Cure Rate and Associated Factors for Children with Severe Acute Malnutrition Under the Out Patient Therapeutic Care Programme in the Health Centres of Kabale District in Southwestern Uganda. A Cross Sectional Study.

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Abstract

BACKGROUND

Severe Acute Malnutrition (SAM) is one of the leading causes of morbidity and mortality among children under the age of five. Globally, SAM affects 19 million children with sub-Saharan Africa being the most affected. In Uganda, Global acute malnutrition (GAM) affects 4% and SAM 1% children. Kabale district in South Western Uganda, located in Kigezi sub-region, has been reported to have a GAM prevalence of 3.8 % and SAM of 2.9% among children below five years. To ensure timely detection and management of SAM, the government of Uganda in collaboration with development partners introduced Out Patient Therapeutic Care (OTC) program in all health centre level III and IV in Kabale district. However, there is limited information about the Cure rate of children and associated factors under the OTC program in Kabale district. This study was therefore designed to assess the Cure rate and factors affecting it.

METHODS: A retrospective cross-sectional study was carried out on records of children under five years of age (n=637), presenting with SAM and enrolled on OTC program in the health centres of Kabale district between 2013 and 2015. Data were collected from the nutrition registration logbook using a structured check list and cleaned using Microsoft Excel. Data were then exported into STATA 12 for analysis. Univariate and Bivariate analysis together with logistic regression were run to generate frequencies and factors associated with the recovery of children from SAM.

RESULTS: The Cure rate was 36.3% (n=231 cases) with a median Recovery time of 21 days. The Default rate was 58.6% (n=373 cases) while the Non-response rate was 0.6% (n=4 cases). Bivariate and multivariate analyses revealed that source where the child was coming from at admission Adjusted Odds Ratio (AOR = 0.1, 95% CI 0.0, 0.7, p = 0.012), Weight at admission (AOR = 0.5, 95% CI 0.0, 0.9, p = 0.014) and Number of visits to the program (AOR = 14.9, 95% CI 9.3, 24.2, p = 0.040) were the major factors influencing the recovery of severely Malnourished children admitted in OTC programme in health centres in Kabale district.

CONCLUSION: Overall the Cure rate and Default rate for the children under the OTC programme in Kabale district were found to be very unacceptable according to both the national and international standards. However, Death rate and Non-response rate were within the acceptable levels. To improve the Cure rates of children with SAM under the OTC programme in Kabale district, there is need for interventions aimed at encouraging caretakers to pay special attention to the number of visits to the programme.

Introduction

Severe Acute Malnutrition (SAM) is defined as very low weight-for-height that is characterized by visible severe wasting or by the presence of nutrition Oedema and an upper arm circumference of less than 115mm in children 6–59 months (WHO, WFP and UNICEF, 2007; Hobbs and Bush 2014). SAM is a global public health problem which affects an estimated 52 million children under five with an annual mortality rate of 1 million children, of which 90% are from Asia and Sub-Saharan Africa (Hobbs and Bush, 2014; Ferguson et al., 2009). Directly or indirectly, SAM is responsible for 53% of deaths of children under-five in developing countries (UNICEF, 2012; Collins, 2007) and the short term consequences, including compromised brain development, reduced growth and changes in body composition and metabolic programming among the survivors who may also end up growing up into poorly nourished adults (Shrimpton R, 2006; Mercedes et al., 2012; Obaid T. A, 2004).

According to a longitudinal study carried out by the World Health Organization and UNICEF in 2007, Uganda had a mortality rate of 12% among the under-fives due to SAM. The UDHS 2016 highlights the problem of malnutrition with stunting, wasting and underweight existing at a rate of 29%, 4% and 11%, respectively (UDHS, 2016).

In 2010, OTC programme were introduced in all the health centre Level III and IV in Kabale, to ensure timely detection and management of children who were found severely malnourished without medical complications (Wamani, 2014; IMAM guideline, 2016). Nevertheless, in 2014, the GAM situation in Kabale district persisted at 3.8% and SAM at 2.9% despite the intervention (Wamani, 2014). Since the introduction of the programme, there has not been a comprehensive study conducted to evaluate its Cure rate and associated factors. This study was therefore designed to assess Cure rate and its associated factors.

Methodology

Study design

A retrospective health centre based cross-sectional study design was used.

