 months, and 19 days is rounded to 3 years and 7 months. Because age for children over 2 is rounded to the nearest 1/4 year, Sam's age is rounded to 3 1/2 years.

- *Enter weight, stature, and head circumference (if appropriate) immediately after taking the measurement.*
- *Add any notable comments (e.g., was not cooperative).*

4 **Calculate BMI** BMI is calculated using weight and stature measurements, then used to compare a child's weight relative to stature with other children of the same age and gender.

- *With a calculator, determine BMI using the calculation below.*

BMI = Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
Or
BMI = Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703

It is necessary to convert the weight and stature measurements to the appropriate decimal value shown in Table 1.

Example: 37 lbs. 4 oz. = 37.25 lbs., 41-1/2 inches = 41.5 in.

Table 1. Decimal Conversions

Fraction	Ounces	Decimal
1/8	2	.125
1/4	4	.25
3/8	6	.375
1/2	8	.5
5/8	10	.625
3/4	12	.75
7/8	14	.875

- *Enter BMI to one place after the decimal point (Example: 15.204 = 15.2).*

See the *Using the BMI-for-Age Growth Chart* module (www.cdc.gov/growthcharts) for more information and additional resources on calculating BMI.

5 **Plot measurements** On the appropriate growth chart, plot the measurements recorded in the data entry table for the current visit.

- *Find the child's age on the horizontal axis. When plotting weight-for-length, find the length on the horizontal axis. Use a straight edge or right-angle ruler to draw a vertical line up from that point.*
- *Find the appropriate measurement (weight, length, stature, head circumference, or BMI) on the vertical axis. Use a straight edge or right-angle ruler to draw a horizontal line across from that point until it intersects the vertical line.*
- *Make a small dot where the two lines intersect.*

6 **Interpret the plotted measurements** The curved lines on the growth chart show selected percentiles that indicate the rank of the child's measurement. For example, when the dot is plotted on the 95th percentile line for BMI-for-Age, it means that only 5 of 100 children (5%) of the same age and gender in the reference population have a higher BMI-for-Age. Interpret the plotted measurements based on the percentile ranking and the percentile cutoff corresponding to the nutrition indicator shown in the table below. If the percentile rank indicates a nutrition-related health concern, additional monitoring and assessment are recommended.

- *Determine the percentile rank.*
- *Determine if the percentile rank suggests that the anthropometric index is indicative of nutritional risk based on the percentile cutoff value.*
- *Compare today's percentile rank with the rank from previous visits to identify any major shifts in the child's growth pattern and the need for further assessment.*

Anthropometric Index	Percentile Cut-off Value	Nutritional Status Indicator
BMI-for-Age	≥ 95th	Overweight
Weight-for-Length	> 95th	Overweight
BMI-for-Age	≥ 85th and < 95th	At Risk of Overweight
BMI-for-Age	<5th	Underweight
Weight-for-Length	< 5th	Underweight
Stature/Length-for-Age	< 5th	Short Stature
Head Circumference-for-Age	< 5th and > 95th	Developmental Problems

References

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