

Long-term Prospects of Malnourished Children After Rehabilitation at the Nutrition Rehabilitation Centre of St Mary's Hospital, Mumias, Kenya

by Liesbeth Reneman and Jet Derwig
Faculty of Medicine, University of Amsterdam, The Netherlands

Summary

The growth and survival of children was studied after rehabilitation for malnutrition at the Nutrition Rehabilitation Centre (NRC) of St Mary's Hospital on average 1.5 year after discharge. The findings are intended partly to provide descriptive information on later progress in the community of these children and also to identify specific risk factors. Of 50 children eligible for follow-up, 39 (78 per cent) could be traced. Overall mortality was 36 per cent, 28 per cent were found to be underweight, and 36 per cent were in good condition with satisfactory catch up in weight. Mortality was determined by age, duration of stay in hospital and centre, and nutritional status.

Most literature on the subject implies that the long-term effectiveness of the NRC is affected by limiting factors at home and in the centre itself. Our data suggest that the poor results are mainly due to improper use of the NRC. The NRC was called in too early by the hospital and children were discharged too soon from the NRC. As evidenced by the frequent presence of infectious symptoms, the severity of nutritional status, inadequate weight gain, and short duration of stay in the hospital and the NRC.

Introduction

Because of high mortality in hospitals, Cook¹ argued that severely malnourished children should be treated at Nutrition Rehabilitation Centres (NRC), by less skilled, but more readily available health personnel. Such centres strive to educate the mother on nutrition through active participation in the nutritional rehabilitation of her child. Many studies on effectiveness of these centres have been reported since, but in general studies fail to report essential information.^{2,3} There is for instance a disappointing lack of information on mortality.⁴ As it is, still surprisingly little is known of the long-term outcome, after discharge from the NRC, when the children return to the community.⁵

What is needed is a careful follow-up study of the growth and development of children who have been rehabilitated for malnutrition at the NRC and factors of

growth failure identified. We had the opportunity to conduct such a study.

Subjects and Methods

The study was carried out in Mumias, Kenya, at the Nutrition Rehabilitation Centre of the St Mary's Hospital. Two routes of admission to the NRC were: (a) malnourished children, referred by Mother and Child Health (MCH) or mobile clinics in the field or by a medical or clinical officer at St Mary's, and (b) malnourished children discharged from the hospital, during their period of recuperation. Children were discharged from the hospital to the NRC if return of appetite, absence of infectious symptoms and weight gain, occurred. Children were admitted with their mothers, for a 3-week period. Children were seen once a week by a doctor or medical assistant. Children were discharged from the NRC when they had improved their nutritional status or when the duration of stay exceeded 3 weeks. If infectious symptoms reappeared or the nutritional status worsened, children were re-admitted to the hospital.

Our subjects were children admitted to the NRC between June 1990 and May 1991, living within the catchment area (up to 30 km from the hospital). During this period 50 patients suffering from malnutrition were admitted to the NRC. Follow-up took place between May and July 1992, on average 1.5 years after NRC discharge. Weight was recorded using a Salter-scale. The

Acknowledgements

We wish to thank the Hospital Management Team of St Mary's Hospital and especially the CBHC team for their assistance and participation. Most gratefully we acknowledge the collaboration of Professor T. W. J. Schulpen (University of Utrecht), G. T. Heikens and in particular Professor A. S. Muller (University of Amsterdam). We received invaluable comments from Professor J. G. A. J. Hautvast (University of Wageningen), M., Shaheen and Professor O. M. Galal (University of California, Los Angeles).

Correspondence: Liesbeth Reneman, Prinsengracht 525-I, 1016 HR Amsterdam, The Netherlands.

TABLE 1
 Mean age, weight, WA and WA-gain as a percentage of the NCHS references (standard error in brackets) for the 'survivor-group' in NRC and follow-up

Variable	NRC (n = 25)		Follow-up (n = 25)
	Admission	Discharge	
Age (months)	25.00 (2.20)	25.21 (2.53)	46.79 (3.25)
Weight (kg)	8.21 (1.58)	8.97 (1.74)	12.29 (2.09)
WA (%)	64.40 (2.25)	70.00 (2.31)	79.78 (2.58)
WA gain (%)		5.60	9.78

Salter hanging scale measures weight to the nearest 0.1 kg with a 25-kg capacity. The children were weighed naked. Follow-up data were compared with data at the NRC using admission records. To assess weight gain, reference data from the National Center for Health Statistics (NCHS) were used.⁶ The data were analysed, focusing on mortality and nutritional status, in a longitudinal comparison. Cross-sectional analyses were made to increase group size.

