

## Growth Assessment and Monitoring during Childhood

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### Abstract

Growth is an indicator of the health and nutritional status of infants and children. Health organisations and professionals worldwide advocate monitoring the growth of children with the primary aim of identifying and preventing malnutrition and/or obesity. Growth monitoring should be part of every health care consultation for children. However, physicians during health care consultations are often so busy addressing acute health issues, that they miss the opportunity to monitor the child's growth and provide anticipatory guidance. Appropriate growth monitoring would enable health care providers to detect abnormal growth in a timely manner, as well as to reassure parents if their concerns are unfounded. To perform this effectively, physicians need to be familiar with measurement methods, use of appropriate growth charts and interpretation of results. As weight, height and growth rates may vary among children, physicians also need to understand what constitutes normal growth. This paper aims to clarify the purpose of growth monitoring and provide recommendations for physicians to assess, monitor and manage growth in infants and children in a primary care setting.

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**Key words:** Body mass index, Child, Height, Weight

### Introduction

Human physical development is continuous from infancy to maturity and involves changes in body size and appearance, including the development of secondary sexual characteristics. Although children tend to have body shapes and sizes similar to their parents or grandparents, living conditions including nutrition and sanitation have significant influence on growth. Growth and development from conception to final height are influenced by genetics, prenatal factors such as maternal-fetal health and well-being<sup>1</sup> and postnatal factors such as nutrition and disease.<sup>2</sup>

There are 2 distinct components of physical development, namely height growth (which continues throughout childhood and puberty until attainment of final height by 18 years of age) and weight growth (which influences height

growth during childhood and determines adiposity status even after final height is attained). Physicians should be familiar with height, weight and body mass index (BMI)-for-age growth charts, since comparison of a child's height, weight and BMI with the respective values of a reference population provides evidence or otherwise of the normal growth process.<sup>3</sup> Although growth is compared to population norms on growth charts, the 50<sup>th</sup> population percentile is not necessarily the target growth pattern for all individuals, and should be de-emphasised during growth monitoring. Growth involves height and weight changes over time and is quantified as growth velocity.<sup>4</sup> Hence, it is the monitoring of growth velocity that is important. Doing so will enable us to detect abnormal growth and assess the impact of interventions.<sup>5</sup>

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Puberty is an important consideration when assessing growth, because, as a child approaches puberty, growth velocity generally slows (preadolescent dip), then accelerates markedly during mid-puberty (pubertal growth spurt).<sup>6</sup> Puberty is delayed in onset if there are no secondary sexual characteristics by age 13 years in girls (e.g. breast development)<sup>7</sup> or 14 years in boys (e.g. attainment of 4 mL testicular volume).<sup>8</sup> If menarche is not attained by age 16 years in girls with breast development,<sup>7</sup> or if boys fail to attain 15–25 mL testicular volume by 17–18 years, then progression of puberty is considered delayed.<sup>9</sup> As puberty onset and progression varies, the age at which children stop growing in height will therefore vary from child to child.

In this review, we clarify the purpose and describe the process of growth assessment and monitoring, as well as provide recommendations for physicians to monitor and manage growth in infants and children in the primary care setting.

### **Purpose of Growth Monitoring**

The aims of growth monitoring are to: a) Demonstrate normal size and growth to allay anxieties related to perceived inadequate or excessive size; b) Guide healthy and appropriate growth; and c) Identify abnormal growth patterns that may suggest underlying disease.

#### *Demonstrate Normal Size/Growth*

Demonstrating normal growth can manage expectations, correct misperceptions and allay undue anxiety. In many instances, growth is normal but parents may have their own perceptions about their child's growth. Perception is influenced by personal factors such as needs, values and beliefs.<sup>10</sup> Some parents may believe that bigger is better, and may be unduly anxious because their child's growth is not above the 50<sup>th</sup> percentile. Perceiving a normal child as underweight may lead to inappropriate overfeeding,<sup>11</sup> while incorrectly perceiving a child as short, when not, may lead to unnecessary referrals and investigations. Growth assessment and monitoring can assure parents of their child's appropriate size status and growth rates.

#### *Guide Healthy and Appropriate Growth*

To realise his or her genetic growth potential, a child must be in good health and have sufficient nutrition, optimal weight, adequate sleep and physical activity. In some instances, children may be provided with excessive nutrition to help attain the tallest possible height by parents (who may not realise that height growth is limited by genetic potential). Through growth monitoring and the use of growth charts, health care providers can help parents understand what constitutes healthy and appropriate growth, and guide parents to help their children attain healthy growth (i.e. optimal height that is not at the expense of excess adiposity).

