3.4 Growth

3.4.2 Growth faltering

Background
Altered growth velocity in infants and children has been traditionally described by the term ‘failure to thrive’. More recently the preferred terms are growth faltering, slow weight gain or under-nourishment, as “failure” to thrive has been associated with negative connotations of parents failing in their job as care providers.¹

The expression ‘to falter’ means to hesitate. Faltering growth is an observation, without value judgement, of slower than expected rate of growth along an infant’s previously defined growth curve.² Faltering growth is usually identified by measuring changes from normal in weight gain. Other indicators for growth faltering can be gained from physical examination of the child, and consideration of a range of contributing factors. Observable indicators may include changes in muscle bulk and tone, the child’s level of activity, alertness, response to carers, and reported changes in intake and output.³

It has been suggested that faltering growth affects 5% of children under 5 years of age across all social classes,¹ although in Australia it is more prevalent amongst Aboriginal infants and children in remote areas.² It often manifests within the first 15 months of life, with most incidences occurring from 3 - 12 months.

While an essential element of faltering growth is suboptimal growth or weight gain⁴ or low weight velocity, assessment must also take into account factors of not only growth, but the child’s developmental progress, overall health and wellbeing, nutritional intake, social/emotional and environmental factors, and family history to enable a holistic view of the underlying causes. Effective and specific management strategies can then be utilised to provide positive outcomes for the child. The Community child health nurse (CCHN) should use professional judgement to make informed decisions in relation to each child’s circumstances.³

Effects of faltering growth

Short term
In the short term, growth faltering can interrupt the immune response, increasing the risk of severe infection and infant mortality. Furthermore, continued growth faltering may cause ongoing growth deficits, delay in cognitive and psychomotor development, diminished physical activity, behaviour problems and learning disabilities.⁵⁻¹⁰
Long term

Adequate nutrition is paramount for normal growth and development, especially in the early years of life. During the first two years, brain growth is rapid. Adverse emotional and intellectual outcomes have been seen in individuals where growth has faltered in infancy. Being undernourished during the first two years of life and then gaining weight in later childhood and adolescence has been associated with a high risk of chronic disease. Long-term effects may be an outcome of the individual’s foetal and infant phenotype becoming biologically adapted to under-nutrition and then being exposed from age three or four years to a nutritional environment of high fat and refined carbohydrate. In this scenario the biochemical and phenotypic features of metabolic syndrome emerge in early adult life: insulin resistance, hyperglycaemia, hyperlipidaemia, hypertension, and central adiposity. Morbidity and mortality from macro-vascular disease is frequently seen in the young-middle aged Australian Aboriginal population (35 to 55 years), and is one of the main causes of their reduced longevity.

There is however, a relative lower rate of morbidity and mortality if weight is regained during the first two years of life. This is due to the tendency for weight gained in infancy to convert to lean body mass, while weight gained in later childhood produces fat mass.

Further to this, being undernourished, having poor growth and/or stunting during the first two years of life is associated with lower educational achievements and smaller offspring.

Risk factors and possible causes

Growth faltering occurs due to the child’s food energy intake (Kj per day) being insufficient for the biological needs for growth. The child is therefore undernourished. Occasionally, this occurs due to the child having an increased food energy requirement due to an underlying medical condition. In approximately 5% of growth faltering cases the cause is gastrointestinal disease, neurological disorder or congenital heart disease. However, the majority of reasons for under-nutrition may be related to combinations of feeding difficulties and or a social/emotional problems such as parent-child relationship difficulties or other illness.