Results

The Nutritional Rehabilitation Centre (n = 50)

Before admission to the NRC, 39 out of the 50 children (78 per cent) had first been admitted to the hospital. On average children stayed 10 days in the hospital. However, a majority of these children remained hospitalized less than the average: between 5 and 7 days (range: 1–79 days).

At time of admission to the NRC, 67 per cent of the children were suffering from complicating factors: mostly chronic diarrhoea; 31 per cent of all children admitted had a recent attack of measles in their history. Mean age was 2.1 years (with a range of 5 months to 7 years).

For 67 per cent, the duration of stay at the NRC was less than the intended 3 weeks. On average, children stayed 16.1 days. Thirty-two children (64 per cent) were discharged because of improvement in their nutritional status according to the staff. Twenty per cent were re-admitted immediately to the hospital as their condition worsened and 16 per cent of the children were taken home against medical advice.

Follow-up (n = 39)

Of the 50 children eligible for follow-up 39 (78 per cent) could be included in the present analyses. 5 (10 per cent) had moved away and six children (12 per cent) were untraceable for other reasons. Fourteen of 39 children had died; they form the 'mortality group'. Twenty-five were found during follow-up, 1.5 years after discharge; they form the 'survivor-group'.

Survivors (n = 25)

Changes in Weight for Age (WA) for different time

periods are shown in Table 1. Growth after admission to the centre was related with the nutritional status at admission: the lower the WA at admission the greater the catch up growth and vice versa. Still, a considerable proportion (44 per cent) of the children were found to be underweight during follow-up (WA below 80 per cent of the NCHS reference).

The data in Table 2 were analysed using the *t*-test for significance.

No significant change in WA was found between admission to or discharge from the centre and 1.5 years after rehabilitation at home. However, a significant change ($P < 0.00018$) in WA is found between the time of admittance (Adm) and that of discharge (Dis) from the centre. This short-term effectiveness of the NRC is considerable, but apparently ceased shortly after discharge from the centre.

Mortality-group (n = 14)

Of the 39 follow-up cases studied, 14 had died, a mortality rate of 36 per cent. Five of these (12 per cent) on the total group) died within 2 weeks after readmission to the hospital. Of all deaths, 66 per cent occurred in the first month after discharge from the NRC, at an average age of 29.1 months (2.4 years). Mean discharge age was 27.5 months (2.3 years), 2.2 months older than the survivors. A lower mortality rate (17 per cent) was observed in children younger than 1.5 years old. Seventy-one per cent of the children that died were first admitted to hospital, before admission to the NRC. This implies that 29 per cent of those who died had not been admitted to the hospital, but came directly to the NRC.

TABLE 2
 Probabilities of group difference for WA as a percentage of the NCHS references (n = 25) at time of: admission to the centre (Adm), discharge from the centre (Dis) and follow-up (Fup)

WA	P
Adm-Dis	<0.00018
Dis-Fup	0.124
Adm-Fup	0.611

TABLE 3
 Mean age, weight, WA and WA-gain as a percentage of the NCHS references (standard error brackets) for the 'mortality-group' in hospital and NRC

Variable	Hospital (n = 10)		NRC (n = 14)	
	Admission	Discharge	Admission	Discharge
Age (months)	27.11 (6.61)	27.46 (6.60)	26.94 (4.77)	27.48 (4.18)
Weight (kg)	6.92 (0.79)	7.08 (0.62)	7.17 (0.46)	7.02 (0.57)
WA (%)	56.11 (0.14)	56.88 (0.63)	58.57 (0.51)	58.21 (0.59)
WA gain (%)		+0.77		-0.36

Children who died had a shorter stay at the centre than the survivor-group, 14 and 16 days, respectively. The duration of stay in the hospital was also shorter: 8 and 10 days, respectively. Discharging themselves was not higher among children who died; however, numbers are small.

