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Departments of General Paediatrics and Dietetics

Faltering Growth – Guideline for assessment and management for infants and children under 2 years

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Algorithm for Management of Faltering Growth in Infants and Children

Algorithm for Management in Emergency Department and Urgent Care Setting

Aim

To provide an evidenced based guide to assist in the identification, assessment and management of children with Faltering Growth.

Definition of terms

Faltering Growth (FG)

Oral Nutrition Support (ONS)

Food Fortification (FF)

Enteral Feeding / Nutrition (EN)

Target Patient Population

Infants and children under age 2 years.

Target Users

This guide is directed at health-care professionals engaged in the care of infants and children under the age of two that are being assessed for FG.

Assessment

What is Normal Growth?

Growth is an important measure of health and wellbeing in infants and children. Some weight loss in the first days after birth is normal and usually relates to body fluid adjustments ¹. This will usually stop after 3-4 days and most will have returned to their birth weight by three weeks ².

The measuring and plotting of weight and length/height on the appropriate growth chart will help to evaluate growth patterns over time. Table 1 displays the typical weight gain per week for infants aged 0-12 months.

Age	Boys (g/week)	Girls (g/week)
0-3 months	240*	210* (ranges 120-350g per week from 0.4 th -99.6 th centile)
4-6 months	130	120
6-9 months	80	75
9-12 months	65	60

Table 1: Typical weight gain per week for infants aged 0-12 months³

*NOTE: Some breastfed infants may have lower rates of weight gain in the first three months of life

*NOTE: The above relates to the infant/child who is growing along the 50th centile.

Children aged 1-2 years typically gain 2-2.5kg over the period of one year ⁴.

Length increases by ~50% from 0-12 months. Thereafter typically a child will grow by ~25cm in the 1st year of life and 12cm in the 2nd year of life.



Definition of Faltering Growth

The term 'faltering growth' is used to describe a pattern of slower weight gain than expected for age and sex in infants and preschool children, and it is most often due to inadequate nutritional intake ¹. Only 5% of children with FG will have an underlying medical condition⁵. The agreed thresholds for FG ¹ are:

- A fall across one or more weight centile spaces if birth weight was below the 9th centile
- A fall across two or more weight centile spaces if birth weight was between the 9th and 91st centiles
- A fall across three or more weight centile spaces if birth weight was above the 91st centile
- Current weight below 2nd centile regardless of birth weight

A weight greater than two centile spaces below length/height centile is also considered a concern for FG².

Anthropometry and Plotting

One-off measurements show a child's size but not their growth. Birth weight is not necessarily representative of the genetic potential for future growth. Thus, there is generally no cause for concern if a baby is healthy and gaining weight but tracking along a lower centile than the birth weight. Length and head circumference should also be plotted for each child on a growth chart.

It is recommended that all healthcare professionals involved in the measuring and plotting of anthropometric measurements of children undertake the e-learning programme "Growth Monitoring" available at www.hseland.ie. Additional resources on measuring and plotting children are available at www.hse.ie/eng/health/child/growthmonitoring. Here you will find videos on how to take anthropometric measurements, as well as the most commonly required growth charts.

Plotting

Growth charts provide a visual representation of growth over time and are an indication of where a child's weight or length/height sits in relation to population norms for that age. The following growth charts are recommended for children:

Growth Chart	Age Category / Criteria
UK-WHO Neonatal and Infant Close Monitoring Growth Chart (Boys/Girls)	23 weeks' gestation to 2 years corrected age and those 0-2 years requiring close monitoring
UK-WHO Growth Chart 0-4 years (Boys/Girls)	0 to 4 years born > 32 weeks
Disease specific growth chart	Children with medical conditions that has its own growth chart

Correct for prematurity for up to:

- 2 years for infants born < 32 weeks
 - 1 year for infants born 32-36 weeks
- No gestational correction is required for term infants born 37-42 weeks.

Disease specific charts exist for the following conditions:

Down Syndrome	Cerebral Palsy
Williams Syndrome	Achondroplasia
Turners Syndrome	Prader-Willi Syndrome
Marfan Syndrome	Sickle Cell Disease
Noonan Syndrome	Wolf Hirschhorn (0-48 months)

Physical Examination

Physical examinations (child undressed to nappy) can be used as part of the assessment for FG; they can also help identify possible signs of undernutrition including:

- Thin hair
- Poor skinfold thickness (reduced subcutaneous fat store)
- Signs of loss of muscle bulk particularly in the upper arm, buttocks and thighs.

