

PEM – LONG TERM EFFECTS OF NUTRITIONAL REHABILITATION
and some reasons for the continued prevalence of malnutrition

Evaluation of the work in Nutrition Unit / Kumi Hospital

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1. Introduction

Children with Protein-Energy-Malnutrition (PEM) are still common in Uganda. They are treated in different kinds of Therapeutic Feeding Centres or Nutrition Units. Following the WHO guidelines for management of children with severe malnutrition, patients are discharged when they reach the target-weight of -1 standard deviation score weight-for-height (W/H z-score). To ensure that the further development of the children is adequately monitored, the caretakers are told to bring the patients for review 2 to 4 weeks after discharge, but often this does not happen, possibly because of practical problems such as lack of transport facilities and so on. Therefore it remains unclear how the previously malnourished children are progressing at home after their discharge from the hospital, and how successful the form of in-patient treatment for nutritional rehabilitation is in a long term run. The aim of this study was to follow a group of 100 children with moderate and severe PEM from the time of their admission in Nutrition Unit (NU)/ Kumi Hospital to a period of up to six months after discharge. A questionnaire was developed to collect data about changes in the weight and height of patients, as well as about their diet and social background. This information was meant to provide us not only with a deeper understanding of the reasons for the prevalence of malnutrition in the catchment area but also to make suggestions for improving the work of the NU. This study was done at the request of the German Medical Missionary-Team (GMMT) and carried out by Esther Rauen, who worked as a dietician in the NU in Kumi Hospital from May 2005 to August 2008.

2. Nutrition Unit in Kumi Hospital

2.1 The history of the NU

The NU was established in September/October 1998. In 1996/97 the harvest in the region was poor, so the Medical Superintendent of Kumi Hospital Dr. John Opolot asked the GMMT to send a nutritionist to help with setting up a Nutrition Unit. Thereupon, Angela Aldinger, a nutritionist from Germany, was sent to Kumi Hospital to establish the Nutrition Unit in cooperation with two Ugandan colleagues. The rooms that had served as the laundry of the hospital were renovated and converted into a room for lessons, a kitchen, a store-room for food and a small office.

The main work of the unit was to treat malnourished children who were admitted in other wards or could stay near the hospital; other jobs included teaching the caretakers about the basics of nutrition and hygiene, and preparing meals at least twice a week. The NU had responsibility for the farm where attendants of the patients grew part of the required food, such as sorghum, groundnuts, soya etc. They were supervised by Martin Aldinger, an agricultural specialist from the GMMT.

The staff consisted of Angela Aldinger as Incharge, Rose Ademun as Nutrition Assistant, Aujo Dinah Loy as Nutrition Attendant and Akello Margaret as Nutrition Coordinator.

One problem that had to be addressed was how the children could be provided with care and attention, particularly at night-time and in the absence of their mothers or caretakers. An extension of the unit was necessary, and in March 2001, a room with 12 beds was opened where the children could be accommodated with their caretaker during their rehabilitation. Medical care continued to be provided by the medical personnel of other wards of the hospital.

The work in the NU was further extended on 3rd May 2004, when the Nutrition Ward was opened. This meant that medical treatment could now be given directly from the Nutrition Ward so that there was no need any longer for patients to move to other wards for treatment. More nurses were employed and a doctor was given the responsibility of making regular ward rounds. The Nutrition Ward now has a capacity of 18 beds.

2.2 Activities of the NU

- Treatment of malnourished children, who are admitted in the hospital or in the NU
- Identification of malnourished children in the area through home visits or outreaches
- Follow-up home visits of discharged patients
- Teaching caretakers about basics of nutrition, hygiene and primary health care
- Counselling of the caretakers by a trained social worker in the NU as well as during home visits
- On-the-job training and supervision of NU staff

More than 1250 patients have been admitted to the unit since the beginning of the program in 1998 upto the end of this study in June 2007. Many hundreds more were taken care of as outpatients who are a part of the feeding program of the Unit.

Table 1: Statistics of Children admitted for feeding in the NU in 2006

2.3 Staff

The current staff consists of 6 members:

One enrolled nurse (Achibu Jennifer), two nursing aids (Aswei Teddy and Akiriat Stella), one social worker (Ademun Rose) and two nutritionists from GMMT (Kristina Krumbein and Esther Rauen).

