

A Follow-up Experience of 6 months after Treatment of Children with Severe Acute Malnutrition in Dhaka, Bangladesh

by Hasan Ashraf,¹ Nur H. Alam,¹ Mohammad J. Chisti,¹ Sayeda R. Mahmud,¹ Md. I. Hossain,¹ Tahmeed Ahmed,¹ M. A. Salam,¹ and N. Gyr²

¹International Centre for Diarrhoeal Disease Research (ICDDR), Clinical Sciences Division, Bangladesh

²University of Basel, Switzerland

Correspondence: Dr Hasan Ashraf, Scientist, International Centre for Diarrhoeal Disease Research (ICDDR), 68 Shaheed Tajuddin Ahmed Sharani, Mohakhali, Dhaka 1212, Bangladesh. Tel: 880-2-8860523-32 (ext. 2355); Fax: 880-2-8823116; E-mail: <ashrafh@icddr.org>.

Summary

Aim: As there is lack of information about what happens to children after recovery from severe acute malnutrition (SAM), we report their relapse, morbidity, mortality and referral during follow-up period. **Methods:** From February 2001 to November 2003, 180 children completing acute and nutrition rehabilitation (NR) phases of protocolized management were advised for 6-months follow-up. The mean (SD) age was 12 (5) months, 55% were infants, 53% were male and 68% were breast-fed. **Results:** The follow-up compliance rate dropped from 91% at first to 49% at tenth visit. The common morbidities following discharge included fever (26%), cough (24%) and diarrhoea (20%). Successful follow-up done in 124 children [68.9% (95% CI 61.8–75.2%)], partial follow-up in 45 [25% (95% CI 19.2–31.8%)], relapse in 32 [17.8% (95% CI 12.9–24%)] and 5 [2.8% (95% CI 1.2–6.3%)] died. **Conclusion:** Our findings highlight need for follow-up as part of overall management of SAM and recommend an effective community follow-up.

Key words: follow-up, morbidity, mortality, relapse, SAM.

Introduction

Childhood malnutrition remains a serious health problem in developing countries with an estimated 1.7 and 3.6 million children dying because of severe acute malnutrition (SAM) and moderate acute malnutrition annually, respectively [1]. Malnutrition is

associated with 54% of deaths under children aged 5 years [2] with SAM having a case-fatality rate as high as 60% in 1990s, primarily due to faulty case management [2]. Management of SAM is done in three phases: (i) acute; (ii) nutrition rehabilitation (NR); and (iii) follow-up [3, 4]. It is possible to successfully manage SAM with medical and nutritional management within a few weeks [5]. The importance of follow-up after acute and NR phases is well recognized [3, 4, 6, 7] and successful treatment is possible through facility [3, 4] and community [8]. There is little information about what happens after recovery and whether this recovery is sustained in their homes over longer period. Short-term successes, if not sustained, and/or if associated with higher relapses or deaths would be less attractive as a public health intervention. In this communication, we report the relapse, morbidity, mortality, extra-visits and the need for referral of children with SAM over a 6-month period following their successful treatment at health-care set ups.

Acknowledgements

The authors acknowledge with gratitude the commitment of the donors to the International Centre for Diarrhoeal Disease Research (ICDDR)'s research efforts.

Funding

The World Bank (Nutrition Centre of Excellence, NCOE) and Government of Bangladesh (GoB) matching fund of the Bill and Melinda Gates Award to International Centre for Diarrhoeal Disease Research (ICDDR), Bangladesh.

Patients and methods

This is an observational, uncontrolled study and information was recorded during follow-up after day-care treatment of SAM in an urban setting. One hundred and eighty children of either gender, aged 6–23 months with either less than -3 weight-for-length Z-score (WLZ) and/or bi-pedal nutritional oedema or less than -3 weight-for-age Z-score (WAZ) with acute illness, living in the Mirpur area and its neighbouring communities in Dhaka, Bangladesh attending the Radda day-care clinic were enrolled into the study after obtaining parental consent. Most (96%) children belonged to poor families with a monthly income of ~ 70 US\$, and 63% of the fathers were day labourer or rickshaw puller, and 74% of the mothers were housewives. They were treated at the clinic according to a protocol [4] including antimicrobials, micronutrients and milk-based diets from 08:00 to 17:00 on each day until clinical improvement. They were sent home daily until completion of acute phase and transitioned to day-care nutrition rehabilitation unit (NRU) receiving NR diets daily until attaining weight-for-length (W/L) of 80% of National Centre for Health Statistics (NCHS) median. After successful completion of the acute and NR phases of management, children were discharged and their parents were advised to bring their children to the clinic for follow-up assessment each week for 2 weeks, then every 2 weeks for 3 months and finally last 50% children were additionally followed on a monthly basis for 6 months. Information on deaths and extra-visits to clinic were recorded. Children were considered to have relapses, when there were recurrence of SAM with less than -3 WLZ.