Overweight and obesity in childhood are associated with increased risk of cardiometabolic problems in adulthood, including premature death.<sup>12</sup> Obesity has led to an increase in incidence of type 2 diabetes mellitus among children. Childhood obesity also predisposes children to develop hypertension in adulthood. Hypertension is a risk factor for developing cardiovascular disease, and identifying obesity in childhood can help with early identification of those at risk of developing hypertension later in life.<sup>13</sup>

A recent Singapore study suggested that mothers may not be able to accurately perceive their child's weight status, particularly if the child is under- or overweight, illustrating the need for measurements to be taken and used to guide parents and caregivers to ensure appropriate growth.<sup>11</sup> In addition, overweight or obese children are more likely to be perceived as healthy by parents in this decade than 10 years ago.<sup>14</sup> These observations imply that parents may not fully understand when growth is considered appropriate and may not be receiving sufficient guidance by current health practices.

#### *Identify Abnormal Growth Patterns*

Extremes in child size (e.g. severe short stature or severe underweight) may indicate underlying pathology, while faltering growth trajectory may be an early marker of illness or suboptimal nutrition. Abnormal growth patterns include weight faltering, height faltering, excessive weight gain and excessive height gain. Growth faltering or stunting can be a marker of underlying disease, and may be associated with irreversibly reduced neurodevelopmental and cognitive function,<sup>15</sup> while overweight or obesity is also linked to adverse long-term health outcomes.<sup>12</sup> If inappropriate growth is observed, assessments to detect occult underlying disease, hormone disorders or malnutrition should be undertaken, with subsequent intervention dependent on the aetiology.

Height faltering, also known as stunting, occurs when height fails to demonstrate age-appropriate increases over time leading to low height velocity. Poor height velocity may be due to underlying poor health, suboptimal nutrition or hormonal disease. Slow height gain may be physiological in children with constitutional growth delay<sup>16</sup> and in those who have passed peak growth velocity during puberty.

Weight faltering, or failure to thrive, describes weight that crosses more than 2 major centile spaces downwards (e.g. from 50<sup>th</sup> percentile to 3<sup>rd</sup> percentile) and should also be considered when BMI is below the 3<sup>rd</sup> percentile on the local BMI for age chart. Weight faltering may raise concerns about possible neglect, deprivation or organic disease. However, it is most commonly caused by under-nutrition relative to the child's energy needs and often involves problems with diet and feeding behaviour that typically respond to simple targeted advice.<sup>17</sup>

Excessive weight gain leading to high BMI is most commonly related to excessive calorie consumption, while excessive height gain suggests the possibility of conditions associated with overgrowth or early pubertal growth.

### How to Assess and Monitor Growth

Monitor a child's growth by measuring height and weight, ideally every 3-4 months for children <2 years of age, and every 6-12 months for children >2 years of age. Plot the data on growth charts and compare them with population norms, genetic potential and with previous height(s) and weight(s). This can determine if children are growing appropriately (for population and genetic potential) and can indicate if further investigations or interventions are needed.

We recommend the following sequence of assessment: 1) Measure the child's height and weight, and note the age in years and months; 2) Measure the parents' heights (or obtain reported heights) and determine the mid-parental height (MPH) and target height range (THR); 3) Plot the child's height, weight and BMI for age; 4) Plot the MPH and THR; 5) Compare the height with population norms and THR; 6) Compare the weight against the height (i.e. determine BMI); 7) Compare the height, weight and BMI with previous measurements; and 8) Interpret the data to identify the nature of the growth abnormality, if any.

#### *Step 1: Measure the Child's Height and Weight*

##### Accurate and Timely Measurements

Measurements must be accurate and timely to be meaningful. Growth monitoring would reassure parents when growth is normal.<sup>18</sup> However, it may cause unnecessary alarm if results are misinterpreted, or faulty equipment or inconsistent methods are used. At the same time, suboptimal monitoring can result in delayed diagnosis and treatment.