Two nursing aides were sent for training as nursing assistants and one for training as an enrolled nurse. All of them are expected back to work in the NU in the year 2008.

A medical officer is responsible for ward rounds (made twice a week) and there is a cleaner who has to keep the ward and the compound clean.

2.4 Financing of the project

The work in the NU is supported by donations from the GMMT. Food, some supplements like multivitamins, folic acid, de-wormer or iron syrup, support for poor families (blankets, clothes, transport money, money for milk, mosquito nets etc.), fuel for home visits and outreaches etc. are paid for fully with money from donors in Germany, as also are a part of the salaries and allowances for the staff.

The expenditure in 2006 was 18.714.850 UGS, used for foodstuff, salaries/allowances, household items, drugs, transport, administration, construction/labour and inventory.

Table 2: Expenditure distribution of the NU in 2006.

2.5 Treatment of a child

The children who come to the NU are usually either transferred from another ward of the same hospital (most often the Paediatric Ward), or another hospital. Sometimes they are sent from the OPD or they come directly to the Unit. Since the expansion of the field-work program in 2006 an increasing number of children are now also being brought from outreach clinics.

Children with a W/H z-score of < -3 (severe Marasmus) and those with oedema (Kwashiorkor) are automatically admitted in the NU. For those with a W/H z-score of between -3 and -2 SD (moderate malnutrition), admission is discretionary and depends largely on the condition of the child and the capacity of the NU.

Therefore some children are only assessed, and not admitted. Their caretakers are instructed about a healthy diet for their child and are sent home again. Other children, who are already in another ward of the hospital, remain where they are and receive only their food from the NU, and they are treated as being a part of the NU's feeding program. The Unit's main work is done for children who are directly admitted to its own ward.

The caretakers are instructed to come daily to weigh the child and to get food and/or therapeutic diet. The feeding plan is adapted daily to take into account such things as improvement through weight-gain or lack of improvement owing to loss of appetite, diarrhoea, vomiting, dehydration etc..

When serious complications arise, as for example, when the child needs to be given oxygen or have its vitals closely observed, he or she is transferred to the pediatric ward of the hospital. This is because the NU is not able to cover night duties and therefore is not able to treat children in critical condition as in-patients.

2.6 Feeding program

The NU provides all the food and diets for its patients. During the period in which a child is admitted, its caretaker receives one meal a day, consisting of posho and red beans.

Depending on the age, the weight, the height and the condition of the child, different therapeutic diets are given to it

- Children with oedematous forms of malnutrition and severely wasted children (W/H z-score < -3) receive F-75 or F-75 with cereals in case of diarrhoea.
- Moderately wasted children (W/H z-score between -3 and -2) receive F-100 and/or NU-diet.
- Children < 6 months of age receive infant formula and/or breastfeeding promotion.

- Children with persistent severe diarrhoea receive a “Diarrhoea diet”, of porridge made out of rice, soya flour, sugar and ReSoMal.
- Children on F-75 who regain appetite and children whose oedema has ceased are changed to F-100 and later to NU-diet.

For new admissions and seriously sick children the formula is given out on a 2-hourly basis by the Unit staff. If the condition of the child is stable and the weight gain good, the formula is given once a day and the mother is counselled to re-boil it and give it to the child on a 4-hourly basis.

3. Methods of the Study:

The study took place in the NU of Kumi Hospital and was carried out between June 2006 and June 2007. The progress of 102 patients was followed-up in a first home visit mainly one to two months after discharge; the further progress of 27 children was followed in a second home visit about six months after discharge. The hospital provided a car, while the GMMT paid the fuel for the home visits as well as for mosquito nets and blankets that were given out to the patients during the visit.

For transport-related reasons the home visits were done once a week, and were always arranged in a way that at least four to eight children could be seen.

3.1 Choosing children for the study

As far as possible every child who had been admitted to the feeding program was followed up at home. Some children had to be left out because they lived too far away, or because they could not be located (in the absence of clearly written addresses). The total number of children admitted to the NU during the period of the study was 221 of which 37 (17%) died in the hospital.

