Welcome to
Allied Health Telehealth Virtual Education

Paediatric Malnutrition and Faltering Growth

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Children’s Hospital at Westmead

Please complete your online evaluation at https://www.surveymonkey.com/r/fgrowth
Outcomes

- Accurately identify and assess faltering growth and malnutrition
- Understand and apply Malnutrition Screening to the paediatric population
- Effectively manage a child or adolescent with faltering growth or under-malnutrition

NSW Ministry of Health - Nutrition Care Policy

Malnutrition: ‘A state in which a deficiency, excess or imbalance of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition), function or clinical outcome’

“undernutrition”
- Descriptive term rather than a diagnosis
- Other terms – growth failure, growth faltering, slow weight gain, failure to thrive, poor growth
- Often multifactorial
- For funding purposes in hospital documentation use “malnutrition”
Definitions

Traditionally
• Height or weight < 3rd percentile band
• Height or weight falling 2 percentile bands
• Weight below height by ≥ 2 percentile bands
• Weight < 80% of ideal weight for height

Diagnosis Related Group (DRG)
• Uses standard deviations below mean (z scores) to define severe, moderate or mild protein energy malnutrition
• Weight loss or clinical judgement can also be indicative
Both height and weight need to be assessed

- Weight gain is usually affected first but if problem persists, height can be affected
- Wasting (acute) = Low weight for age or decreasing weight centile
- Stunting (chronic) = Low height/length for age or decreasing height centile, may indicate chronic poor nutrition

Example of Wasting
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Paediatric Malnutrition

Prevalence
• 15% of Australian Paediatric inpatients are malnourished
• 44% are at risk of malnutrition

Implications
• Loss of lean body mass
• Muscle weakness
• Developmental or intellectual delay
• Infections
• Immune dysfunction
• Delayed wound healing
• Prolonged hospital stay

White et al, 2015
Mehta et al, 2013

Example of Stunting
Malnutrition Prevalence

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>National Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Patients Included (n=)</td>
<td>1175</td>
</tr>
<tr>
<td>Eligible Patients (n=)</td>
<td>832</td>
</tr>
<tr>
<td>Malnourished BMI Z-scores ≤ -2</td>
<td>15%</td>
</tr>
<tr>
<td>Wasting Weight-for-age Z-score ≤ -2</td>
<td>13.8%</td>
</tr>
<tr>
<td>Stunting Height-for-age Z-score ≤ -2</td>
<td>11.9%</td>
</tr>
<tr>
<td>Overweight 85%-95%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Obese ≥95%</td>
<td>9.9%</td>
</tr>
</tbody>
</table>

White et al. 2015

Nutrition Screening

- At CHW nutrition screening occurs on admission for every patient admitted using the Paediatric Nutrition Screening Tool (PNST)

- PNST is the only validated malnutrition screening tool in Australia for paediatrics

- The PNST will form part of the admission assessment procedure and will be predominately completed by nurses on the ward, however any health professional can identify a patient as at risk of malnutrition

Mandatory for all NSW Health Facilities
Validated Paediatric Nutrition Screening Tool (PNST)

1. Has child unintentionally lost weight lately? Yes/No
2. Has child had poor weight gain over the last few months? Yes/No
3. Has child been eating/feeding less in the last few weeks? Yes/No
4. Is child obviously underweight/significantly overweight? Yes/No

White et al 2014

Paediatric SGNA

<table>
<thead>
<tr>
<th>Muscle wasting</th>
<th>Clavicle</th>
<th>Pectoral muscle</th>
<th>Shoulder (pectoral muscles)</th>
<th>Scapula - All the muscle groups around the</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look along line of the clavicle. The smaller the muscle mass the more prominent the bone.</td>
<td>Prominence of bone</td>
<td>Prominence of bone</td>
<td>Prominence of bone</td>
<td>Prominence of bone</td>
</tr>
<tr>
<td>Shoulder-to-arm joint looks square. Bones prominent. Axillary protrusion quite prominent</td>
<td>Scapula bone is not prominent. No impressions around</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Secker & Jeejeebhoy, 2012
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Paediatric SGNA