Data analysis

All data were collected on case report forms, edited, entered into a personal computer and analysed using statistical softwares (SPSS version 10; SPSS Inc, Chicago, Illinois, USA; EPI Info version 6.0; and CIA). The main outcome measures were the proportion of complete and partial successes to the follow-up, which were determined by estimating

odds ratios (ORs) with their 95% confidence intervals (95% CIs). The other outcome measures were the proportion (with 95% CI) of children developing relapses and deaths.

Results

Table 1 shows the baseline characteristics of 180 SAM children with mean (SD) age of 12 (5) months, 55% were infants (<12 months of age), 53% were male and 68% were breast-fed (Table 1). According to the Wellcome classification [9], majority (77%) of the children were non-oedematous having clinical features of marasmus only, and the remaining 23% children had oedematous malnutrition: 22% had features of marasmus kwashiorkor and only 1% had features of kwashiorkor. Ten per cent of the children had SAM only, 38% had associated pneumonia, 35% had associated diarrhoea and 17% had both pneumonia and diarrhoea. Successful follow-up was possible in 124 children [68.9% (95% CI 61.8–75.2%)], while partial follow-up in 45 [25% (95% CI 19.2–31.8%)], but 11 [6.1% (95% CI 3.4–10.6%)] failed to comply with any follow-up (Fig. 1). Table 2 shows the compliance rates and morbidities during the follow-up visits. The compliance rates to follow-up gradually declined with time following discharge: 91, 86, 82, 78, 78, 77, 79, 29, 36 and 49% for first, second, third, fourth, fifth, sixth, seventh, eighth, ninth and tenth visits, respectively (Table 2). The compliance rates significantly dropped after 3 months (OR 10.4; $P < 0.001$). The common morbidities noted during the first 3 months of follow-up visits included fever (26%), cough (24%), diarrhoea (20%) and other minor illnesses (25%) (Table 2). After 3 months, diarrhoeal diseases sharply dropped (5%); however, some had cough (16%), fever (13%) and other minor illnesses (16%) (Table 2). About 16% of the children required medication for their illnesses during the follow-up period (Table 2). Thirty-two children [17.8% (95% CI 12.9–24%)] relapsed, 5 [2.8% (95% CI 1.2–6.3%)] died (Table 3) and 37 [20.6% (95% CI 15.3–27%)] made extra-visits. Children were severely undernourished (less than -3 WAZ) on admission, discharge

TABLE 1
Baseline characteristics of the study children ($n = 180$)

Characteristics	Non-oedematous children ($n = 139$), n (%)	Oedematous children ($n = 41$), n (%)	Total children ($n = 180$), n (%)
Male	74 (53)	21 (51)	95 (53)
Age, mean (SD) (months)	12.3 (4.8)	11.6 (5)	12 (5)
Infants (6–11 months)	73 (53)	26 (63)	99 (55)
Children (12–23 months)	66 (47)	15 (37)	81 (45)
Breast-fed	100 (72)	22 (54)	122 (68)

TABLE 2
Compliance rates and morbidities during 6-months follow-up of children recovering from SAM ($n = 180$)

Follow-up visits	Compliance to follow-up visits, n (%)	Diarrhoea, n (%)	Cough, n (%)	Fever, n (%)	Other illness, n (%)	Medicine taken, n (%)
First follow-up (Day 7)	164 (91)	27 (15)	36 (20)	45 (25)	32 (18)	24 (13)
Second follow-up (Day 15)	155 (86)	36 (20)	39 (22)	47 (26)	43 (24)	28 (16)
Third follow-up (Day 30)	148 (82)	12 (7)	34 (19)	39 (22)	35 (19)	25 (14)
Fourth follow-up (Day 45)	140 (78)	14 (8)	32 (18)	26 (14)	38 (21)	20 (11)
Fifth follow-up (Day 60)	141 (78)	15 (8)	43 (24)	39 (22)	43 (24)	15 (8)
Sixth follow-up (Day 75)	139 (77)	11 (6)	39 (22)	34 (19)	44 (24)	24 (13)
Seventh follow-up (Day 90)	142 (79)	17 (9)	40 (22)	41 (23)	45 (25)	20 (11)
Eighth follow-up (Day 120)	52 (29)	2 (1)	21 (12)	15 (8)	26 (14)	7 (4)
Ninth follow-up (Day 150)	65 (36)	5 (3)	20 (11)	16 (9)	25 (14)	9 (5)
Tenth follow-up (Day 180)	88 (49)	9 (5)	28 (16)	24 (13)	28 (16)	17 (9)