Study site

This study was carried out in health centers Level III (n=23) and IV (n=07) of Kabale district located in Kigezi sub-region, south western Uganda. Kabale district is approximately 420 km from Kampala; the capital city of Uganda and, according to the district local government statistics (2012), has a population of 490,227 people with an under five population of 101,103 whose prevalence of Severe Acute Malnutrition lies at 1% according to Wamani (2014).

Selection of health centres that participated in the study

All the health centres were purposively selected based on participation in implementing the OTC program. A total of 17 health centres were selected to participate in the study. Twelve (12) were health centre IIIs and 5 were health centre IVs.

Target population

All children aged 6–59 months who were enrolled and treated for severe acute malnutrition under the OTC Programme from July 2013 to January 2015 and had information on age, sex, source of admission, nutrition status and exit outcome were included in the study.

Sample size (calculation/estimation)

The study sample size was calculated based on Kish and Leslie's formula (Negash et al., 2015)

$$N = \frac{Z^2P(1-P).}{d^2} = \frac{1.96^2 \times 0.85(1-0.85)}{0.03^2} = 544 \text{ Children.}$$

Where

N is sample size and

d is the margin of error

Z is cut off point at 5% level of significance

P is prevalence of cure rate (85%) obtained from a similar program in Kabongo in 2011in the under five children with SAM (ACF, 2011)

By adding 15% for compensation of missing data (Tefera, et al, 2014), the final sample size was

N= 625 children.

A roaster of eligible children was generated from the registration logbooks and only 637 children were found. The total number of eligible children generated being close to the calculated (625), all of them were enrolled into the study.

Data collection procedure and Quality control

A checklist was used to collect data from the OTC nutrition registration logbook for children aged 6-59 months who had SAM and were admitted to the program between July 2013 to January by a team of 5 trained nutrition research assistants. The quality of data was ensured by thorough training of research assistants who were nutritionists and also by checking all the questionnaires for completeness at every end of the day's data collection.

OTC outcome indicators evaluated in the study

Five outcome indicators were evaluated in this study: Cure rate, Death rate, Default rate, Non-response rate and Referral rate (Table 1). In addition, the average length of stay (days) on the programme before discharge was also evaluated.

Data management and Analyses

Quantitative data was entered into Microsoft Excel, cleaned and then imported into STATA version 12 for analysis. Univariete analysis was run to generate frequencies and percentages of the programme outcome indicators (Cure rate, Death rate, Default rate, Non-response rate and Referral rate) together with other general characteristics of the study population. All the factors that were found to be associated with the Cure rate of children in bivariate analysis were further analysed using multivariate analysis to assess the true factors associated with Cure rate. Adjusted Odds Ratios (AOR) together with their respective 95% confidence intervals were reported in the table. P-Values < 0.05 were considered to be statistically significant.

Results

The socio-demographic characteristics of the children (6-59 months) were summarized in Table 2. The results indicate that out of the total 637 children, 54% (n=343) were females, 47.4% (n=302) children were aged 6-12 months. Most of the children 54% (n=344) were being managed from health centre level IV and the average weight for the children at admission was 7.1+2.1 kg with over 64% (413) having an admission weight of 6 – 10 kg. The average height for the children was 71.5+27.8 cm with the majority (45.2% (n= 288) children in the range of 60-69.9 cm.

The study findings indicate that only 4.4% (n=28) were HIV positive. About 2.5% (n=16) of the HIV positive children were moderately malnourished. About 2% (n=174) of the children who participated in the study did not have HIV test results in their records. The majority of the children 71% (n=452) had SAM without Oedema. Admission was more from the community 96.7% (n=616) and only 8.5% (n=54) of the children were re-admitted into the program.

Programme outcome indicators in comparison with national IMAM and Sphere standards

The results of the programme indicators presented in Table 3 show that the cure rate was at 36.3% (n=231) while the death rate was at 1.1% (n=7). The results indicate that there was a high default rate of 58.6% (n=373). The non-response rate was at 0.6% (n=4). The results also indicate that the average length of stay on the programme was 21 days with about 20% (n= 124) staying on the programme for more than 30 days and referral rate at 3.5% (n=22). The average number of visits made by the children under the programme was 1.4+1.7 visits.

Results of bivariate and logistic regression analysis to establish the factors associated with cure rate are summarized in Table 4.