A number of risk factors have been identified which contribute to faltering growth in early childhood. These include maternal factors such as:

- domestic violence
- single motherhood
- alcohol and drug abuse
- psychiatric illness including attachment disorder, and
- smoking, alcohol, or medication use during pregnancy.
Infant risk factors include:

- intrauterine growth retardation
- congenital disorders
- physical illness
- feeding difficulties, and
- sleep difficulties.\(^{15}\)

Growth faltering may occur in circumstances where there is poor or disorganised parental/child attachment or a lack of emotional nurturing. Contributory factors may include family conflict, parental depression and/or anxiety, family social isolation, parental intellectual incapacity, eating disorder or where there is a family history of inadequate nurturing. In families where there is a disorganised/disruptive or chaotic lifestyle, parents are alcohol or substance dependent, or there are issues of poverty or a large number of family members, children may miss out on adequate intake.\(^1\)

Within Aboriginal families, growth faltering often occurs at around 6 months of age when infants are transitioning to solids which are inadequate in both amount and quality. In remote Aboriginal communities other factors such as chronic infection and parasite infestation may further exacerbate the prevalence of underweight, stunting and wasting.\(^2\)

Complexities with feeding patterns which may contribute to under-nutrition include:

- Compromised sucking ability, or decrease in milk transfer
- Delay in introduction of solids, whereby an over-dependence on milk occurs and resultant non-acceptance of solid foods
- Low appetite or lack of eagerness to eat, including food refusal
- Oral health issues
- Parent/carer insensitivity to developmental needs, where the child is not encouraged to self-feed, make a mess, or is offered inappropriately sized food pieces
- Some children who have previously faltered in growth may show feeding difficulties such as holding food in their mouth, spitting food out or vomiting.\(^1\)

Identifying faltering growth

Monitoring of growth is an important means to identify whether a child is growing and developing normally or deviating from normal parameters. Growth monitoring is especially important during infancy to detect and monitor slow or excessive growth, check the impact of illness and treatment, and to identify or monitor those at higher risk.\(^{16}\)
For growth monitoring to be meaningful, serial measurements should be taken and plotted onto a growth chart over a period of time. Along with growth measurement, the child should always be assessed according to their overall health, wellbeing, and developmental progress. Consideration of the combined factors of overall rate of growth, or growth trajectory, the actual position on the growth chart, and clinical judgement, including a knowledge of the child’s history, are required to determine whether further investigation is required.

**Definition**

A working definition for faltering growth is of a growth velocity which is lower than required to maintain the child’s position on their percentile track. When growth falters due to malnutrition, the weight slows first followed by the length, and in severe circumstances the rate of increase of the head circumference will also be affected. Growth faltering is also evident when the weight, length/height and head circumference are not tracking in proportion.

International criteria for categories of malnutrition may obscure the true extent of growth faltering because it is a dynamic process which requires for its identification the ability to calculate and interpret a minor deviation in growth velocity from multiple repeated measurements of weight and length.

**Relevance of trajectories and standard deviation**

For a normally distributed population, 66.5% of measures fall within 1 standard deviation (SD) and 95.5% within 2 SDs of the mean. Identification of growth faltering is from an assessment of the degree of deviation of weight or height from the normal trajectory. Growth faltering corresponds to a fall in growth of 0.5 SD score or more for weight or length between two measures taken at an interval of 12 weeks, or less for an infant under 12 months of age. This calculation is commonly used by paediatric specialist services, and is a clear indication for further assessment and nutritional intervention (Boulton J. 2014, personal communication, January 31).

The World Health Organization (WHO) have developed chart-based broad cut off indicators to classify population prevalence of malnutrition, stunting, wasting and poor growth in children as summarised below. These are frequently quoted and can be useful in identification of growth faltering. However, these classifications have limitations, and are not diagnostic determinants. Growth charts should always be used in conjunction with an overall clinical assessment of the child being measured.
Table 1: WHO Cut-off indicators for growth faltering

<table>
<thead>
<tr>
<th>Growth status</th>
<th>Indicator</th>
<th>Percentile 0-2 years</th>
<th>Percentile 2-5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Weight for age</td>
<td>&lt;3rd</td>
<td>&lt;3rd</td>
</tr>
<tr>
<td>Severe underweight</td>
<td>Weight for age</td>
<td>&lt;0.1st</td>
<td>&lt;0.1st</td>
</tr>
<tr>
<td>Stunting</td>
<td>Length/height for age</td>
<td>&lt;3rd</td>
<td>&lt;3rd</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>Length/height for age</td>
<td>&lt;0.1st</td>
<td>&lt;0.1st</td>
</tr>
<tr>
<td>Wasting</td>
<td>Weight for length</td>
<td>&lt;3rd</td>
<td>-</td>
</tr>
<tr>
<td>BMI for age</td>
<td>-</td>
<td>&lt;3rd</td>
<td></td>
</tr>
<tr>
<td>Severe wasting</td>
<td>Weight for length</td>
<td>&lt;0.1st</td>
<td>-</td>
</tr>
<tr>
<td>BMI for age</td>
<td>-</td>
<td>&lt;0.1st</td>
<td></td>
</tr>
</tbody>
</table>