- Uses pt Hx, clinical symptoms, and a physical assessment
- Validated to identify malnourished children and those at risk of longer hospital stay
- Need to be able to conduct a physical assessment to assess muscle and fat wasting – training required
- All sections of the form do not need to be filled in
- Gives a rating of normal, moderate and severe
- Adult SGA is not validated in paediatrics

Secker & Jeejeebhoy, 2012
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Paediatric Malnutrition

Under-nutrition, growth faltering, slow weight gain or failure to thrive OFTEN MULTIFACTORIAL

<table>
<thead>
<tr>
<th>Potential Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inadequate Intake</strong></td>
</tr>
<tr>
<td>Inability to consume food/drink – poor oral skills, dysphagia, Oral aversion – force feeding/pain Maternal neglect, depression, poverty, food insecurity Check infant formula recipe</td>
</tr>
<tr>
<td><strong>Excessive Loss</strong></td>
</tr>
<tr>
<td>Vomiting, reflux, diarrhoea</td>
</tr>
<tr>
<td><strong>Inability to digest or absorb nutrients</strong></td>
</tr>
<tr>
<td>Coeliac disease, Cystic Fibrosis, Chronic inflammation, Short gut</td>
</tr>
<tr>
<td><strong>Inability to fully metabolise nutrients</strong></td>
</tr>
<tr>
<td>Metabolic diseases e.g mitochondrial disease</td>
</tr>
<tr>
<td><strong>Increased requirements</strong></td>
</tr>
<tr>
<td>Increased work of breathing, cardiac issues, chronic infection</td>
</tr>
</tbody>
</table>
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Pulling it all together - baby <1 year

Diet history
- How often does the baby feed?
- How much does he/she drink? (how do you assess this in a breast fed baby?)
- What other drinks and food?

Cross checks:
- Wet nappies
- Diarrhoea or constipation
- Vomiting
- How settled is the baby?
- How does parent feel about feeding?
- What supports do parents have?

Diet History
From first waking to get up in the morning right around to the next morning
- Record actual times
- Details of what and how much ingested (not offered)
- Include sleeps
- All fluids, including breastfeeds and water
- Food groups by week – cross check

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Plan

- Always aim to establish what is appropriate for the age group if possible
- Appropriate feeding patterns/timing
- Appropriate foods
- Appropriate feeding positions
- Appropriate child-centred feeding behaviors
- Adapt as necessary

Estimated Requirements

- Use appropriate equation i.e. NAP with current wt plus an IF of 1.2 – 1.3 for catch up wt gain or and a DF if appropriate OR use IBW
- If < 3 yrs no activity factor needed
- Over 3 years of age if height not available use Schofield equation
- Can also use the Failure to Thrive Equation (FTT)

FTT Equation - Peterson et al 1984, JADA 1984;84:810-5

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Estimated Requirements

- Use actual weight for protein and fluid

- Protein:
  - ~ 9% of EER or RDI for age
  - Do not exceed 4g/kg/d protein (from term)
  - Check when manipulating formulas – adding CHO can impact on CHO:protein ratio

- Fluid: Use RDI for age
  (NRV's for Australia and New Zealand, 2006)

Assessment

- Is the child meeting their energy, protein and fluid requirements based on your calculations?

- If not what will you do?
  - Depends on age and intake

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How Much Growth to Expect?

