

Interpreting child growth

Interpretation of plotted growth charts requires competent staff trained in the use of child growth equipment and growth chart interpretation. Growth charts are needed for the assessment and monitoring of individual children and populations and are used universally in paediatrics [1].

One-off measurements only describe a child's size. Serial measurements are needed to provide information on a child's growth; the direction of serial measurements on the curve is more important than the actual centile.

Growth assessment involves looking at the overall trajectory of weight for age, length for age and weight compared to length, or BMI for age to determine whether a child is tracking along the growth curves, or crossing centiles upwards or downwards.

Growth chart 'centile' lines show the reference range of weights and heights for a particular age and gender. For example, 50% of the population are expected to be below the 50th centile; 90% below the 90th centile. Half of all children at a given age are usually between the 25th and 75th centiles, but parents and professionals should not feel under any pressure to try and ensure that the baby's weight should be on or near the 50th centile at any age.[2]

Very few babies grow along the same centile line from birth with about half crossing at least one centile band (the distance between 2 centile lines) up or down during the first year. Babies who are large at birth are more likely to move to a lower centile, whereas the opposite is true for babies of low birthweight. Infant growth is not a linear process (despite how growth is represented by centile lines), and babies measured too frequently may see times of 'zero' growth [3].

Poor growth is reflected by an extreme measurement centile on a single occasion, or evidence of centile 'crossing'. An 'ideal' weight for height is when the weight centile is close to the height centile. [3]

Children with either weight or height measurements 'crossing' centile spaces in either the upwards or downwards direction, OR BMI above the 85th centile or below the 5th centile (over 2 year olds) should be monitored more closely. A mid-parental stature should be considered if there are concerns about the child's short-stature. This involves calculating the 'average' of mother and father's heights and provides context for the child's predicted height potential. Despite many parents' perceptions, the 50th centile is not the goal for each child. Normal children often shift one or two centiles for both length and weight, especially in the first 6 months, with the majority settling into a channel towards the 50th centile rather than away. With the exception of the first 2 years when channel shifts are normal, a sharp incline or decline in growth, or a growth line that remains flat, are suggestive of a problem.

Breastfed infants with low birth weight will be expected to track along the lower centiles of the WHO growth charts because exclusive breastfeeding does not change the fact the infants were small for their age in the first place. Formula-fed infants grow differently to breastfed infants during the first year of life. In particular formula-fed infants tend to be lighter in the first 3 – 4 months and heavier after 4 – 6 months.

Growth monitoring has been criticised as a waste of valuable time and a cause of unnecessary parental anxiety. A Cochrane review concluded there was insufficient evidence that routine growth monitoring is of benefit to child health in either

developing or developed countries [4]. A review of the evidence concerning growth monitoring and surveillance could find little evidence for monitoring weight beyond 12 months [5], however parents can be readily reassured by growth monitoring. Counselling sessions about child growth accounted for 18% of all MCH Child Health and Wellbeing counselling sessions with families [6].

Conversely, there are widespread concerns about the increasing prevalence of overweight and obesity in children and adolescents in Australia and growth monitoring is an important assessment and monitoring tool. BMI for age is an effective screening tool for children, but not a diagnostic tool. It should be used for guidance for further assessment, referral or intervention, rather than as diagnostic criterion for classifying children. Children who are crossing BMI centiles in an upward direction may be at risk of becoming overweight or obese. Unlike adults, age-related increases in BMI during growth are associated with increases in both fat mass and fat-free mass [7]

Possible Causes of Growth problems

Weight fluctuations are much more common than height or head circumference changes. They are also more easily rectified. Crossing of height represents longer term influences on growth and is more significant, particularly if slowing. Crossing of head circumference is cause for concern and needs further investigation [8].

| Crossing centiles | Possible causes | |
|-----------------------------|---|--|
| Increasing weight centiles | Energy imbalance¹ | Excessive food Inadequate physical activity |
| | Endocrine disorders | Hypothyroidism Excess cortisol (Cushings) Pituitary disease |
| | Genetic disorders | Prader-Willi Downs syndrome |
| Decreasing weight centiles | Acute illness | Short term illness, vomiting, diarrhoea |
| | Chronic illness | Including, but not limited to cardiac, respiratory, gastrointestinal, renal disease |
| | Physical and/or developmental concerns | |
| | Nutritional | Inadequate energy intake |
| Increasing height centiles | Endocrine disorders | Excessive growth hormone Hyperthyroidism Rare genetic syndromes |
| | Decreasing height centiles | Endocrine |
| Chronic illness | | Chronic anaemia Chronic illness Systemic failure (eg renal, cardiac) Ricketts |
| Genetics | | Chromosomal disorders |
| | Nutritional | Long-term primary or secondary malnutrition ie infection |
| Increased head size centile | Hydrocephalus, chromosomal abnormality, Developmental delay | |
| Decreased head size centile | Prenatal insult | Maternal substance abuse, maternal infection |
| | Birth complication | |
| | Chromosomal abnormality | |

Table 2 Possible causes of abnormal child growth

¹ Causes listed in **bold** are more common

References

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