The bivariate analysis indicated that the health center where SAM management was done (OR= 0.6, 95% CI: 0.4 - 0.8, p = 0.02), the source where the child was coming from (OR = 0.3, 95% CI: 0.8 - 0.9, p = 0.033), the weight at admission (OR = 0.5, 95% CI: 0.4 – 0.7, p = 0.0006), the number of visits to the program (OR = 6.9, 95% CI: 4.0 – 11.9, p = 0.001) and the Length of stay on the program (OR = 7.0, 95% CI: 4.1 – 12.3, p = 0.001) were associated with the Cure rate. After adjusting for any possible confounders in multivariate analysis, only the Source of admission (AOR = 0.1, 95% CI: 0.0, 0.7, P = 0.012), Weight at admission (AOR = 0.5, 95% CI: 0.0, 0.9, P = 0.014) and Number of visits to the program (AOR = 14.9, 95% CI: 9.3, 24.2, P = 0.040) were the major factors influencing the recovery of children from severe acute malnutrition under the OTC programme.

Discussion of Results

The findings showed a Cure rate of 36.3% of the children who were enrolled into the OTC program which was very low compared to both the IMAM and the Sphere Standards that recommend a Cure rate of greater than 75% which puts the programme in the study into an alarming state. The results indicated a lower Cure rate than in similar studies done in Ethiopia, Pakistani and Zambia (Genene et al., 2019; Eleanor et al., 2019; Mwanza et al., 2016). However, the results of this study showed a slightly higher Cure rate than the one observed in a similar study done in Ghana in 2015 with a Cure rate of 33.6% (Mahama et al., 2015). The reason for this could be due to the frequent stock outs of the Ready to Use Therapeutic Feeds (RUTF) as confessed by many of the health centre in charges, which interferes with children's recovery.

The Death rate, the Non-response rate and the average Length of stay were within acceptable levels based on both the national and international sphere standards. Death rate in the study were in line with studies done in Ethiopia (Negash et al., 2015; Binyam et al., 2019; Mulugeta et al., 2017) and in Pakistan (Eleanor et al., 2019). It was also

noted that the Death rate in the current study was much lower than the one observed in Malawi (Saddler, 2003). This was because of proper adherence to the treatment protocol under the OTC programme.

The overall Default rate in this study was way out of the national and the international standards and also higher than findings in similar studies in other countries like Ghana (Mahama et al., 2015), Ethiopia (Tefera et al., 2014; Mulugeta et al., 2017), and Pakistani (Eleanor et al., 2019). However, the Default rate was found to be close to a recent study done in Ghana by Mahama et al in 2015 and the one done by Action against Hunger (2011) in Moroto Karamoja sub-region in North Eastern Uganda. In general, the default rate was very unacceptable and this was fuelled by frequent stock outs of RUTF and long distances walked by the caretakers to reach the health facilities as mentioned by the In charges and also as indicated by ACF in Karamoja sub-region Northern Uganda.

The average Length of stay on the program for children who cured from SAM was 21 days (3 weeks) which was within the acceptable national and international standards and this agrees with recent studies done in Ghana (Mahama et al., 2015)] and in Ethiopia (Tefera et al., 2014; Kabeta and Bekele, 2017; Muluken B.M, 2018). This was due to the caretaker compliance to the programme.

The Nonresponse to treatment was within the acceptable levels and this was due to early health seeking behaviours by the caretakers which reduces long stay to the OTC programme which is in line with sphere standards (2004) where it's noted that seeking treatment late is associated with delayed or long stay on the programme.

The factors predicting Cure of children from severe acute malnutrition under the OTC programme

The source where the child was admitted from was significantly associated with the cure of the child from severe acute malnutrition. It was seen that children who were admitted from the community were 0.3 times less likely to cure from SAM than those admitted from other health facilities and finding was similar to studies done in Zambia and Ghana (Michelo and Muyode, 2012); Hamulembe, 2010) and this was because of the poor health seeking habits of children admitted from the communities as they report to the health facilities late. However this study was contrasting with a similar study done in Ghana by Mahama et al 2015 which did not find any association between source of admission and cure of children from severe acute malnutrition.

The weight of the child at admission was also associated with the child's Cure from SAM. The admission weight between 6 - 10 kgs were 0.5 times less likely to cure from SAM as compared to those between 3-6 kgs with reason linking to the breastfeeding age. When cross tabulations were run, it was noted that majority children between the ages of 6 – 12 months were falling in the weight ranges of 3 – 6 kg meaning that breast feeding children if complemented with RUTF can have better cure rates than elder children. However this was contradicting with findings of the study done in Ghana by Mahama et al. in 2015.