On admission to the centre 73 per cent of those who died were still suffering from fever and loss of appetite, compared to 54 per cent of the survivors.

Mortality was also correlated with anthropometric indicators. On admission to the hospital all those who died had a WA ≤ 60 per cent: they were severely malnourished (see Table 3), 88 per cent of these children were still severely malnourished upon discharge from hospital. Mean WA in hospital and NRC remains below 60 per cent of the reference. Of all children discharged from the centre with a WA ≤ 60 per cent, 69 per cent eventually died. While attending the centre, these children even show a small decrease in WA, after approximately 14 days of rehabilitation. The mortality group is apparently not able to decrease their weight deficit: very few (14 per cent) were eventually able to elevate their WA above the 60 per cent.

Overall, there is very little improvement in the nutritional status. No deaths occurred in the group of children who had a WA above 70 per cent, on admission as well as discharge.

As indicated by WA, those who died were more severely malnourished than the survivors. The survivors are able to elevate their mean WA to 76.19 per cent in the centre, whereas those who died were not able to elevate their WA and actually show a decrease. At the time of discharge from the centre the difference in WA between the two groups had doubled to 12 per cent. Even though the children who died were 2.2 months older, they were nearly 2 kg lighter than those who survived.

Discussion

This study reports findings on growth and survival of children after rehabilitation for malnutrition at the NRC on average 1.5 year after discharge.

A high percentage (78 per cent) of children eligible for follow-up could be traced. Only 36 per cent of all children ($n = 39$) studied showed satisfactory catch up

growth in weight as judged by WA equal to or higher than 80 per cent of the NCHS reference.⁷ Several studies have shown a much higher percentage (60–89 per cent) of children with good catch up growth, 4 months or more post-discharge.^{8,9} Of the survivors ($n = 25$) a considerable proportion, 44 per cent, showed unsatisfactory catch-up growth, though the achieved mean WA at follow up of 79.78 per cent of the reference is similar to other reports.^{8,9} As there is no significant change in WA after discharge from the centre, while this is statistically significant in the centre, growth at home seems to be correlated to an immediate response to treatment given at the centre, which ceases shortly after treatment is stopped. This trend was also observed by others:^{4,9} children studied in Haiti and Guatemala⁹ show a significantly higher WA at discharge from the centre than on admission, though they had not improved the following year.

We have reported a mortality rate of 36 per cent. This is higher than usual reports (4 months or more post-discharge) varying between 1 and 14 per cent.^{8–10} Compared to the children who 'survived', those who died were older and had a shorter duration of stay in hospital and NRC. This is in conflict with a study¹¹ in which no difference was found in length of stay in hospital between children who died in the first year after discharge and those who survived.

Mean duration of stay in hospital was 10 days for all children, for those who died the duration of stay was 8 days. Much longer durations of stay (from 19 to 79 days) usually occurred.^{11,12} One could speculate that children in this study were discharged (quite understandably) earlier than usual from hospital, because further nutrition rehabilitation was provided in the centre, but which, unfortunately, lacked proper medical care.

The Haiti and Guatemala study⁹ showed a much lower mortality (4 instead of 14 per cent) 1 year post-discharge, for children who stayed longer at the centre, as confirmed by our data.

With regards to anthropometric indicators, these were significantly lower than those who survived. Unlike the survivor-group, those who died were not able to improve their nutritional status and even show a small decrease in weight during treatment. Mortality increased sharply for the children discharged with a WA ≤ 60 per cent of the

reference, as nearly 70 per cent eventually died. The results suggest that mortality of discharged children is determined by age, duration of stay in hospital and centre, and nutritional status.