CCHNs should conduct additional monitoring, and referral should be considered when the direction of growth tracks downwards within or across a percentile, or if weight plateaus. This is particularly important with the WHO charts as there are fewer percentiles on the charts when compared to CDC charts. Significant weight loss can occur yet only 1 percentile may be crossed. Therefore the previous rule of thumb, whereby a cause for concern is flagged when growth trajectory crosses 2 or more percentiles is no longer valid with the WHO charts.

Weight assessment

Serial weight assessments are useful to monitor changes in weight over time. Measures tracking along a percentile are usually not a concern, even if they are low. Weight tracking downwards within one percentile indicates weight loss and additional monitoring should occur, with referral made if necessary.

Length/ height assessment

Serial length assessment can detect a long term cumulative effect of growth faltering which has resulted in stunting. This may be due to persistent malnutrition. A child whose adjusted stature is less than expected should be investigated further. Genetic disorders may also alter a child’s length velocity e.g. Trisomy 2, Prader-Willi syndrome.

Head circumference assessment

Head circumference assessment is important for the detection of abnormalities in head growth and brain development. Serial measurement is particularly important in the first two years of life. Prior to age 36 months the head circumference increases rapidly however after 36 months the growth slows. Growth deviations in head circumference are not usually related to nutritional intake, except where there is long term malnutrition. Deviation is more likely due to non-nutritional factors which may impact on brain growth, for example, craniosynostosis. Some intracranial expansion conditions may be detected through changes noted in serial head circumference assessment. Small or diminishing head circumference may serve as an indicator of poor brain development for some disorders such as those within the foetal alcohol spectrum.
Care should be taken when plotting and interpreting measurements to ensure abnormal growth patterns are identified. Tracking downwards for weight is more common and more easily rectified than length/height or head circumference. If tracking downwards occurs in length/height or head circumference, further investigation is warranted. However, all measurements which begin to track downwards should be monitored accordingly.

**Typical trends in suboptimal growth velocity**

The graphs outlined below show examples of typical patterns of suboptimal weight velocity, which may be encountered within child health practice settings. All of these patterns indicate a need for additional monitoring, consideration of a combination of anthropometric measures and assessment of overall health, wellbeing, and developmental progress. Clinical judgement, including knowledge of the child’s history will assist in determination of plan of action.

The example below shows weight tracking well until 4-6 months, then gradual tracking downwards across a percentile. Common contributing factors to this trend may include environmental and/or biological factors leading to inadequate intake.

![Weight-for-age GIRLS](image-url)

**Weight-for-age GIRLS**
Birth to 2 years (percentiles)

[Image of graph showing weight-for-age growth charts for GIRLS from birth to 2 years.]
The example below shows weight tracking well then a rapid weight loss. Biological factors such as acute illness may commonly contribute to this pattern.

**Weight-for-age GIRLS**

The example below shows weight tracking well to 6 months, then becoming static, tracking downwards across a percentile as the infant’s weight plateaus. Investigation of a range of possible biological, environmental or nutritional contributing factors is warranted to elicit reason for this trend.

**Misdiagnosis**

To avoid misdiagnosis of growth issues it is important to note a number of factors:

- If an infant is large at birth then their growth curve may move to a lower percentile. Hence, these infants may not follow the same percentile from birth.\(^1\)
Children with constitutional delay in growth, premature infants, or children of genetically small parents may also show suboptimal growth velocity on the growth charts when they may not be actually faltering in growth.