<table>
<thead>
<tr>
<th>Age (months)</th>
<th>Weight Gain (g/week)</th>
<th>Length Gain (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>3-6</td>
<td>150</td>
<td>25cm</td>
</tr>
<tr>
<td>6-9</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>9-12</td>
<td>50-75</td>
<td></td>
</tr>
<tr>
<td>12-24</td>
<td>2.5kg/year</td>
<td>12cm</td>
</tr>
</tbody>
</table>

Manipulation of Formula

1. Determine the usual concentration of the formula if formula fed

2. Determine how many calories and/or protein you need to add
   - Difference between required calories/protein and current intake

3. Decide how you will add calories/protein
   - Concentrate, add energy supplements or both
Manipulation of Formula
(role of the dietitian)

General Considerations
• Standard formula provides ~67kcal/100ml.
• Increasing energy usually occurs in 2 stages

80-85kcal/100ml formula can be achieved by either
• Concentrating the formula by 1.2 – 1.3 OR
• Adding an energy supplement such as a carbohydrate or lipid

Can increase to 100kcal/100ml if needed
➢ If breastfeeding can add carbohydrate syrup or lipids via syringe orally before, during or after a breast feed

Manipulation of Formula

Take care when concentrating formula:
• Don’t exceed 4g/kg of protein
• Adding a lot of CHO can increase osmolality and can cause feed intolerance
• LBW formula can become too high in osmolarity
• Follow-on formula – Check protein is not too high

The following formulas should not be concentrated
• Soy formula - Aluminum too high
• AR formula - Too thick, particularly on standing for 24hrs and used for enteral feeds
Children and Adolescents

- Aim to fortify food as a first step

- Can add oral supplements or formulas if required

Women and Children’s Hospital SA Health. 2010
Nutritional plan

- Assess need for NGT or admission
- Always have a plan for NGT removal

Monitoring

- Repeat diet Hx to assess if changes have been implemented - don’t assume they have
- If some progress, give more time before making changes – don’t be ruled by numbers

Biochemistry
- Albumin can be unreliable in acute phase response
- Check vitamins and minerals if relevant, i.e. iron, vitamin D
- Don’t check vitamins and minerals if there is no clinical reason
Case study

- 4.5 month old girl referred for faltering growth due to recent influenza illness
- Growth tracking from birth – 3 months but no weight gain in the past 1.5 months
- Whilst unwell oral intake decreased, however this has not improved since illness resolved
- Formula fed, solids not introduced as yet
Case study

- Currently 5.8kg, 13th centile, length 62.3cm and tracking on the 30th centile.
- Weight previously tracking on the 40th centile
- Usual feeds S26 Gold Newborn standard concentration, only managing 110ml x 6 per day
- Provides:
  - 76kcal/kg, 1.5g/kg of protein, and 113ml/kg

Case study

- EER – 100kcal/kg (NAP x 1.2 IF for catch up)
- EPR – 13g/day (2.2g/kg – 9% EER)
- EFR – 130 – 155ml/kg

- Currently receiving:
  - 76% EER, 68% EPR and 87% EFR
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Case study

Step 1
- 1.2 concentration S26 Gold Newborn orally at a minimum of 110ml x 6
- Provides 91kcal/kg, 1.8g/kg protein, and 113ml/kg fluid
  - 91% EER, 81% EPR and >87% EFR
- Review in 4-7 days and review weight

Case study

Step 1
- After 1 week 5.9kg and only 100g weight gain. However taking 125ml bottles. Further increase of calories required

Step 2
- Increase the concentration to 1.3 conc which will provide 110kcal/kg, 2.2g/kg protein, and 127ml/kg fluid
  - 100% EER, EPR and EFR

Step 3
- After a few weeks her intake and weight improved so were able to resume standard concentration formula as she was having 130ml/kg orally due to improved nutrition and appetite

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Change takes time

A small adjustment to the wheel of an ocean liner takes time to show the ship has changed course

Prof Ian Alexander Metabolic Physician CHW
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References


- Seker DJ and Jeejeebhoj KN. How to perform Subjective Global Nutritional Assessment in Children. J Acad Nutr Diet. 2012;112(3)424-431
SAVE THE DATE
Paediatric Update Day
NUTRITION & DISABILITY
(Tube feeding, blenderised feeds, a safe swallow, the NDIS & case studies)

The Children's Hospital Westmead
Friday 10th March 2017
Program and registration will be released in late 2016

Thank you
Questions?

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