To facilitate correct interpretation, we recommend measuring children at regular intervals (ideally every 3-4 months for children <2 years of age, and every 6-12 months for children >2 years of age) using appropriate technique and equipment. If there are concerns about faltering growth, weight should be measured weekly (if less than 1 month old), fortnightly (between 1-6 months old), and monthly (between 6-24 months of age). Length or height should not be measured more often than every 3 months.<sup>19</sup>

Whilst height and weight should be measured at least annually, the best practice is to take accurate measurements opportunistically at every clinic visit, e.g. vaccination visits, illness visits.

##### Length/Height Measurement

For children under 2 years of age, the supine length should be measured:

- Use a length board or mat, placed on a flat, stable surface (for e.g. on a table).

- Lay the child on his or her back, straight along the board, with shoulders touching the board, and without arching the spine.

- Children should not be wearing a nappy/diaper or footwear during measurement.

- Two persons (e.g. the observer and a parent) are needed to measure supine length.

- Repeat the measurement 2 or 3 times and take the average.

- For children over 2 years, standing height should be measured.

- Use a rigid upright measure with a T piece, or a stadiometer mounted at a right angle between a level floor and against a straight, vertical surface such as a wall or pillar.

- The observer should get on a face-to-face level with the child and position his or her head so that a horizontal line drawn from the ear canal to the lower edge of the eye socket is running parallel to the baseboard (i.e., the Frankfort plane positioned horizontally).

- Repeat the measurement 2 or 3 times and take the average.

In general, standing height is about 0.7 cm less than length measurement in young children, so it is important to adjust the measurements if length is measured instead of height.<sup>20,21</sup>

##### Weight Measurement<sup>20</sup>

The following are suggested when measuring children's weight:

- Babies should be weighed without clothes or nappies/diapers.

- Children older than 2 years may be weighed in vest and pants, without footwear.

- The World Health Organization (WHO) (2008) recommends the use of clinical electronic scales of up to 150 kg with graduations of 0.1 kg (100 g) graduations.<sup>20</sup> Scales should allow tared weighing to facilitate weighing a child younger than 2 years old held by a carer. For infants, electronic baby scales with better precision and smaller graduation (e.g. 20 g) should be used.<sup>20</sup>

#### *Step 2: Measure Parental Heights and Determine MPH and THR*

Measure the standing heights of both parents. Only measured (rather than reported heights) should be used to perform accurate evaluations of height, particularly when diagnostic tests or treatment interventions are being considered.<sup>22</sup>

Determine the MPH: MPH for boys = [(father's height + mother's height) + 13] divided by 2; and MPH for girls = [(father's height + mother's height) - 13] divided by 2.

Determine the THR. This is determined by first obtaining the MPH and then applying 2 residual standard deviations

above and below the MPH<sup>23</sup> (applying 2 residual standard deviations would imply that 9 out of 10 normal children would have an adult height within the THR). THR is sex- and population-specific, and dependent on adult heights of men and women in that population.<sup>21,23</sup> We recommend the following THR based on estimates derived from parental height data from a Singapore cohort:<sup>24</sup> for boys: THR = MPH  $\pm$  9 cm; and for girls: THR = MPH  $\pm$  8 cm.

### *Step 3: Plot the Child's Height, Weight and BMI*

Plot the height, weight and BMI data using appropriate growth charts. Use dots to plot and do not join the dots. Note that age and measurement errors are common plotting mistakes. Plots should be accurate to age in years and months.

### *Step 4: Plot the Derived MPH and THR*

The MPH should be plotted into the child's growth chart corresponding to age 18-20 years old. Sex-specific THR should also be plotted as  $\pm$  9 cm and  $\pm$  8 cm from the MPH for boys and girls, respectively, as described in Step 2. The MPH and THR serves to reference the child's genetic potential.

### *Step 5: Compare the Child's Height to Population Norms and with Genetic Potential*

The appropriate height for a population may be determined by plotting the child's height on the relevant growth chart. For Singapore, we recommend growth charts published by the Health Promotion Board (HPB) of Singapore (available at: <https://www.healthhub.sg/sites/assets/Assets/Programs/screening/pdf/health-booklet-2014.pdf>).<sup>25</sup>

Parental heights are used to determine if a child has the appropriate height for genetic potential. For example, a child whose parents are short (e.g. MPH 3<sup>rd</sup>-10<sup>th</sup> percentile) and who is growing along the 3<sup>rd</sup> percentile, may not necessarily have poor growth but familial short stature instead. MPH adjusted for the THR will indicate whether the child is growing appropriately from a biological standpoint,<sup>26,27</sup> although do consider that very short parents may have a growth disorder themselves.<sup>28</sup>

To approximate the estimated adult height, extrapolate along the height percentile curve, until the value given for 18-20 years of age.<sup>29</sup> Height is likely to be normal if the extrapolated height falls within the THR. Estimation of genetic height potential cannot be done when the height of either parent is unavailable.<sup>30,31</sup> In this situation, we recommend the doctor to monitor the height velocity closely (see Step 7) as an alternative strategy and investigate or refer if height velocity falters.