The number of visits the child made to the programme was predicting cure of children from severe acute malnutrition who were admitted to the programme. Children who made between 1 – 4 visits where 4 visits are the standard recommended were 6.9 times more likely to cure from SAM than those who did not make a single visit and this was in line with a study done in Ghana and Ethiopia (Mahama et al., 2015 and Hamulembe, 2010). The reason was compliance to treatment that enabled cure of children.

Other factors like Length of stay on the programme, age of the child at admission and the health centre where the child sought treatment seemed to be associated with cure of children from severe acute malnutrition in Bivariate analysis but it was because of confounding that they appeared so. However these factors have been found significant in other studies done in south Sudan, Malawi and Zambia by other countries but in this particular one they were not predicting cure rate of children (Taylor, 2001; Saddler, 2003; Michelo and Muyode, 2012).

Study limitations

The study relied on secondary data, which lacked information on weight gain, history on breast feeding and distance from home to the health centre, which other studies elsewhere found significant in determining Recovery of children from severe acute malnutrition under the OTC programme.

Conclusion

From this study, it can be concluded that the OTC programme in Kabale district was not performing well due to the low Cure rates and the high Default rates. There is need for (i) detailed investigation on the causes of high default rates, (ii) capacity building among the health workers required to improve delivery of OTC services in the health centres and (iii) putting in place interventions that encourage caretakers to make more visits to the programme.

Abbreviations

OTC: Outpatient Therapeutic Care, IMAM: Integrated Management of Acute Malnutrition, AOR: Adjusted Odds Ratios, SAM: Severe Acute Malnutrition, RUTF; Ready-to- Use Therapeutic Food, CI: Confidence Interval, ITC: Inpatient Therapeutic Care, ACF: Action Against Hunger, OR: Odds Ratio, MAM: Moderate Acute Malnutrition, HIV: Human Immune-deficiency Virus, MDG: Millennium Development Goals, HC: Health Centre, SD: Standard Deviation, MUAC: Mid-Upper Arm Circumference, BMI: Body Mass Index, WFH: Weight For Height, FANTA: Food and Nutrition Technical Assistance, UNICEF: United Nations Children Education Fund.

Declarations

Ethical considerations and consent to participate

Approval to conduct this study was obtained from Makerere University School of Public Health Higher Degrees Research and ethics Committee. Permission was also sought from the District Health office. The purpose, risks and benefits of this study were explained to the health workers in the health centres from which data was collected. However no subject consent was needed for this study.

The need for informed consent to access the medical records of the OTC clients was waived by the Makerere University School of Public Health Higher Degrees Research and ethics Committee and Authors [2&3] had access to OTC client's information during the analysis.

The methods were performed in accordance with the guidelines and regulation of the Declaration of Helsinki during data collection as approved by Makerere University School of Public Health Higher Degrees Research and ethics Committee.

Consent for publication

Not applicable for this study.

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Availability of raw data

Data will be made available upon request from the corresponding author

Conflict of Interest

The Authors of this work declare that they have no conflict of interest

Authors' contributions

Vincent S came up with the idea of the study, developed tools, managed data collection, analysis, interpretation and drafting of the manuscript. Henry W and Fred K assisted in data collection supervision, development and improvement of tools, oversaw analysis as well as interpreting results. Abel A participated in statistical analysis, interpreted results and critically reviewed the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1. Definition of OTC programme outcome indicators based on National IMAM Guidelines of 2016

Outcome Indicator	Definition
Cured	Attained Weight For Height (WFH) Z score >-2 SD or Normal Mid Upper Arm Circumference (MUAC) (>125mm) cut off for two consecutive visits
Non response	Not reached target WFH or MUAC without aggravating conditions for 3 months on the program
Defaulter	Patients missing two consecutive visits while on the program
Dead	Patient died while on the program
Transfer/Referral to ITC	Static WFH or MUAC or weight loss for two consecutive visits or not responding to treatment.