3.2 Data of the patient

We had access to different types of information and data in the admission sheet which had been filled in at the time the child was admitted to the feeding program in NU.

A special questionnaire for the follow-up home visits was developed and used in addition to the standard admission sheet. Both forms were usually filled in by the social worker of the NU, who was at the same time responsible for counselling the caretakers.

3.3 Problems Encountered and Limitations

The biggest problem we encountered was in organising the home-visits. Hospital cars, which we were using, were in great demand for other hospital activities, and often long distances in different directions had to be combined; further the cost of fuel was high and some visits were beyond our financial means.

Another problem was the process of finding homes in the villages, because the mothers had been vague in describing where exactly they lived. Sometimes, neighbours whom we sought directions from, were afraid to show us the right place, because they thought we had come there to force the family to settle a pending hospital bill.

4. Results

4.1 Admission Sheets

The information from the admission sheets used for this study relate to the age and sex of the patients, the duration of stay in the NU, the type of malnutrition, other complications, the usual diet and the weight gain of the child during rehabilitation as well as the educational status of the parents, age of the mother and sanitation.

4.1.1 Duration of stay in Nutrition Unit

Children are discharged from the NU when they reach the target weight of -1 W/H z-score. Sometimes the caretaker becomes impatient at having to remain in the hospital for such a long time and they ask to have the child discharged earlier. Since the electrolyte imbalance alone takes 2 weeks and more to correct, a stay of at least 3 weeks would be optimal.

The period of stay of the 102 children included in this study ranged widely, from 3 to 100 days. The average was 26 days which we interpret as a reasonable time for the rehabilitation of children with severe malnutrition.

Extremely short periods of stay were caused by caretakers who requested the discharge of a child against medical advice, while extremely long periods can be attributed to other medical conditions, like HIV infection, to which the child may have been subjected.

4.1.2 Age and gender of the patients

The average of age of the patients was 28 months. Again the range was wide from 2 months up to 16 years of age. 27% were 3 years and more and 73% were below 3 years of age.

There is nearly no difference between the genders: 48% were female and 52% male.

4.1.3. Types of malnutrition

Different forms of malnutrition caused by protein- and energy-deficiency, are usually summarised as Protein-Energy-Malnutrition or PEM (Wellcome Classification, 1970).

The WHO (1999) differentiates between 3 types of malnutrition: marasmus (wasting), kwashiorkor (bipedal pitting oedema) and marasmic kwashiorkor (severe wasting together with bipedal pitting oedema).

To diagnose the type of malnutrition a child suffers from, it is necessary to take the weight and height of the child. The observed values are compared with reference data,

collected from US children between birth and 18 years by the National Centre for Health Statistics (NCHS). This W/H z-score (standard deviation score) describes the current nutritional status. Children with a W/H z-score between -2 and -3 are considered to be moderately wasted (too thin for their height), < -3 SD means they are severely wasted.

The evaluated group consisted of 63 (62%) children with marasmus, 21 (21%) kwashiorkor and 18 (18%) marasmic kwashiorkor.

4.1.4 Weight gain in Nutrition Unit

The WHO estimates a moderate weight gain for the rehabilitation process as 5 – 10 g per kg bodyweight and day. A good weight gain would be more than 10g / kg / d. The average weight gain of all children in this study was 5.1 g / kg / d. But since these numbers only refer to the rehabilitation phase it is more accurate to include only the children with marasmus, because children with kwashiorkor would lose weight in the beginning because of the oedema. The average weight gain of all marasmic children was 6,7 g / kg / d. Even this, however, is only a moderate weight gain, therefore we have to think about how to improve the services of the Unit in order to increase the weight gain.

One reason for the only moderate weight gain could be the problem that seriously sick children have to stay in the childrens ward where their feeding can't be adequately observed because of limited staff resources in the NU. Another reason can be in the affordability of the treatment, and yet another, the high prevalence of HIV infection among children which results very often in their responding poorly to nutritional rehabilitation.