### *Step 6: Compare the Weight Against the Height by Determining the BMI*

There is rising concern about the number of overweight/

obese children in developed countries due to the serious health conditions linked to obesity.<sup>12</sup> An overweight child has excessive weight for height, and it is recommended that BMI—adjusted for age and sex—should be used to estimate adiposity in children.<sup>32,33</sup> However, BMI should be interpreted with care because it does not directly measure adiposity. Waist circumference is not recommended as a routine measure,<sup>33</sup> as there is little clinical evidence to support this. Similarly, skinfold thickness and electrical bio-impedance do not have sufficient clinical evidence to date to be used routinely as a measure of overweight in children.<sup>32</sup>

### Children Under 6 Years

Charts from Singapore HPB and the National Healthcare Group Polyclinics (available at the following websites) may be used: [https://www.nhgp.com.sg/Our\\_Services/General\\_Medical\\_Services/Child\\_Health\\_Services/](https://www.nhgp.com.sg/Our_Services/General_Medical_Services/Child_Health_Services/) and <https://www.healthhub.sg/sites/assets/Assets/Programs/screening/pdf/health-booklet-2014.pdf>.

There is currently no consensus in the definition of overweight and obese status in children <2 years of age, although the WHO international growth standard for children aged 0-59 months may be used to screen for unhealthy growth patterns.<sup>34</sup>

### Children 6-18 Years

Use the HPB BMI-for-age percentile chart for classification in boys and girls between 6-18 years old. The HPB Obesity Clinical Practice Guidelines, 2016 are available from: [https://www.moh.gov.sg/content/dam/moh\\_web/HPP/Doctors/cpg\\_medical/current/2016/obesity/Obesity%20CPG\\_Main.pdf](https://www.moh.gov.sg/content/dam/moh_web/HPP/Doctors/cpg_medical/current/2016/obesity/Obesity%20CPG_Main.pdf).<sup>35</sup> Those with BMI between 90<sup>th</sup> to <97<sup>th</sup> percentile are classified as overweight, while severely overweight (obesity equivalent) children have BMI  $\geq$  97<sup>th</sup> percentile on the HPB chart. Adolescents older than 16 years may be defined as obese if BMI-for-age is equal to or greater than 97<sup>th</sup> percentile, or if BMI is equal to or greater than 30 kg/m<sup>2</sup>.

### *Step 7: Compare Height, Weight and BMI with Previous Measurements*

To determine height velocity, measure height over time, ideally every 3-4 months for children <2 years of age, and every 6-12 months for children >2 years of age. Approximate minimum growth rates in prepubertal children are as follows: 5-6 cm per year for those from 2-6 years old; and 4 cm per year (3<sup>rd</sup> percentile for the lowest nadir) for those between 6-12 years.

Typically, preschoolers and school age children put on 2-3 kg/year. To determine weight change, assess weight and BMI over time. Rising or falling BMI could indicate appropriate catch-up/down-growth, increasing overweight/obesity or worsening underweight/failure to thrive.

*Step 8: Interpret and Identify the Nature of the Growth Abnormality, If Any*

Interpret height according to Tables 1 and 2 if there are short and tall stature concerns, respectively. Interpret weight (i.e. BMI) according to the Singapore HPB BMI chart,<sup>35</sup> noting that weight interpretation is also relevant in the assessment of children with height concerns. In addition, as growth varies widely during childhood, always evaluate

according to a child's age, gender, health status, nutritional status, genetic potential and hormonal changes.

