Improving quality of care for severe malnutrition in children at Port Moresby General Hospital

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Introduction

- **Malnutrition**
  - Under nutrition or over nutrition
  - Commonly used to refer to under nutrition

- **Malnutrition (under nutrition)**
  - Moderate or Severe malnutrition
  - Acute or chronic malnutrition

- **Moderate malnutrition**
  - \( WFAz < -2 \text{ SD} \)
  - \( WFHz < -2\text{SD} \)

- **Severe malnutrition**
  - \( WFAz \text{ score } < -3 \text{ SD} \)
  - \( WFHz \text{ score } < -3 \text{ SD} \)
  - \( \text{MUAC } < 115 \text{ mm } (< 11.5 \text{ cm}) - \text{age } > 1 \text{ yr.} \)
  - Presence of nutritional oedema regardless of WFHz score
Introduction

- **Under nutrition**
  - Significant cause of mortality – triggers > 50% of deaths in < 5 yrs. (Younas 2012)

- **Global figures: (UNICEF-WHO 2012)**
  - 162 million children (< 5 yrs.) – stunted
  - 51 million – wasted
  - 17 million – severely wasted
  - Over 90% of these cases – living in Asia and Africa

- **PNG**
  - Severe malnutrition – most important form affecting both adults and children (Passingan 2001)
  - 2012
    - 12.6% of all admissions to all hospitals nationwide due to malnutrition
    - Malnutrition associated with 36% of all deaths
    - CFR of 23.3%
  - 2011
    - CFR = 21%
  - 2010
    - CFR = 18.8%
Aim

- To assess the quality of care provided to children with severe malnutrition.

- To evaluate the effectiveness of a multifaceted intervention to improve the care for paediatric inpatients at PMGH using the PNG and WHO recommended management guidelines for severe malnutrition.
Multifaceted intervention

- **Teaching**
  - Formal sessions – 10 steps & feedback on baseline survey results: March – July
  - Ongoing informal teachings:
  - Teaching on new formulas (F75, F100, RUTF) – June to August

- **Equipment/Supplies**
  - Ensuring adequate supplies of milk
  - Ensuring availability of necessary equipment
  - F75, F100 and RUTF introduced – feed preparation much easier (June)
  - Diagnostic and monitoring equipment donated (July)
  - Feeding timing modified

- **Staffing**
  - Made use of students (medical and nursing) to assist with feeding, taking weights, heights and doing BSL and temperature monitoring
  - Recommend for more nursing staff for the nutrition unit
MANAGEMENT OF SEVERE MALNUTRITION

Checklist

- Check for hypoglycaemia
- Prevent hypothermia
- Treat dehydration if present
- Electrolytes - zinc, potassium, magnesium
- Infection
  - Start antibiotics + albendazole
  - Exclude HIV and TB
- Micronutrients - vitamin A, folate
- **Start milk feeding immediately**
  - At least 6 feeds per day, every 3 hours
  - 130ml/kg/day
  - An 8kg child should receive $8 \times 130 = 1070$ ml per day / 6 = 170ml per feed
  - Continue breast feeding
- Catch-up growth
  - Give Milk Oil Formula (or F-100) increase volume per feed as tolerated
  - Start RUTF
  - Continued breast-feeding
- Sensory stimulation & play
- Monitoring
  - Weigh every 2nd day
  - Good weight gain = 10g/kg/day
- Supportive care - check Hb, start iron*
- Discharge planning
  - Good weight gain consistently for 1-2 weeks, weight >3 Z-scores
  - Good appetite
  - Parents able to feed child
- **Follow-up weekly**

* start iron in 2nd week of treatment
F-75

F-100

eeZeePaste™

Nutriset

F-75 therapeutic milk

F-100 therapeutic milk

Net weight: 95g

eeZeePaste™

102.5 g

114 g

500 ml

500 ml

100 kcal / 100 ml

eeZeePaste™

150 kcal / 100 ml

100 kcal / 100 ml

100 kcal / 100 ml

100 kcal / 100 ml

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Methodology

- Point prevalence surveys

Timeline:
- Baseline survey: February 15-16
- Intervention: March-July
- 1st follow-up survey: August 8-9
- 2nd follow-up survey: planned October
Methodology

The point-prevalence surveys:

- Survey of all paediatric inpatients
- Identified all children with severe malnutrition (primary or secondary, acute or chronic)

Key outcome measures

- Compliance with guidelines
- Initiation of feeding
- Volume and frequency of feeding
- Weight gain (g/kg/day): poor / moderate / good

Permission and ethical approval

- Permission was given by the hospital management through the office of the DMS, PMGH
Methodology

DATA ANALYSIS

- SPSS Version 20 and Open Epi version 2.3 used for analysis.

