NUTRITIONAL AND MORBIDITY OUTCOMES OF CHILDREN MANAGED FOR SEVERE ACUTE MALNUTRITION IN JIGAWA STATE, NIGERIA.

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ABSTRACT

INTRODUCTION: The community-based approach to the management of severe acute malnutrition (SAM) is a cost effective and scientifically sound method of mitigating the soaring burden of under-five malnutrition in resource constrained countries. However, since the adoption of this novel intervention in Nigeria, local studies that have evaluated its overall effectiveness are sparse.

METHODOLOGY: This longitudinal observational study was designed to assess at discharge, the nutritional status, as well as the nutritional related co-morbidities of 494 children enrolled into the Community Management of Acute Malnutrition (CMAM) programme. It is part of an impact evaluation study. The parameters evaluated at enrolment and at discharge included the anthropometry, presence of common morbidities and immunization status. Data were captured electronically with the aid of CSPro software. The study was carried out across 10 randomly selected CMAM clinics in Jigawa state, North West Nigeria.

RESULT: Out of the 494 malnourished children recruited, 410 were discharged, the remaining were reported as absconded or died, with an average duration of stay of 7.3±1.6 weeks in the clinics, and a discharge cure rate of 63.4%. There was improvement in the mean weight (6.0kg at enrolment vs 7.3kg at discharge, p=0.000), mean occipito-frontal circumference (44.1cm at enrolment vs 45.3cm at discharge, p=0.000) and Weight-for-Height z score (-2.65 at enrolment vs 0.75 at discharge, p=0.000). A significant discordance in the nutritional outcome at discharge, as assessed independently by Mid Upper Arm Circumference (MUAC) and Weight-for-Height z score (WHZ), was documented; 9% and 28% still had SAM at discharge based on MUAC and WHZ respectively (p=0.000). The burden of nutritional related morbidities (diarrhoea dysentery, refusal to eat) reduced significantly at discharge (p=0.000) while immunization coverage increased by 7%.

CONCLUSION: The CMAM programme in Jigawa, Nigeria has undoubtedly yielded positive outcomes. However, proactive measures should be taken to achieve the Sphere standards recommended minimum discharge cure rate. This may be achieved by ensuring that health care workers continually adhere to the guiding principles of CMAM. There is also a need for introduction of HIV and tuberculosis screening as non-responders maybe infected by any of these diseases.

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INTRODUCTION

Malnutrition contributes about 53% of deaths of children under-five in developing countries. According to the United Nations International Emergency Fund (UNICEF) estimates, around 50.5 million under five children suffer from severe acute malnutrition (SAM) in these countries.[1]

Children with SAM often present with varied morbidities which may in themselves be triggers or determinants of poor outcomes of treatment of the condition. The outpatient treatment of SAM focuses on children with no medical complications. Although, the children may have symptoms such as fever, cough, diarrhoea and vomiting, but so long as these symptoms are not related to a severe condition, they are treated on outpatient basis with the administration of ready to use therapeutic feeds (RUTF), antibiotics and others as needed.[2]

The World Health Organisation (WHO) defines SAM in children 6–59 months old as: weight-for-height Z score (WHZ) <−3.0 and/or mid upper arm circumference (MUAC) <115 mm and/or bilateral pitting oedema.[3] These, alongside a good appetite test, serve as part of the admission criteria into the Outpatient Therapeutic Programme (OTP), which is an essential component of the Community Based Management of Acute Malnutrition (CMAM) model. The recommended discharge indices include MUAC >12.5cm, and/or WHZ ≥-2. Subjects are expected to spend up to 8weeks on

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admission and not more than 12weeks according to the Nigerian adaptation.[4] Eligible SAM children are provided with weekly rations RUTF, along other routine medications such as de-worming tablets, antibiotics, vitamin A, folic acid and measles vaccine.[4]

The CMAM programme has recorded several outcomes among implementing countries with some good and some below expected standards. Discharge cure rates of over 70% has been previously reported[5] There is however paucity of data on morbidity and treatment outcomes among SAM children in OTPs in the northern parts of Nigeria. The mean duration of stay is largely unknown and the changes in morbidity pattern from time of admission to discharge are also unknown.

This study was intended to evaluate the morbidity pattern and treatment outcome of patients admitted into the CMAM programme in 10 OTP sites in Jigawa State, North- west Nigeria.

METHODOLOGY

Study location

This study was conducted in Jigawa state, northwest Nigeria and it was part of an Operation Research Impact Evaluation (ORIE) studies. The research was carried out in ten CMAM clinics within two randomly selected local government areas (LGA) of the state. Jigawa is a high malnutrition burden state with a prevalence of global acute malnutrition of 17.6% according to the 2016 Multiple Indicator Cluster Survey (MICS).[6]

Study design

This was a longitudinal cohort study of children, 6-59months, admitted with diagnosis of SAM using MUAC <11.5cm in the selected LGAs. The study was a two-phased study with an enrolment phase lasting four weeks from June 6th to July 4th 2016 and a discharge phase conducted from July 4th 2016, when the first discharge occurred, to September 2nd 2016 when the last enrolled subject would have been discharged following recommended guidelines of a maximum stay of 12weeks. Children who met the admission criteria and enrolled into the CMAM program were consecutively sampled until the calculated sample size was achieved.

