Morbidity patterns and factors associated with mortality in the Inpatient Therapeutic Feeding Centre (ITFC) in Abs General Hospital, Yemen

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INTRODUCTION

Context:
- Abs General Hospital serves >1 million people, including internally displaced persons (Figure 1).
- MSF supports the ITFC ward (stabilisation centre).
- ITFC: 60 beds, >100 patients/day during malnutrition peak (June – September).
- Admission: malnourished children (MUAC <125mm, WH2 ≤ 23/%, + unilateral oedema) aged 1-59 months, + medical complication or failed appetite test.

Rationale:
- Mortality rate in the last 2 years: 2 – 7% (threshold: 5%).
- No studies on mortality and adherence to treatment guidelines in eight years of operation.

Objectives:
- Describe the demographic, anthropometric and clinical conditions of patients, and their nutritional and medical treatments.
- To identify risk factors associated with mortality.

METHODS

Unmatched case-control study with retrospective data.

RESULTS

1. Demographics of study sample (Table 1).

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Overall</th>
<th>Age &lt; 6 months (n=75)</th>
<th>Age ≥ 6 months (n=249)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2.3mn</td>
<td>75 (23%)</td>
<td>40 (100%)</td>
<td>35 (100%)</td>
</tr>
<tr>
<td>2.4-6mn</td>
<td>32 (9.6%)</td>
<td>17 (42%)</td>
<td>15 (52%)</td>
</tr>
<tr>
<td>Sex (Female)</td>
<td>162 (50%)</td>
<td>86 (49%)</td>
<td>76 (51%)</td>
</tr>
<tr>
<td>MUAC category at admission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;90</td>
<td>67 (21%)</td>
<td>31 (50%)</td>
<td>36 (21%)</td>
</tr>
<tr>
<td>90-114</td>
<td>63 (66%)</td>
<td>38 (60%)</td>
<td>24 (15%)</td>
</tr>
<tr>
<td>≥114</td>
<td>24 (9.1%)</td>
<td>16 (63%)</td>
<td>8 (0%)</td>
</tr>
<tr>
<td>WHZ score at admission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; -3</td>
<td>285 (88%)</td>
<td>20 (30%)</td>
<td>24 (0%)</td>
</tr>
<tr>
<td>0-&lt; -3</td>
<td>29 (9.6%)</td>
<td>7 (12%)</td>
<td>2 (0%)</td>
</tr>
<tr>
<td>≥-3</td>
<td>7 (11%)</td>
<td>8 (14%)</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>Oedema</td>
<td>+</td>
<td>15 (4.6%)</td>
<td>5 (0%)</td>
</tr>
<tr>
<td>++</td>
<td>10 (5.5%)</td>
<td>8 (14%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>+++</td>
<td>14 (4.6%)</td>
<td>1 (2.5%)</td>
<td>3 (18%)</td>
</tr>
<tr>
<td>Major complications</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Demographics and anthropometrics of study sample. *Major diagnoses at death: pneumonia (38%), gastrointestinal (24%), sepsis (23%). Major immediate cause of death: hypothermia (n=18), acute kidney injury (n=17) and coma (n=13).

2. Factors significantly associated with ITFC mortality.

- Figure 2 highlights the ITFC mortality risk factors.
- Thirty-two (32) variables from the domains of demographics, congenital conditions, presentation at emergency department, and medical complications were significant in the univariate analysis.
- Medical complications found exclusively among the deceased (n=9), hypothermia (n=18), acute kidney injury (n=17) and coma (n=13).
- Sub-analysis of ≥ 6 months: Oedema was additional risk factor while hepatomegaly and congenital heart disease were not.
- Sub-analysis of those without congenital diseases: additional risk factors were diarrhoea that persists and seizure.

3. District of origin is significantly associated with ITFC mortality.

- Those who came from further have higher chances of death (Table 2).
- Patients coming from further districts arrived in more severe condition. They have more complications, with most complications associated with mortality, compared to those living near Abs.

4. Adherence to hydration and nutrition protocol may affect ITFC mortality and morbidity.

- Prior knowledge: Rehydration in children with severe acute malnutrition (SAM) must be performed slowly. Nutritional rehabilitation is as important as medical treatment.
- Plan B was the least used plan (Figure 3). There were more patients on Plan C than those with relevant complications.
- 45% of the patients were on nasogastric tube (NGT) feeding; reliance on NGT hinders oral intake.
- 32% of the patients were nil-per-os (NPO); these patients were often more severe.
- Plan C, NGT and NPO were significantly associated with mortality and PEWS score deterioration, but this relationship cannot be ascertained without accounting for confounding factors.

LIMITATIONS

- Some important variables were not obtainable or verifiable due to the retrospective study design, such as the severity of the dehydration, the appropriateness and duration of NGT and NBM. This made it difficult to establish clear relationships for non-adherence and mortality.
- The wide 95% CI in Figure 3: The small prevalence (<5%) of independent variables (the risk factors) in the control group may have resulted in higher odds ratio but wider uncertainty.
- We did not distinguish whether the complications were already present at admission or developed in the ward. Though such stratification would provide a better description of the patients, it would still be recovered as one variable in the risk factor analysis.

CONCLUSION

Certain medical complications, congenital disease and further districts appear to pose as significant mortality risk factors to patients admitted to the ITFC. The study’s findings have been used to initiate quality improvement measures on the clinical management of ITFC and the adherence to the nutrition protocol.

ETHICS STATEMENT: Fulfill the exemption criteria set by the MSF ERB and was approved for submission by the OCHA Medical Director and Abs Hospital Director. All data are anonymised.

Translating findings to improve ITFC patient care

- Two doctors were assigned as ITFC focal points, tasked to reinforce protocol adherence and monitor clinical and nutritional management.
- The focal points presented findings to the all doctors, emphasising the mortality risk factors, and gave refresher on patient management protocol.
- Designated a “red zone” to monitor unstable children identified based on the risk factors, and increase the follow-ups.
- Monitor closely the usage and duration of IV fluids, NGT and NPO, avoid when not indicated.
- Promote and support breastfeeding/oral feeding practices.
- Obtain blood culture for critical cases; if indicated, escalate antibiotic treatment.
- Admit patients with conditions such as congenital heart disease, cerebral palsy, Down syndrome to general paediatric ward.

Figure 1. Map of Abs Hospital coverage area.

Figure 2. Factors significantly associated with ITFC mortality.

Figure 3. The proportion of hydration plans and complications. Note: Plan A = PRN; Plan B = Intravenous; Plan C = IV fluid.

Table 4: Districts and its odds ratio for ITFC mortality.

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