Source: IMAM Guidelines for Uganda 2016

Table 2. Showing the socio-demograpghic characteristics of children enrolled on OTC programme

Characteristic	**Percentage (Frequency) N=637**
Sex	
female	54 (343)
male	46 (292)
Age in months	
6-12	47.4 (302)
13-18	24.8 (158)
19-24	13.3 (85)
25-59	14.4) (92)
Height in cm	
50-59.9	6.1 (39)
60-69.9	45.2 (288)
70-79.9	39.7 (253)
80-150	8.9 (57)
Weight at admission	
3-5.9	26.5 (169)
6-9.9	64.8 (413)
10-14.9	7.7 (49)
15-22	0.9 (6)
Nutrition status	
SAM without oedema	71 (452)
SAM with oedema	3.9 (25)
MAM with HIV	2.5 (16)
MAM with TB	22.6 (144)
HIV status	
Positive	4.4 (28)
Negative	68.3 (435)
Unknown	27.3 (174)
Source of admission	

Community	96.7 (616)
Health centre	3.3 (21)
Readmission	
Yes	8.5 (54)
No	91.5 (583)

Table 3: Programme Outcome Indicators in comparison with National IMAM and International Sphere standards

Indicator	**Results** **N=637** **Percentage (Frequency)**	**IMAM Standard**	**Sphere Standard**	
			Acceptable	**Alarming**
Cured	36.3% (231)	≥75%	> 75%	<50%
Died	1.1% (7)	<5%	< 10%	>15%
Defaulted	58.6% (373)	<15%	< 15%	>25%
Non-respondent	0.6% (4)	<10%	15%	
Referred	3.5% (22)	<10%		
Average Length of stay	21 days	<60 days	< 8 weeks	>6 weeks
Average Recommended number of visits	1.4	4 visits		

Table 4: Results of bivariate and multivariate analysis indicating factors associated with the Cure of children from SAM in the Health centres of Kabale district between 2013 and 2015

Variable	Frequency (%)	OR (95% CI)	P-value	AOR (95% CI)	P-value
Health centre					
IV	344 (54)	1.0			
III	**293 (46)**	**0.6(0.4 – 0.8)**	**0.02**		
Source of admission					
Health centre	21 (3.3)	1.0			
Community	**616 (96.7)**	**0.3(0.8 – 0.9)**	**0.033**	**0.1 (0.0 – 0.7)**	**0.012***
Weight at admission					
3 – 5.9	169 (26.5)	1.0			
6 – 9.9	413 (64.8)	**0.5(0.4 –0.7)**	**0.0006**	**0.5 (0.0 – 0.9)**	**0.014***
10 – 14.9	49 (7.7)	2.5(0.3 – 1.2)	0.118		
15 – 22	6 (0.9)	2.2(0.0 – 1.9)	0.139		
No. of Visits					
0	320 (49.9)	1.0			
1 – 4	**283 (44.8)**	**6.9(4.0–11.9)**	**0.001**	**14.9(9.3 – 24.2)**	**0.040***
5 – 8	**34 (5.3)**	**5.8(2.3–14.9)**	**0.001**		
Length of stay (days)					
0	284 (44.6)	1.0			
15– 30	229 (35.9)	**7.0(4.1–12.3)**	**0.0001**		
31 – 120	124 (19.5)	**5.3 (0.2 - 8.7)**	**0.0001**		
Age					
6 – 12	302 (47.4)	1.0			
13 – 18	158 (24.8)	0.8(0.6 – 1.2)	0.330		
19 – 24	**85 (13.3)**	**0.5(0.3 – 0.9)**	**0.010**		
25 – 59	92 (14.4)	0.8(0.5 – 1.4)	0.470		
Sex					
Female	343 (54)	1.0			
Male	292 (46)	0.8(0.6 – 1.2)	0.330		
Height at admission					
50 – 59.9	39 (6.1)	1.0			
60 – 69.9	288 (45.2)	0.6(0.3 – 1.3)	0.190		

70 – 79.9	253 (39.7)	0.5(0.3 – 1.0)	0.050
80 – 150	57 (8.9)	0.6(0.3 – 1.4)	0.250
Readmission			
Yes	54 (8.5)	1.0	
No	583 (91.5)	0.9(0.5 – 1.6)	0.680
HIV status			
Positive	28 (4.4)	1.0	
Negative	435 (68.3)	0.9(0.5 – 2.1)	0.920
Unknown	174 (27.3)	0.7(0.3 – 1.6)	0.860
Nutrition status at admin			
SAM without oedema	452 (71)	1.0	
SAM with oedema	25 (3.9)	0.9(0.4 – 2.0)	0.730
MAM with HIV	16 (2.5)	1.8(0.7 – 4.9)	0.230
MAM with TB	144 (22.6)	1.1(0.8 – 1.7)	0.540