It is therefore paramount a full assessment is taken considering the overall health and wellbeing of the infant/child.³

**General principles**

The relationship between the CCHN and the family plays a crucial role in promoting healthy outcomes for children.

Assessing infants and children in collaboration with their parents/carers at key developmental stages as part of the Universal child health contact schedule enables the CCHN to:

- Conduct serial growth measurements and developmental assessments to monitor growth patterns important in identification of deviation from healthy growth trends.
- Recognise variations in growth at an early stage, thus facilitating earlier interventions with potential improvement of long term outcomes for the child.
- Support parents to be actively involved in their child’s growth and development, especially when deviation occurs, thus improving parent understanding and efficacy in their role.
- Provide information to parents in response to specific concerns.
- Provide opportunities to increase parent awareness and knowledge of their child’s growth and development through delivery of key messages about parenting strategies, childhood growth and promotion of health.
- Promote positive parent-infant attachment and parent/infant/child interaction.

It should be re-emphasised that growth monitoring and early detection of deviation from normal expectations is not based solely on screening tools or limited to one point of time, rather should form part of a continual growth and developmental surveillance program and involve holistic assessment and observation of all relevant available information about a child.

Serial growth monitoring in conjunction with developmental assessment is important to identify deviation from normal expectations.²⁷ Where growth faltering is identified, further assessment should be undertaken to determine the underlying cause so that appropriate strategies can be placed to address the child’s needs. Early intervention will contribute to a decrease in the incidence of associated health concerns in later childhood and adulthood.
Role of community health professionals

Growth monitoring of infants and young children should be conducted as an integral component of the universal child health schedule as outlined within the Community Health Policy, Procedures and Guidelines manual.

Universal serial growth assessment should be undertaken at key critical developmental stages with the aim of confirming healthy growth, and for the early detection and prompt attention to any deviation from normal expectations.

Targeted growth assessment should undertaken more regularly where there is parental or professional concern regarding growth or development, or where there is any identified risk. Along with measurements the child should be assessed according to their overall health, wellbeing, treatment plan and progress at each schedule.

Key points for assessment of growth faltering

- Obtain accurate physical measures.
- Select appropriate percentile growth chart and accurately plot these measures.
- Conduct detailed physical assessment to illicit additional associated concerns, and possible contributory factors. Growth charts are not intended to be used as sole diagnostic or screening instruments.
- Correctly interpret percentile growth charts to parents.
- Children at risk of growth faltering should have a combination of anthropometric measures undertaken.\(^3\)
- Targeted growth monitoring should be conducted where relevant risk factors are identified.
- Laboratory testing to identify faltering growth is generally not recommended.\(^3\)

Key points for management of faltering growth

- The course of action for management will vary according to the cause of the faltering growth and presenting factors.

- Any assessment should be followed by appropriate actions:
  - Motivate, support and/or reinforce positive parental practices.
  - Provide appropriate brief interventions.
  - Refer to appropriate health professionals for further assessment and follow up where indicated.
  - Provide support for the family to develop achievable goals to manage identified health issues.

- Where significant deviation in growth velocity occurs, accompanied by symptoms of acute illness, including dehydration or infection, the child should have prompt referral to a medical practitioner or acute health facility.
• In the absence of an underlying medical condition, undernutrition should be the management focus of growth faltering. It is essential to reduce the short and long term impact by identifying the underlying cause.²

• Nutrition assessment and counselling with parents will assist in identification and management of any contributory feeding difficulties.³

• With a successful intervention in place, catch-up growth may occur within 4-8 weeks with weight tracking upwards on the percentile.²⁸ For children without a medical reason for poor growth, some will re-establish healthy growth rates with nutrition intervention, but for others poor weight gain persists.¹⁹

• Based on holistic assessment findings, referral may be made to a range of additional health professionals or other services for further assessment and support. Relevant health practitioners may include:
  o medical practitioner
  o paediatrician
  o dietitian
  o speech pathologist
  o other allied health professionals as appropriate
  o lactation consultant
  o Princess Margaret Hospital Feeding Services.