Parents may worry if their child is not on the 50<sup>th</sup> percentile, and so should be reassured that height or weight above or below the 50<sup>th</sup> percentile can be appropriate. The 50<sup>th</sup> percentile is not to be emphasised (e.g. United Kingdom-WHO charts) to avoid suggesting to parents that all children should be on or near the 50<sup>th</sup> percentile.<sup>21</sup>

Table 1. Recommendations When There Are Concerns about a Child's Poor Height

| Identify the Phenotype                     |                              | Interpret:<br>Clinical Diagnosis                    | Communicate*                                                                                                         | Advise Next Steps: What You Can Do<br>in Your Practice                                                                                                           |
|--------------------------------------------|------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Height for Population                      | Height for Genetic Potential |                                                     |                                                                                                                      |                                                                                                                                                                  |
| Within 3 <sup>rd</sup> to 97 <sup>th</sup> | Within THR                   | Normal height                                       | Your child's height is currently normal compared to both population norms and genetic potential.                     | <ul style="list-style-type: none"> <li>• Assess weight and BMI status.</li> <li>• Advise yearly height, weight and BMI monitoring.</li> </ul>                    |
| <3 <sup>rd</sup>                           | Within THR                   | Short stature; may represent familial short stature | Although your child's height is below the normal population range, it is currently within his/her genetic potential. | <ul style="list-style-type: none"> <li>• Assess if child is underweight or overweight relative to height.</li> <li>• Subsequent steps depend on this.</li> </ul> |
| Within 3 <sup>rd</sup> to 97 <sup>th</sup> | Below THR                    | Short for genetic potential; may indicate pathology | Although your child's height is within the normal population range, it is currently below his/her genetic potential. | <ul style="list-style-type: none"> <li>• Assess if child is underweight or overweight relative to height.</li> <li>• Subsequent steps depend on this.</li> </ul> |
| <3 <sup>rd</sup>                           | Below THR                    | Short stature; may indicate pathology               | Your child's height is currently below both population norms and genetic potential. Investigations are needed.       | <ul style="list-style-type: none"> <li>• Full evaluation needed to determine reason for short stature.</li> </ul>                                                |

BMI: Body mass index; THR: Target height range

\*Note: Avoid labelling when communicating.

Table 2. Recommendations When There Are Concerns about a Child's Excessive Height

| Identify the Phenotype                     |                              | Interpret:<br>Clinical Diagnosis                   | Communicate*                                                                                                         | Advise Next Steps: What You Can Do<br>in Your Practice                                                                                                                                                                                                                                        |
|--------------------------------------------|------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Height for Population                      | Height for Genetic Potential |                                                    |                                                                                                                      |                                                                                                                                                                                                                                                                                               |
| Within 3 <sup>rd</sup> to 97 <sup>th</sup> | Within THR                   | Normal height                                      | Your child's height is currently normal compared to both population norms and genetic potential.                     | <ul style="list-style-type: none"> <li>• Assess weight and BMI status.</li> <li>• Advise yearly height, weight and BMI monitoring.</li> </ul>                                                                                                                                                 |
| >97 <sup>th</sup>                          | Within THR                   | Tall stature; may represent familial tall stature  | Although your child's height is above the normal population range, it is currently within his/her genetic potential. |                                                                                                                                                                                                                                                                                               |
| Within 3 <sup>rd</sup> to 97 <sup>th</sup> | Above THR                    | Tall for genetic potential; may indicate pathology | Although your child's height is within the normal population range, it is currently above his/her genetic potential. | <ul style="list-style-type: none"> <li>• Assess if child is overweight (indicating excessive nutrition).</li> <li>• Assess for dysmorphic features (possibility of overgrowth syndromes).</li> <li>• Assess for secondary sexual characteristics (to consider precocious puberty).</li> </ul> |
| >97 <sup>th</sup>                          | Above THR                    | Tall stature; may indicate pathology               | Your child's height is currently above both population norms and genetic potential. Investigations are needed.       | <ul style="list-style-type: none"> <li>• Assess if child is overweight (indicating excessive nutrition).</li> <li>• Assess for dysmorphic features (possibility of overgrowth syndromes).</li> <li>• Assess for secondary sexual characteristics (to consider precocious puberty).</li> </ul> |

BMI: Body mass index; THR: Target height range

\*Note: Avoid labelling when communicating.