TABLE 3
Final outcome of the study children during 6-months follow-up period ($n = 180$)

Outcome	Non-oedematous children ($n = 139$), n (%)	Oedematous children ($n = 41$), n (%)	Total children ($n = 180$), n (%)	OR	P -value
Successful completion of follow-up visits	96 (69)	28 (68)	124 (69)	1.04	0.92
Partial follow-up visits	35 (25)	10 (24)	45 (25)	1.04	0.92
No follow-up visit	8 (5.8)	3 (7)	11 (6)	0.77	0.71
Relapse	28 (20)	4 (10)	32 (17.8)	2.33	0.12
Death	3 (2.2)	2 (4.9)	5 (2.8)	0.43	0.31

TABLE 4
Anthropometrical indices during admission, discharge, 3-months' and 6-months' follow-up

Index	Admission, mean (SD)	Discharge, mean (SD)	Three-months' follow-up, mean (SD)	Six-months' follow-up, mean (SD)
WAZ	-5.1 (1.0)	-4.3 (0.9)	-3.7 (1.2)	-3.4 (1.0)
WLZ	-3.9 (1.1)	-2.5 (0.6)	-2.0 (1.3)	-1.9 (1.0)
HAZ	-4.3 (1.3)	-4.2 (1.3)	-4.0 (1.6)	-3.9 (1.2)

and even after 3–6 months of follow-up visits (Table 4). They were severely wasted (less than -3 WLZ) on admission, improved to moderately wasted (greater than or equal to -3 and less than -2 WLZ) on discharge with further improvement to mildly wasted (greater than or equal to -2 and less than -1 WLZ) after 6 months (Table 4). The number of severely wasted (less than -3 WLZ) children declined from 39/142 (28%) to 14/89 (16%) during 3–6 months (Table 5). Children remained severely stunted [less than -3 height-for-age Z-score (HAZ)] throughout the whole course of observations starting from

the time of admission through discharge until 6 months of follow-up (Table 4).

Discussion

The aim of our study was to assess the complete and partial success and compliance to follow-up visits, determine relapse of SAM, monitor nutritional status and record morbidities, deaths of the children during the 6 months follow-up after successful management of SAM at a day-care clinic. Such follow-up is not routinely done in Bangladesh. The results indicate that 6-months following discharge is very crucial for successful day-care management of SAM, since some cases relapsed or developed morbidities or unscheduled extra-visits, and a few died during this period. Such follow-ups should be ideally done at health facilities where children received the initial treatment, but a community follow-up system may be possible if trained and motivated community health workers and adequate resources are available [4, 6]. In our study, the follow-up compliance rate reduced over time; however, the rates were significantly worse than those we observed in our study with pneumonia (OR 5.85; $P < 0.001$) [10]. About 16% of the children recovering from SAM

required medication for various illnesses during the follow-up, in contrast, to 9% children recovering from pneumonia [10]. The differences are due to significantly higher rates of morbidities such as cough, fever, diarrhoea and other illnesses among children recovering from SAM than those recovering from severe pneumonia [10]. The high prevalence of illnesses during first 3 months highlights the need for continued access to health-care facilities and for interventions to reduce acquisition of new infections and receive treatment for such conditions. The mean height-for-age (H/A) with children remaining severely stunted with a -4.3 HAZ on admission to -3.9 HAZ after 6-months follow-up (Table 4) was similar to that reported from Bangladesh [6]. The improvement of W/L with children being severely wasted having a WLZ of -3.9 on admission to mildly

wasted with a WLZ of -1.9 WLZ after 6 months of follow-up (Table 4) and persistent severe stunting following recovery was also similar to that reported from Bangladesh [6]. There should be more intense education of parents and families during acute and NR phases through ready access to health-care facilities supported by well-trained personnel. Micronutrient supplementation including zinc therapy may be useful to improve immune function and to enhance linear growth [6, 11].