- Quantitative data stated using
  - Mean and 95% CI – normal distribution
  - Median IQR – skewed distribution (Mann-Whitney U Test)

- Categorical data analyzed using
  - Chi square test (Fishers exact test for data with small numbers)
## Results: Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline survey</th>
<th>First follow up survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total analyzed</td>
<td>43 (34.4)</td>
<td>38 (31.7)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>27 (62.8)</td>
<td>26 (68.4)</td>
</tr>
<tr>
<td>Females</td>
<td>16 (37.2)</td>
<td>12 (31.6)</td>
</tr>
<tr>
<td>Length of stay (days): Median</td>
<td>16 (IQR: 7 – 32)</td>
<td>8.5 (IQR: 5 – 23)</td>
</tr>
<tr>
<td>Admission weight (Kg): Average</td>
<td>7.9 (7 – 8.7)</td>
<td>7.2 (6.4 – 7.9)</td>
</tr>
<tr>
<td>Current weight (Kg): Average</td>
<td>8.1 (7.3 – 8.9)</td>
<td>7.6 (6.9 – 8.3)</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th>Baseline survey (N = 43)</th>
<th>N (%)</th>
<th>First follow up survey (N = 38)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra pulmonary TB</td>
<td>14 (32.6)</td>
<td></td>
<td>6 (15.8)</td>
<td></td>
</tr>
<tr>
<td>Diarrhoeal disease</td>
<td>10 (23.3)</td>
<td></td>
<td>5 (13.2)</td>
<td></td>
</tr>
<tr>
<td>Pulmonary TB</td>
<td>9 (20.9)</td>
<td></td>
<td>8 (21.1)</td>
<td></td>
</tr>
<tr>
<td>ALRTI</td>
<td>4 (9.3)</td>
<td></td>
<td>3 (7.9)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>3 (7)</td>
<td></td>
<td>8 (21.1)</td>
<td></td>
</tr>
<tr>
<td>Primary malnutrition</td>
<td>2 (4.7)</td>
<td></td>
<td>4(10.5)</td>
<td></td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>1 (2.3)</td>
<td></td>
<td>4 (10.5)</td>
<td></td>
</tr>
</tbody>
</table>
## Results – Processes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline survey</th>
<th>First follow up survey</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=43 N (%)</td>
<td>N=38 N (%)</td>
<td></td>
</tr>
<tr>
<td>Treatment of confirmed / suspected hypoglycaemia</td>
<td>10 (25.3)</td>
<td>27 (71.1)</td>
<td>p = 0.00</td>
</tr>
<tr>
<td>Instruction to keep warm</td>
<td>2 (4.7)</td>
<td>14 (36.8)</td>
<td>p = 0.000</td>
</tr>
<tr>
<td>Supplemental potassium prescribed</td>
<td>9 (20.9)</td>
<td>37 (94.4)</td>
<td>p = &lt;0.000</td>
</tr>
<tr>
<td>Albendazole treatment</td>
<td>30 (69.8)</td>
<td>24 (63.2)</td>
<td>p = 0.35</td>
</tr>
<tr>
<td>Zinc</td>
<td>27 (62.8)</td>
<td>38 (100)</td>
<td>p = 0.000</td>
</tr>
<tr>
<td>Multivitamins</td>
<td>31 (72.1)</td>
<td>38 (100)</td>
<td>p = 0.000</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Baseline survey</th>
<th>First follow up survey</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation of feeding: (Average day)</td>
<td>4 (2.7 – 5.3)</td>
<td>3.1 (1.9 – 4.3)</td>
<td>P = 0.193</td>
</tr>
<tr>
<td>Feeding volume given in 24 hours (ml): Median</td>
<td>356ml (IQR: 178 – 450)</td>
<td>820ml (IQR: 600 – 1110)</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>31% (21 – 48%) of required calories</td>
<td>98% (67 – 100%) of required calories</td>
<td></td>
</tr>
<tr>
<td>Median weight gain (g/kg/day)</td>
<td>1.55 (IQR: -4.3 – 6.0)</td>
<td>5.56 (IQR: -3.7 – 12)</td>
<td>P = 0.10</td>
</tr>
</tbody>
</table>
Discussion

- 34.4% vs. 31.7% of all inpatients were severely malnourished for the two respective surveys.

Baseline survey
- Generally poor compliance with treatment guidelines
- Delay in initiation of feeding
- Outcome areas – poor (e.g. Weight gain)

First follow-up survey
- Significant improvement – processes/compliance with guidelines
- Modest improvement – outcome areas
Persisting problems

- No control in some areas of intervention
  - Nursing manpower
  - Milk supplies

- Faulty equipment/Lack of equipment

- Standardized methods of taking measurements
Conclusion

- A significant proportion of inpatients in both surveys were severely malnourished.

- Improving quality care requires ongoing implementation of multifaceted intervention (holistic approach)

- Attempt to diagnose severe malnutrition as a comorbidity should be an additional indicator.

- Acute malnutrition needs to be differentiated from chronic malnutrition

- No need to prescribe individual multivitamins and electrolytes if F75, F100 or RUTF being instituted
Acknowledgement

- Prof. Trevor Duke and Dr. H. Welch for assistance with this project
- Dr. P. Ripa – classes on statistics and use of SPSS software
- All paediatric SMOs, MOs, and RMOs of PMGH.
- All paediatric nursing staff of PMGH
- PMGH Hospital Management
- UNICEF
- OXFAM International
- Nursing and medical students
- Patients/guardians involved in the two surveys
References:

- UNICEF-WHO-The World Bank Child malnutrition Databases: Estimates For 2012 and Launch of Interactive Data Dash Boards. [http://www.who.int/entity/nutgrowthdb/jme unicef_who.pdf](http://www.who.int/entity/nutgrowthdb/jme unicef_who.pdf)