A visual and physical examination will also provide valuable information in the assessment for FG:

- Does the child appear sick, irritable or lethargic? Respiratory distress, jaundice, cyanosis, pallor
- Are there any dysmorphic features? Trisomy 21, Turner Syndrome, Russell Silver Syndrome, 22q11 deletion
- Developmental delay, regression or syndromal causes of poor growth
- Organomegaly or palpable mass on abdominal examination. Inspection of the anus for fissure or fistula formation
- Parent / child interactions
- Signs of abuse or neglect

Medical history

- Antenatal complications and maternal health
- Birth weight, length and head circumference
- Significant intercurrent illnesses coinciding with onset of poor growth
- Vomiting and diarrhoea
- Parental ethnicity and stature
- Refugee or recent immigrant background
- Onset at 6 months or at the time of weaning consider Coeliac Disease

Investigations

Investigations may be required if the initial assessment identifies relevant signs or symptoms:

First Line Investigations	
Full Blood Count, Ferritin	To investigate for anaemia or low lymphocyte count (SCID)
Renal, Liver, Bone profile + glucose	To assess renal function and posterior urethral valves To investigate for diabetes insipidus
Thyroid Function Tests	To investigate for hyperthyroidism (may be transient)
Coeliac screen (IgA and tTG)	To investigate for coeliac disease (if FG occurs post-weaning)
Urinalysis	To assess hydration status To investigate for type 1 diabetes or urinary tract infection Urine microscopy in under 1 year

Investigations in OPD	
Sweat test	To investigate for Cystic Fibrosis
Vitamin D	To investigate for rickets (consider ethnicity)
Karyotype	To investigate for Downs, Edwards or Turner Syndrome
Chest x-ray*	To investigate for Cystic Fibrosis or Congenital Heart Disease
Stool analysis*	To investigate for parasite infections or malabsorption

** investigations may be clinically indicated in ED/Urgent care*

Diet History

A detailed feeding history and direct observation of feeding may help to identify if there are non-organic causes of FG²:

The dietitian will carry out a detailed diet history.

Non-organic causes of FG
<ul style="list-style-type: none"> • Inadequate intake of energy • Reduced appetite • Dental caries • Impaired progression through weaning • Poor parent-child interaction • Learned food aversion



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- Child management / coercive behaviour
- Parental anxiety re: insufficient weight gain and feeding problems
- Cultural beliefs / attitudes
- Family difficulties
- Poverty

Key Nutrients to identify in diet history ^{6,7}:

Energy	Carbohydrates and fat sources
Protein	Dairy, meat (red and white) and vegetarian sources
Vitamin D	Supplements and dietary sources
Calcium	Dairy and fortified milk-free sources
Iron	Meat (red and white) and vegetarian sources
Micronutrients	Vitamins and minerals in food and fluids

Refer to the table below to assess fluid intake as part of the medical review and diet history.

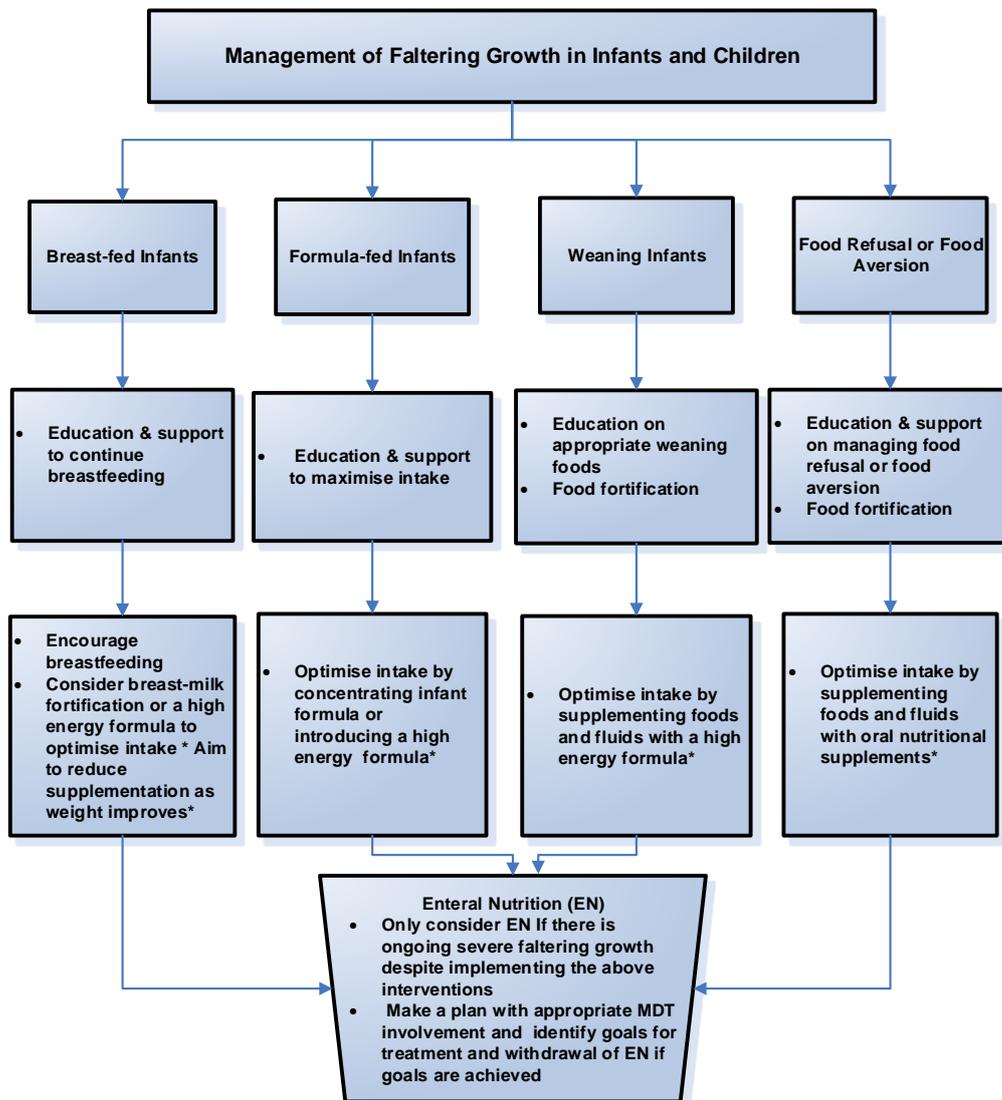
Age	Approx. Weight (kg)	Fluid (ml/kg)
Premature	1-2	150-200
0-6 months	3-8	150
7-12 months	6 – 10	120
1- 2 years	11-20	100ml/kg for the first 10kg + 50ml/kg for the next 10kg