The CMAM clinics are manned by community health extension workers who have received prior training on the CMAM programme. Clients are either self-referred or identified in the communities by community volunteers who have received training on how to identify SAM patients using the MUAC tape and referred to the nearest CMAM site.

The study was an impact evaluation study, hence the research team were not involved in the determination of the outcome of care.

Data collection

Data received were entered into CSPro (US Census Bureau) platform mounted on android devices and analysed using Stata 14 (Stata Inc USA). The anthropometric measurements of weight and height were transformed to z-scores based on the WHO 2006 growth standard. Data were expressed as frequency tables, Student T test was applied for comparison of means, and Chi statistics was used for comparison of categorical variables. A p statistic of <0.05 was considered as significant.

Ethical Clearance

Ethical approval for the study was obtained from the Jigawa State Primary Healthcare Development Agency and consent was obtained from the caregivers of the children.

RESULTS

General characteristics

A total of 494 subjects were recruited at admission of which 410 were discharged. Those not discharged (83) were out of the scope of this study, hence not part of this analysis. Out of those discharged , females were 213 (52%). Mean age at admission was 15.9±6.9months and at discharge was 17.4±6.7months, p=0.002.

The mean duration of stay in clinic was 7.3±1.6weeks (4-12), with most discharges occurring before eight weeks in care.

There was a general improvement in the mean anthropometric measurements from admission to discharge. This is shown in table 1.

Table 1: General nutritional status

Variable	Admission (n=410)		Discharge (n=410)		*P*
Mean HC	44.1	(CI 43.9-44.3)	45.3	(CI 45.0-45.5)	0.000
Mean weight	6.0	(CI 5.9-6.1)	7.3	(CI 7.2-7.4)	0.000
Mean height/length	68.9	(CI 68.3-69.6)	69.8	(CI 69.1-70.5)	0.07
WHZ	-2.65	(CI -3.8, -1.4)	0.75	(CI -0.4, 1.9)	0.000
Mean duration of stay	7.3±1.6weeks (Range 4-12weeks)				

Treatment Outcome

Among the subjects, 260 (63.4%) were discharged cured (MUAC>12.5cm). There were 141 (34.4%) discharges with moderate acute malnutrition (MAM) (MUAC 11.5cm-12.5cm) **(Table 2)**. Using WHZ parameters, 116 (28.3%) were discharged with SAM and 59 (14.4%) with MAM.

Table 2: MUAC and WHZ status on admission and discharge

Nutritional status	Admission		Discharge	
MUAC	n	%	n	%
SAM (<11.5)	404	98.5	9	2.2
MAM (11.5-12.5)	6	1.5	141	34.4
Normal (>12.5)	0	0.0	260	63.4
Total	410	100.0	410	100.0
P=0.000				
WHZ				
SAM (<-3)	279	68.0	116	28.3
MAM (-3 to -2)	63	15.4	59	14.4
Normal (>-2)	68	16.6	235	57.3
Total	410	100.0	410	100.0
P=0.000				

Most discharges occurred before eight weeks, **(Table 3)**. Of the subjects, 131 (66.5%) who spent <8weeks were discharge cured as against 78 (56.5%) discharge cured at eight weeks and 51 (68.0%) discharge cured after 8weeks, p=0.048. More subjects discharged at 8weeks of care had global acute malnutrition (SAM+MAM), 43.5%. This is shown in **Table 4**.

Table 3: Duration of stay in care

Categories	Frequency	Percent
<8weeks	197	49.0
8weeks	138	33.7
>8weeks	75	18.3
Total	410	100.0

Mean duration of stay 7.3± 1.6weeks

Table 4: Discharge nutritional status and duration of stay

Nutritional status	<8weeks		8weeks		>8weeks		Total	
(MUAC)	n	%	n	%	n	%	n	%
SAM	2	1.0	7	5.1	0	0.0	9	2.2
MAM	64	32.5	53	38.4	24	32.0	141	34.4
Normal	131	66.5	78	56.5	51	68.0	260	63.4
Total	197	100.0	138	100.0	75	100.0	410	100.0

P=0.048

Changes in morbidity pattern

Most subjects, 330 (80.5%), reported a history of illness in the last one month before admission into care. There was significant reduction in the number, 158 (38.5%), of subjects reporting history of illness in the last one month before discharge, p=0.000. (Table 5)

The commonest morbidities at presentation were fever (71.1%), diarrhoea (43.7%) and cough (14.2%). These all showed significant decline at the time of discharge as shown in Table 6.