### Potential Benefits of Growth Monitoring<sup>18,36,37</sup>

Growth monitoring may provide the following benefits: 1) Facilitates early diagnosis of underlying illness to allow early referral of growth disorders (e.g. Turner syndrome, achondroplasia), illnesses that affect growth (e.g. gastrointestinal, renal and cardiac disorders), and hormone disorders (e.g. hypothyroidism, growth hormone deficiency, precocious puberty); 2) Demonstrates normal growth to allay anxiety and manage expectations; 3) Identifies abnormal weight trends to guide appropriate nutrition (underweight, and overweight and obesity); 4) Assesses response to nutrition intervention/advice; and 5) Monitors recovery from illness.

### Interventions: Strategies for Primary Care Physicians and Indications for Referral

#### *Short Stature Concerns*

When a child is short for population (below the 3<sup>rd</sup> centile) and short for genetic potential, or short for population (and weight is 2 percentiles higher), consider if the child has inadequate nutritional intake or a chronic illness with persistent symptoms and test the child for hypothyroidism. If thyroid function is normal, optimise nutrition and repeat height measurement in 4-6 months to determine the growth velocity. A child who is short for population but appropriate for THR may have appropriate small stature (e.g. familial short stature). However, it is recommended that all girls below THR or the 3<sup>rd</sup> height percentile (regardless of genetic potential) be assessed for Mosaic Turner syndrome.

#### *Tall Stature Concerns*

When a child is tall for population (97<sup>th</sup> centile and above) and/or tall for genetic potential, consider if the child is overweight/obese, has commenced pubertal development too early or has unusual facial features or a Marfanoid habitus. Assess if the child has features of thyrotoxicosis. In general, children who are inappropriately tall should be referred to a specialist for assessment.

Instructions on identification, interpretation, communication and further actions when there are concerns about a child's height are outlined in Tables 1 and 2. It is useful to complement this with the growth velocity and with serial measurements over time.

#### *Overweight and Obesity*

Overweight and obese children can be managed in primary care. Refer patients to tertiary care if management strategies fail after 6 months—although referral can also be guided by the degree of obesity, presence or likelihood of comorbidities (e.g. family history), or where a pathological cause of obesity is suspected.<sup>32</sup>

Obese children and adolescents (BMI  $\geq$  97<sup>th</sup> percentile) should be evaluated for obesity-related comorbidities or

complications.<sup>32</sup> Overweight children (BMI  $\geq$  90<sup>th</sup>-97<sup>th</sup> percentile) may also be screened for comorbidities if there is a strong family history of diabetes and other obesity-related morbidities.<sup>32</sup>

#### *Inadequate Growth: Indications for Intervention<sup>26</sup>*

These relate to: 1) Crossing down of 2 growth percentiles over 3 months in a child  $<2$  years and over 6 months if the child is between 2-6 years; 2) Inadequate growth or weight gain for  $>1$  month in a child  $<2$  years; and 3) Weight loss or no weight gain for a period  $>3$  months in a child  $>2$  years.

### Conclusion and Summary of Recommendations<sup>38</sup>

Growth monitoring can demonstrate normal size and growth to allay anxieties related to perceived size, identify abnormal growth patterns that suggest underlying disease, and guide healthy and appropriate growth. The commonly used indices to assess growth status are height-for-age, weight-for-age and weight-for-height or BMI. Low weight for height or BMI can indicate malnutrition or under-nutrition, while high weight for height or BMI can indicate obesity, and low height for age can indicate stunting. Timely measurements and accurate plotting on the relevant growth charts can enable physicians to assess the child's growth and help guide appropriate interventions where necessary.

### Resources

Royal College of Paediatrics and Child Health:  
<http://www.rcpch.ac.uk/>

National Health Care Group growth charts:

- [https://www.nhgp.com.sg/Our\\_Services/General\\_Medical\\_Services/Child\\_Health\\_Services/](https://www.nhgp.com.sg/Our_Services/General_Medical_Services/Child_Health_Services/)
- <https://www.nhgp.com.sg/uploadedFiles/.../BMI%20CHART%20FOR%20BOYS.pdf>
- <https://www.nhgp.com.sg/uploadedFiles/.../BMI%20CHART%20FOR%20GIRLS.pdf>

Assessment tools such as stadiometers and scales growth charts, among others, may be obtained via the following websites:

- <http://www.progress.com.sg/product/seca-217-stadiometer/>
- <http://equipmedical.com.sg/catalog/seca/#all>
- <http://www.healthprofessionalsolutions.com.au>
- <http://www.stadiometer.com/>
- <http://amamedicalproducts.com.au>
- <http://www.detecto.com/product-family/stadiometers/>

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