4.1.5 Other complications

Other complications that cause malnutrition are common. Of the 102 children included in this study only 69 (68%) had primary malnutrition, while 33 (32%) appeared to have other complications. 18 (18%) suffered from cerebral palsy, 8 (8%) were known cases of HIV (only 49% were tested), 4 (4%) had a hydrocephalus and 3 (3%) a cleft palate. The disadvantage of disability was sometimes compounded not only by the child's difficulty in taking and swallowing food, but also by parents who very often tended to neglect their disabled children. AIDS is another big problem that causes malnutrition. Of the 221 in-patients in NU during the time of this evaluation, 70 were tested for HIV and 28 (40%) of them were found reactive. Of this 28 HIV positive children, 10 died during treatment in the hospital. Since these children could not be included in this study, it explains the lower percentage (18%) under the evaluated group given above.

4.1.6 The usual diet and breastfeeding

Questions about the usual diet included the number of meals in a day and the frequency of commonly used foods in a week. According to the caretakers of the patients the average number of meals per day was 3.2 (ranging from 2 to 8).

Mothers in developing countries are recommended to exclusively breastfeed their babies up to the age of 6 month if there is sufficient breastmilk, and then to continue breastfeeding for up to 2 years of age, while supplementing with other food. The 102 children in this study had an average duration of breastfeeding of 15.2 months (ranging

between 0 and 26 months). 75% had stopped breastfeeding before the child was admitted to the NU, while 25% still continued breastfeeding.

41% of the mothers had a new pregnancy following the birth of the malnourished child. In interpreting this finding we have to bear in mind that 27% of the children were at least 3 years old. A new pregnancy in this group does not necessarily mean poor family planning. Nevertheless, a new pregnancy is still a common reason for stopping breastfeeding early.

4.1.7 Educational status of the parents

It can be expected that a high educational status will prevent malnutrition in the family because the financial status can be assumed to be better and because there is likely to be better knowledge of how to use the available food resources. Arguing from this assumption, we expected a family with malnourished children to have an extremely low-level of education and a deeper level of poverty. These assumptions were confirmed by our results:

36 (37%) of the mothers were illiterate (less than 2 years in school), 50 (51%) had poor reading ability (incomplete primary education – less than 7 years) and 12 (12%) were literate (more than 7 years in school).

The educational status of the fathers was a bit higher: 20 (20%) illiterate, 52 (53%) poor reading ability and 26 (26%) were literate. This difference in levels between the genders shows that women are still discriminated against men as far as basic education is concerned.

4.1.8 Age of the mothers and Sanitation

It is generally agreed that the young age of the mother very often goes together with lack of knowledge and ability to care for the family. Therefore it is interesting to examine the statistics relating to the age of mothers with malnourished children. It is also interesting to look at the sanitation in the homes of the patients, because poor sanitation can lead to frequent diarrhoea which, in turn, can lead to malnutrition.

The average age of the 102 mothers we surveyed was 26.6 years, which is not as young as we had expected; the variation, spanning between 17 to 40 years was quite high. These findings seem to contradict our assumption that a young age of a mother results in a higher risk of the child becoming malnourished.

73 (72%) of the 102 households were using pit latrines, while 29 (28%) were using the environment for their daily needs. This means that one third of the admitted children were at a higher risk of frequent diarrhoea due to poor sanitation at home.

4.2 The first home visit

The first home visit was planned to take place one to two months after discharge from the hospital. Due to the transport problems mentioned above, it was not possible to follow-up all children according to this time frame. Therefore some patients had to be followed-up after a longer period of time. During these home visits we intended to fill in, as stated earlier, a second questionnaire which sought information about the child's

current weight, the number of meals and normal diet as well as questions about sickness and social problems.

4.2.1 Weight gain between discharge and first home visit

The weight gain from the time of discharge to that of the home visit is one of the most important pieces of information, because it shows whether the caretaker was able to put into practise what he or she had learned during the stay in the hospital. If the child continues to gain weight, we can assume that the parents were able to change certain things in their diet or daily life in order to improve on their child's health. Our results are encouraging:

During the first home visit we found that 80 (78%) patients had gained more weight while 20 patients (20%) had either remained at the same weight-level during discharge or lost some weight. 2 children (2%) had died. Of the 20 patients who were at the same level or had lost weight, 11 had other complications like AIDS, cerebral palsy or hydrocephalus and 7 were in families with serious social problems caused by such things as the death of a parent, or divorce, or polygamous relationships. The 2 patients who died at home, were children discharged at the request of their parents against medical advice.