Conclusions

The results of our study indicate that follow-up of SAM children for 6 months after discharge from the day-care clinic is very important for early detection of medical problems for reducing morbidities and deaths. The high prevalence of fever, cough and diarrhoea indicates a need for improved household living conditions and more importantly establishment of an effective health and nutrition education system for improving safe water and sanitation, and personal hygiene through accessible health-care facilities with well-trained personnel and home-visits for continuation of medical and nutritional support.

References

- Collins S, Sadler K, Dent N, *et al.* Key issues in the success of community-based management of severe malnutrition. *Food Nutr Bull* 2006;27:S49–82.
- Schofield C, Ashworth A. Why have mortality rates for severe malnutrition remained so high? *Bull World Health Organ* 1996;74:223–9.

TABLE 5
Improvement of anthropometrical indices during 0–3 months and 3–6 months of follow-up

Index	0–3 months (<i>n</i> = 142), <i>n</i> (%)	3–6 months (<i>n</i> = 89), <i>n</i> (%)
WLZ greater than -2 and no oedema	73 (51)	49 (55)
WLZ less than -2 but greater than -3	30 (21)	26 (29)
WLZ less than -3 (SAM)	39 (28)	14 (16)

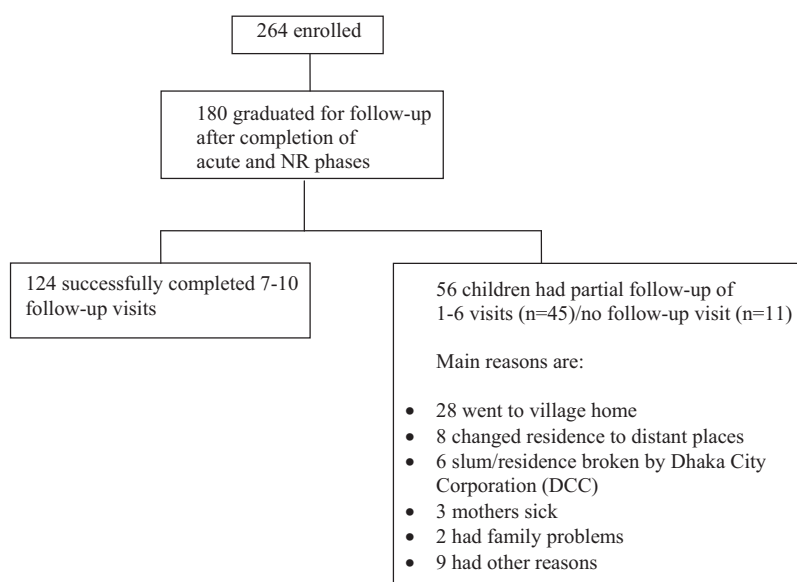


FIG. 1. Trial profile.

3. Ahmed T, Ali M, Ullah MM, *et al.* Mortality in severely malnourished children with diarrhoea and use of a standardised management protocol. *Lancet* 1999;353:1919–22.
4. Ashraf H, Ahmed T, Hossain MI, *et al.* Day-care management of children with severe malnutrition in an urban health clinic in Dhaka, Bangladesh. *J Trop Pediatr* 2007;53:171–8.
5. Ashworth A, Jackson A, Khanum S, Schofield C. Ten steps to recovery. *Child Health Dialogue* 1996;3–4:10–2.
6. Khanum S, Ashworth A, Huttly SRA. Growth, morbidity, and mortality of children in Dhaka after treatment for severe malnutrition: a prospective study. *Am J Clin Nutr* 1998;67:940–5.
7. Khanum S, Ashworth A, Huttly SRA. Controlled trial of three approaches to the treatment of severe malnutrition. *Lancet* 1994;344:1728–32.
8. Ashworth A. Efficacy and effectiveness of community-based treatment of severe malnutrition. *Food Nutr Bull* 2006;27:S24–48.
9. Waterlow JC. Classification and definition of protein-calorie malnutrition. *Br Med J* 1972;3:566–9.
10. Ashraf H, Jahan SA, Alam NH, *et al.* Day-care management of severe and very severe pneumonia without any associated co-morbidities like severe malnutrition in an urban health clinic in Dhaka, Bangladesh. *Arch Dis Child* 2008;93:490–4.
11. Makonnen B, Venter A, Joubert G. A randomized controlled study of the impact of dietary zinc supplementation in the management of children with protein-energy malnutrition in Lesotho. II: Special investigations. *J Trop Pediatr* 2003;49:353–60.