Table 5: History of ill-health within previous month

	Illness	No illness	Total
At admission	330 (80.5%)	80 (19.5%)	410(100%)
At discharge	158 (38.5%)	252 (61.5%)	410(100%)
P=0.000			

Table 6: Changes in morbidity patterns

Common morbidities	Admission	Discharge	P value
Fever	291 (71.0)	149 (36.3)	0.000
Diarrhoea	179 (43.7)	98 (23.9)	0.000
Dysentery	24 (5.85)	8 (1.9)	0.004
Refusal to eat	19 (4.93)	0 (0.0)	0.000
Cough	58 (14.2)	26 (6.3)	0.000

Changes in morbidity pattern

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Table 7: Immunization status

Status	Admission	Discharge	X^2	P value
Completed/up-to-date	110 26.8	139 33.9	RC	
Incomplete	160 39.0	160 39.0	1.91	0423
Unimmunized	140 34.2	111 27.1	6.74	0028
Total	410 (100.0)	410 (100.0)		

X^2 6.728, P=0.034 RC=reference category

DISCUSSION

This study demonstrates the treatment and morbidity outcome of SAM patients seen in CMAM clinics in Jigawa state, northern Nigeria. SAM patients are considered discharged cure if MUAC at discharge is ≥12.5cm with no medical complications. This study reports a discharge cure rate of 63.4%. This is less than the Sphere minimum standard of 75%.[7] The observed discharge cure rate is, however, about twice the discharge cured rate reported in Tamale, Ghana, where a cure rate of 33.6% was observed.[8] Retrospective studies in Wolaita southern Ethiopia and Kamba district, Southwest Ethiopia reported a similar cure rate with this study's findings, 64.9% and 67.7% respectively.[9,10.] The less than accepted cure rate seen here may be due to undetermined co-morbidities such as tuberculosis, HIV infection, cardiac and renal pathologies in the study population. It may also be due to quality of care given at the health facilities, given the large number of clients with few and sometimes untrained personnel managing the centres. Thus, stakeholders in the CMAM program will have to review this outcome and address the challenges.[11]

The mean duration of stay in the clinics was 7.3±1.6weeks. This is slightly longer than the median duration of 7.1weeks reported in Kamba district by Shamka *et al*[10] and the 6.8weeks by Kabalo and Seifu in Wolaita[9], although the cure rates in Wolaita (64.9%) was slightly higher than those of this study. The observed duration of stay thus indicates that OTPs are discharging patients outside of the recommended eight weeks. From our observations, significant numbers of subjects were discharged before eight weeks. This varied discharge dates may be contributory to the failure to meet the Sphere standard of >75% discharge cure rate, because, it is expected that with more time spent more patients would have been cured as can be seen in our study where no patient discharged after eight weeks of treatment had SAM. However, in our study, shorter study duration was not significantly associated with poor outcome (Table 4). There was a general decline in the morbidities reported by the subjects at the time of discharge compared with what was reported at enrolment.

The percentage of subjects that reported fever at admission was 71% but markedly declined to 36.3% at discharge. History of diarrhoea also showed significant decline, among other complaints. This further lends evidence that resolution of morbidities justifies the various interventions received at the OTPs such as the antibiotics, vitamin A and RUTF. These morbidities, if unattended to, have the potential to make uncomplicated SAM to worsen, requiring inpatient care with a possible poorer clinical outcome. Irena AH *et al* in Lusaka Zambia noted that children with diarrhea have a two and half times higher odds of mortality than those without diarrhea.[12]

Even though, the OTP attendance also impacted positively on immunization uptake as the number of unimmunized children showed a significant decline with a corresponding increase in the number of children with complete/up-to-date immunization status, 111(27.1%) of the patients still had not received any immunization in spite of repeated contact with healthcare providers. This figure is similar to the no-immunization rate of 29.9% reported in the Nigerian Demographic Health survey of 2013 and reflects the underlying prevalent poor knowledge, attitude and practices about immunization in Northern Nigeria.[13] This may also be as a result of poor level of implementation of the CMAM packages which includes immunization services. Childhood immunization has been reported to lower prevalence of both wasting and stunting.[14] The integration of immunization services helps in the identification of sick children and subsequent referral to care centres.

CONCLUSION

Community Management of SAM has shown significant improvement in the nutritional status and morbidity of children admitted. The programme has also contributed to the uptake and completion of immunization of children within the period of the study. However, the less than standard discharge cure rate seen in the study requires a review of clinical practices at the OTPs to determine what factors are responsible for this outcome. Capacity of health care workers and supplies of commodities, which was not assessed in this study, rather than the severities of the patients' condition, are perhaps more important predictors of the outcome of care in the studied population.

There is a need to integrate retroviral and tuberculosis screening into the CMAM programme. Subjects staying longer, poorly responding or non-responding may have underlying HIV infection or even tuberculosis, hence a need to investigate this early in the course of treatment.

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