4.2.2 Changes in usual diet and number of meals in a day

During the first home visit the caretaker was again asked the same questions about the usual diet of the child and the number of meals in order to discover if changes had been made in their diets.

The number of meals at home had increased from 3.2 on admission to 3.8 on the first home visit, still ranging from 2 to 8 meals in a day. The numbers of families that were feeding their malnourished children only twice a day had reduced from 25% to 11%. In both questionnaires, the main group was feeding 3 times (46% on admission and 40% on first home visit).

The changes in the normal diet appeared to be difficult to evaluate, since the statements of the mothers were often not clear. Diets seemed to change according to the seasons, the crops that were planted, and changes in the family situation. Therefore this information cannot be taken alone as evidence that the families had learnt to feed their children more effectively.

We decided, therefore, to sort out the children into the following categories: those who had clearly improved their child's diet: 29 (35%); those who had improved in some things but deteriorated in others: 47 (57%); those who had clearly deteriorated: 3 (4%); and those whose conditions were unchanged - 4 (5%).

4.2.3 Social problems

Our survey showed that poverty was the biggest problem in the families. Especially during the second half of the time period of the study most families had nothing to eat at home due to a prolonged dry season from January up to April. Very few parents had other incomes in addition to their own crops. Therefore poor changes in the diet cannot be interpreted independently of the social problems of the family. If for example a child gets less milk because the cow has delivered a calf or rarely gets porridge because the

millet is over we can not say that the mother didn't learn anything. What is encouraging is the clear evidence of small improvements, such as using cooking oil, groundnut paste or pounded dried fish.

Another very common social problem is that most households have a large number of children to take care of. Quite often a family has to care for many other children, when their parents die of AIDS or other sickness. The gardens/fields are often not big enough to meet the needs of all the children and if support is given for the malnourished child the other children will have to get an equal share. The large number of children also results in the neglect of disabled children, especially if they are not able to feed themselves; these children are at extremely high risk of ending again in a malnourished state.

4.3 The second home visit

The study was designed to visit all children twice: one to two months after discharge and again six months after discharge. But due to a variety of practical problems already discussed, it was not possible to meet this target. Therefore we visited only 27 patients in a second home visit around six months after discharge. Since we knew that we would not be able to see all the children a second time, we tried to choose those who had not improved on the first visit. During this second visit the main issue for us was the weight gain. Questions about the normal diet and number of meals were asked again in some families but are not included in this study.

4.3.1 Weight gain between first and second home visit

In the second home visit we found that 20 (74%) children had again gained more weight from the time of the first home visit. These children could all be discharged from the NU program. 5 (19%) children had lost weight and 2 (7%) had died. Of the 5 children who had lost weight 2 had a severe disability (cerebral palsy), 2 had AIDS and one had a serious family problem (divorced parents). The 2 children that had died had fallen sick at home of pneumonia and malaria and the parents had delayed bringing the children for treatment. Of the 20 children who had improved 7 had not improved on the first home visit. This last finding shows, that the home visit itself can bring improvement to the child, since the possibilities of counselling the mother on a one to one basis, in a manner relevant to their home situation is much better during a home visit than during the hospital stay. It also shows that nearly all families can manage to feed their children in spite of their poverty if they are given advice and counselling on how to use their resources in an efficient way.

5. Conclusion

This evaluation shows clearly that nutritional rehabilitation of children with PEM in the Nutrition Unit in Kumi Hospital has a good long term effect on the health of the treated children. The fact that so many children gained weight at home after discharge proves that the caretakers learn, during their stay at the Unit, to take better care of their children with their available local resources. What can be improved is the weight gain in the hospital, perhaps by better medical care and closer observation of the children. Instruction given to caretakers could also be improved in order to make more significant changes in the usual diet in the villages. The home visits seem to be good not only for collecting data, but also for counselling the caretakers on a one to one basis bearing their individual needs in mind.