Table 2 Fluid requirements for infant and children ages 0-2 years⁶

Management

Medical and dietary assessment should help to determine the cause(s) for FG which can be addressed. The following algorithm outlines a pathway for the management of FG in infants and children. The dietician will advise on the most appropriate management strategy for the infant or child.

Figure 1: Algorithm for Management of Faltering Growth in Infants and Children



*Under the direction of a dietitian only

Special Considerations

Red Flags

Involvement of the Social Worker if there are **any** child protection concerns, or they **may** be required if there are social issues identified.

If any of following are found in an infant or child with FG, onward referral to an appropriate paediatric specialist care service should occur:

- Signs of abuse or neglect
- Signs of family or social vulnerability e.g. parental intellectual disability, non- English speaking carer, social isolation ^{1,2}
- Rapid weight loss or severe undernutrition
- Signs of dehydration
- Signs of malnutrition or significant illness
- If an infant is not gaining appropriate weight on two consecutive occasions, despite intervention



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Monitoring

Monitor weight if there are concerns about FG but be aware that weighing children more frequently than is needed is unhelpful and may add to parental anxiety. If there are concerns about FG, measure the weight at appropriate intervals taking account of factors such as age and the level of concern, but usually no more often than:

Less than one month old	Daily (as patients)
1-6 months old	Weekly
6-12 months old	Fortnightly
>1 year old	Monthly

Ongoing Assessment

Regularly reassess infants and children receiving an oral nutritional supplement for FG to re-evaluate the ongoing need for supplementation.

Assess the following:

- weight change
- linear growth
- intake of other foods
- tolerance
- adherence
- the views of parents or carers

Links to useful websites

- HSE Growth Monitoring Recommendations - www.hse.ie/eng/health/child/growthmonitoring.
- [HSE Nurture Programme](https://www.hse.ie/nurtureprogramme) <https://www.hse.ie/nurtureprogramme>
- Growth Charts for Cerebral Palsy <http://www.lifeexpectancy.org/articles/GrowthCharts.shtml>
- Growth Charts for Williams <https://williams-syndrome.org/growth-charts/growth-charts>

Links to Companion Documents

References

[Algorithm for Management of Faltering Growth in Infants and Children](#)

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UK- WHO (Ireland) growth charts (0-4years):

- [Growth Chart, Boy, 0-4 Years \(1\)](#)
- [Growth Chart, Boy, 0-4 Years \(2\)](#)
- [Growth Chart, Girl, 0-4 Years \(1\)](#)
- [Growth Chart, Girl, 0-4 Years \(2\)](#)

Neonatal and Infant Close Monitoring Charts

- [NICM Boy Growth Chart \(1\)](#)
- [NICM Boy Growth Chart \(2\)](#)
- [NICM Girl Growth Chart \(1\)](#)
- [NICM Girl Growth Chart \(2\)](#)