Although official policy of St Mary's Hospital regarding malnutrition in itself was good, our data suggest that in practice children were transferred from hospital to NRC too early, as evidenced by: (a) the frequent presence of infectious symptoms and (b) inadequate weight gain: 88 per cent of the children admitted with severe malnutrition were discharged in the same condition. Management at the NRC failed in the fact that: (a) 54 per cent of all children admitted to the NRC had a WA \leq 60 per cent of the reference, and were severely malnourished. (b) For a majority (67 per cent) the duration of stay in the NRC was less than the intended 3 weeks. (c) Eleven children (78 per cent) of those who died were still losing weight at discharge from the NRC and should therefore have been re-admitted to hospital, only three (27 per cent) were re-admitted. (d) The low readmission rate in the children who died might be partially due to the fact that the children at the NRC were not regularly seen by a doctor or medical officer. Thus, the severity of their clinical state was not acknowledged.

The results of our study are disappointing. Prospects of children rehabilitated for malnutrition in the NRC studied are not favorable. Only a minority (36 per cent) of those admitted to the NRC did eventually benefit from the treatment given. The favorable effect of the NRC on the growth of children after they return home is limited.^{4,9,13} Our data, however, suggest that the poor results of the NRC should be ascribed to the way in which the NRC was being used. The hospital's management of malnutrition, unfortunately, failed on several points (as stated above). The NRC was called in too early by the hospital and children were discharged too soon. It seems that children were discharged earlier than usual from hospital, because further nutrition rehabilitation was provided in the centre, but which, unfortunately, lacked proper medical care. Because of this, most of these children never had the opportunity to start recovery from severe PEM. For quite a number of children it seems as if the presence of the NRC was not beneficial. A majority of the children were in fact too severely malnourished to be admitted to the NRC. Would the hospital have been a better place for treatment?¹

References

1. Cook R. Is hospital the place for the treatment of malnourished children? *J Trop Pediat* 1971; 17: 299-332.
2. Anderson MA, Austin JE, Wray JD, Zeitlin MF. Nutrition intervention in developing countries. Study I, supplementary feeding. New York: Oelgeschlager, Gunn & Hain, 1981.
3. Beaton GH, Ghassemi H. Supplementary feeding programs for young children in developing countries. *Am J Clin Nutr* 1982; 35 (suppl.): 864-916.
4. Heikens GT, Schofield WN, Dawson S, Grantham-McGregor SM. The Kingston Project I. Growth of malnourished children during rehabilitation in the community, given a high energy supplement. *Eur J Clin Nutr* 1989; 43: 145-60.
5. Heikens GT, Schofield WN, Dawson SM, Waterlow JC. Long-stay versus short-stay of children suffering from severe protein-energy malnutrition. *Eur J Clin Nutr* 1994; 48: 873-82.
6. Stephenson LS, Latham MC, Jansen A. A comparison of growth standards: similarities between NCHS, Harvard, Denver and privileged African children and differences with Kenyan rural children. Ithaca, New York: Cornell University, Program on International Nutrition and Development Policy, 1983.
7. Van Roosmalen-Wiebenga MW, Kibona WN, Kusin JA, de With C, Buning M. Action-oriented assessment of nutritional status of young children in Mbozi SW Tanzania. *E Afr Med J* 1985; 62: 640-9.
8. Van Roosmalen-Wiebenga MW, Kusin JA, de With C. Nutrition rehabilitation in hospital—a waste of time and money? Evaluation of nutrition rehabilitation in a rural district hospital in Southeast Tanzania II. Long-term results. *J Trop Pediat* 1987; 33: 24-8.
9. Beaudry-Darisme M, Latham MC. Nutrition rehabilitation centres—an evaluation of their performance. *J Trop Pediat* 1973; 19: 299-332.
10. Beghin ID, Viteri FE. Nutrition rehabilitation centres: an evaluation of their performance. *J Trop Pediat* 1973; 19: 215-19.
11. Hennart P, Beghin D, Bossuyt M. Long-term follow up of severe protein-malnutrition in Eastern Zaire. *J Trop Pediat* 1987; 33: 10-12.
12. Van Roosmalen-Wiebenga MW, Kusin JA, de With C. Nutrition rehabilitation in hospital—a waste of time and money? Evaluation of nutrition rehabilitation in a rural district hospital in Southwest Tanzania. Short-term results. *J Trop Pediat* 1986; 32: 240-3.
13. Jansen AAJ, Verkley MTB. Ambulatory home nutrition rehabilitation in rural Kenya. *J Trop Pediat* 1986; 32: 258-62.