The reasons for the prevalence of malnutrition in this specific catchment area are varied: strikingly high numbers of people with HIV infection and disabilities. Much more sensitization is needed in order to prevent new cases and to help children who are already affected. Also the extremely low educational status especially of the mothers has to be looked at. Basic health care education is urgently needed in the villages to teach mothers who have never gone to school about hygiene, balanced diets and family planning. This study showed that it is possible for most families to keep their children healthy, so more effort should be put into the prevention of malnutrition instead of only on treating children when it is already late. Therefore the government and the local counsellors should think and plan about how to improve the lives of this “poorest of the poor” people.

The scope of this study is limited on account of limitations of time and money. There are still many things that require more investigation which can only be obtained through an examination of a larger number of patients and more reliable data to interpret. One issue that seems to be very important, and needs to be looked at more closely is the stigma of malnutrition in the community. It seems that many people are afraid of bringing their malnourished children for treatment. If we can get more information about the reasons for this and what actually goes on, we might be able to prevent many deaths in the villages because of malnutrition.

Appendix: Table 1
Statistics of Children admitted for feeding program in NU in 2006

Type of PEM	Status at discharge				Total number
	Improved	Died	Escaped	Transferred	
Kwashiorkor	26 (76%)	5 (15%)	2 (6%)	1 (3%)	34 (18%)
Marasmus	99 (83%)	16 (12%)	1 (1%)	5 (4%)	120 (63%)
Marasmic Kwashiorkor	15 (50%)	13 (43%)	1 (3%)	1 (3%)	30 (16%)
Others (orphants, cleftlips...)	5 (83%)	1 (18%)	0	0	6 (3%)
Total number of patients with malnutrition	145 (76%)	34 (18%)	4 (2%)	7 (4%)	190
Number of not malnourished patients from other wards for diarrhoea diet or food assistance					81
Number of patients seen in home-visit (follow-up)					85

Appendix: Table 2

Expenditure distribution of the Nutrition Unit in 2006

Income and Expenditure Statement												
Kumi Nutrition Unit, Kumi Hospital, P.O.Box 9, Kumi												
<u>Expenditure 2006</u>												
month	items										total	total 2005
	foodstuff	household items	drugs	salaries/ allowances	administration/ office	inventory	transport	construction/ labour	Outreachfond	Education/Training		
January	494.700	100.600	0	683.200	1.500	0	6.000	6.000	0	0	1.292.000	981.650
February	461.050	54.200	0	503.400	0	0	3.000	3.000	0	0	1.024.650	1.127.950
March	237.550	19.100	53.800	503.400	1.300	0	46.200	6.000	0	0	867.350	1.646.750
April	752.400	67.400	25.000	503.400	11.700	0	49.700	107.000	0	0	1.516.600	969.550
May	289.300	60.200	0	644.700	0	18.500	66.700	23.000	0	0	1.102.400	1.744.100
June	866.300	45.800	184.000	584.800	13.000	18.000	59.000	14.500	34.000	650.000	2.469.400	1.180.700
July	685.050	39.900	0	751.900	0	36.500	120.300	0	0	0	1.633.650	997.600
August	519.700	59.300	41.750	547.800	44.500	112.500	149.200	16.000	110.000	0	1.600.750	1.182.750
September	681.600	123.500	0	590.400	49.850	17.000	266.700	45.000	105.000	0	1.879.050	1.361.000
October	781.900	140.100	107.800	804.800	8.500	54.000	194.300	0	105.000	100.000	2.296.400	1.616.900
November	551.600	75.400	0	747.800	7.500	7.400	302.600	0	55.000	0	1.747.300	1.038.900
December	1.072.000	62.800	0	50.000	8.500	0	69.500	22.500	0	0	1.285.300	1.250.900
total (year)	7.393.150	848.300	412.350	6.915.600	146.350	263.900	1.333.200	243.000	409.000	750.000	18.714.850	
<i>total 2005</i>	<i>5.458.850</i>	<i>481.800</i>	<i>625.200</i>	<i>7.048.550</i>	<i>137.550</i>	<i>709.000</i>	<i>494.300</i>	<i>143.500</i>	<i>0</i>	<i>0</i>		<i>15.098.750</i>
monthly average	616.096	70.692	34.363	576.300	12.196	21.992	111.100	20.250	34.083	62.500	1.559.571	1.258.229
<u>Income 2006</u>												
Money from German Missionary Medical Team											18.714.850	