  A range of other agencies may offer support where disruption to family functioning is impacting on the child’s growth, including:
  o Department for Child Protection and Family Support – where child protection issues are of concern, referral may be indicated even in the absence of carer consent
  o Mental health services
  o Recognised non-profit organisations offering parenting support.

Unfortunately there is limited Australian evidence regarding the implementation of interventions and the best management approach for growth faltering. An article on Aboriginal infants and children in Northern Territory determined the best approach would be to include community-based nutrition counselling that focuses on nutrition behaviour change and interventions that are well integrated into primary health care systems. Further to this, determining the reason for the growth faltering and exploring this issue with parents is of great importance.²

In a recent review of the current international research, regular home care follow-up along with basic nutrition assessment can support families; resulting in increased dietary intake. Similar findings were found when follow-up occurred in a multidisciplinary clinic. Researchers indicated for the success of home care programs to occur there would have to be access to specialist input, particularly for severe or complex cases, with the most likely input being from a dietitian.²⁸
Documentation

All relevant assessment findings are to be accurately recorded on the appropriate growth chart located within the Child Health Record and Personal Health Record (PHR). Details of additional assessments and relevant history should also be clearly recorded. Summary information should also be entered into relevant electronic record systems according to local protocols. CCHNs should refer to the appropriate record keeping guidelines for documentation storage and use.

For those CCHNs using HCARe clinical services data collection, growth assessment is recorded as a component of each scheduled universal contact using the health issue code for that contact.

For non scheduled additional contacts dedicated codes are used. These are outlined on the CACH website, under HCARe coding guidelines.

Should a referral be required, physical and developmental assessment results and relevant history should be included to provide more relevant information.

Follow-up

Following growth assessment, the CCHN together with the parent should develop a plan outlining frequency of follow up and referral needs. This plan will be determined by the results of the assessment which contributes to identification of the needs of the client. The parent/caregiver and, where appropriate, other family members should be involved in the development of the plan, ensuring service provision is coordinated and comprehensive.

For children requiring additional monitoring, parameters should be determined in relation to the needs of the child, and for the duration required.

Children identified as requiring referral to specialist services should be directed to appropriate public or private services as available. CCHNs should maintain links with the referral services to ensure the needs of the client are being met. When specialist services are unavailable or inappropriate, the client may be offered continuing community health contact as appropriate and where resources are available.

Clinical Pathways for growth are a useful guide to assist in determination of monitoring needs and direction of referral. Management plans will vary according to the contributing factors.

Once consistent growth improvement is established, the child may be returned to the universal contact schedule.

Alternatively, a targeted monitoring schedule may be used where ongoing risk is identified. The Enhanced Aboriginal Child Health Schedule is an example of a targeted schedule which offers an increased number of contacts for Aboriginal children at identified risk. The CHN should:

- Follow-up on specific concerns which were identified at baseline assessment.
- Ensure screening and follow-up of children in the same household where appropriate.
• Continue to provide prevention information.
• Discuss options for additional care if required by parents.

Monitoring of growth should continue until the child enters school.

If growth faltering recurs, then further plans should be developed with the parent/carer, including additional monitoring and support by the CCHN and/or referral to relevant health professionals.

**Related professional development**

<table>
<thead>
<tr>
<th>Using WHO growth charts eLearning package</th>
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<tr>
<td>The Royal Children’s Hospital Melbourne Child growth learning resource</td>
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**Related policies, procedures and guidelines**

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<th>3.4.1 Growth in childhood</th>
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<td>3.4.4 Iron deficiency anaemia</td>
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<td>6.1.3 Growth monitoring</td>
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<td>3.8.5 Guide to completing a physical assessment of an infant and child</td>
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<td>3.8.6 How children develop</td>
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Clinical Pathway. Universal Child Health Services: Weight and Growth Referral and Follow Up

**Useful resources**

Infant Feeding Guidelines
Royal Children’s Melbourne Hospital Growth Charts e-learning package

**Policy Owner**
Director Statewide Policy Unit.

**Portfolio**
Birth to School Entry

**References**


