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Research Article

Treatment Outcome of Severe Acute Malnutrition and its Determinants among Under Five Children Admitted to Pediatrics Ward at Adama Hospital Medical College, Adama, Ethiopia

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Abstract

Background: Severe acute malnutrition (SAM) is the common reason for pediatric hospital admission in Ethiopia. Different studies revealed that despite numerous advances made in improving child health and the clinical management protocols for treating severe acute malnutrition at treatment centers the mortality rate of under-five children is still higher than the acceptable level. However, treatment outcome and its predictors for severe acute malnutrition have not got enough attention. So, this study aimed to estimate treatment outcomes and its determinant among children with SAM in Adama Hospital Medical College (AHMC).

Objective: To assess treatment Outcome of Severe Acute Malnutrition and its determinants among under five children admitted to pediatrics ward at AHMC.

Methods: A retrospective hospital based cross-sectional study design was conducted on severely malnourished children who were admitted to AHMC from September 2018 to 2019. Data was collected by reviewing severe acute malnutrition registration logbook and patient charts using structured pre tested check lists. The collected Data was entered to Epi-info version 7.2 and it was exported to SPSS version 20 for analysis to assess the treatment out come and factors associated with under nutrition in under five children. Data was summarized by descriptive analysis, figures and tables. To identify associated factors, Adjusted odds ratio was computed and p-value < 0.05 at 95% confidence interval was considered as statistically significant.

Result: A total of 344 records of children with a diagnosis of severe acute malnutrition were reviewed, of these 78.2% had good treatment. The average length of stay and weight gain were 52.5 days and 11.01 g/kg/day respectively. Not taking folic acid [AOR 0.44 95% CI (0.18 - 1.0)], having Rickets [AOR 6.9 95% CI (1.5, 30.7)] and having poor appetite on admission [AOR 0.47 95% CI (0.25 - 0.88)] were factors significantly determine treatment outcome.

Conclusion: The magnitude of treatment outcome of severely malnourished children admitted to AHMC was higher. Not taking Folic acid and having Rickets, co morbidity and poor appetite on admissions were positively associated with treatment outcome.

Keywords: Severe Acute Malnutrition; Treatment Outcome; Adama

Introduction

The term malnutrition addresses 3 broad groups of conditions: undernutrition, which includes wasting (low weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age); micronutrient-related malnutrition, which includes micronutrient deficiencies (a lack of important vitamins and minerals) or micronutrient excess; and overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and some cancers) [1].

SAM is a form of undernutrition which is caused by a decrease in food consumption and/or illness resulting in bilateral pitting edema and/or sudden weight loss. It is defined by the presence of bilateral pitting edema or wasting [low Mid Upper Arm Circumference (MUAC) or low Weight-For-Height (WFH)/Weight-For Length (WFL)] [2].

Globally, in 2018, over 49 million children under 5 were wasted and nearly 17 million were severely wasted. Approximately 149 million children under 5 suffer from stunting from this more than half of all stunted children under 5 lived in Asia and more than one third lived in Africa. The same data shows more than two thirds of all wasted children under 5 lived in Asia and more than one quarter lived in Africa [5].

Severe acute malnutrition is still a major public health problem in many African countries affecting the overall health and development priorities due to the resulting effects. In Africa, 14.0 million children under 5 are wasted, of which 4.1 million are severely wasted [5].

In Ethiopia, based on the 2019 EMDHS (Ethiopia Mini Demographic and Health Survey) the prevalence of stunting has decreased considerably, from 51% in 2005 to 37% in 2019. Moreover, the prevalence of wasting decreased over the same time period, from 12% to 7%. The percentage of underweight children has consistently decreased from 33% to 21% over this 14-year period [3].

In Oromia region from EMDHS 2019 the prevalence of child malnutrition indicated that 16.1% are underweight with 4.9% severe underweight, and 35.6% of the children are stunted with 11.1% sever stunting [3].

Admission for SAM treatment is now based on MUAC < 11.5 cm or any degree of bilateral pitting edema or WFH < -3 z-score, they failed the appetite test, and with medical complications. The management of program is mainly with F-75 (The "starter" formula used during initial management of malnutrition. It contains 75 kcal and 0.9 g protein per 100 ml which is low in protein and sodium and high in carbohydrate because severely malnourished children cannot tolerate normal amounts of protein and sodium or high amounts of fat), F-100 (is used as soon as the child is stabilized on F-75 as a "catch-up" formula to rebuild wasted tissues. It contains more calories and protein: 100 kcal and 2.9g protein per 100 ml) and ready-to-use therapeutic foods (RUTF); other routine medications like antibiotics, vitamin A, folic acid; and de-worming. Children receiving SAM treatment should be discharged when they reach a MUAC ≥ 12.5 cm or WFH ≥ -2 z-scores and have no bilateral pitting edema for two consecutive visits [2].

To address malnutrition in all its forms The Federal Ministry of Health (FMOH) developed the first Protocol for the Management of SAM in 2007, and the Guideline for the Management of Moderate Acute Malnutrition (MAM) in 2012 [2]. The services for the management of SAM and MAM is delivered through the health system including; Health Posts, Health Centers, Woreda, Zonal, Regional and referral Hospitals [1].

Treatment outcomes could be stated as recovered, defaulted, died, medical transfer, and non-respondent based on WHO (World Health Organization) management protocol [1]. Based on that, the recovery, death, and default rates were considered as acceptable when > 75%, < 10% and < 15% respectively and alarming when < 50, > 15 and > 25% respectively. Moreover, weight gain, length of stay, and coverage were thought as acceptable when ≥ 8 g/kg/day, < 4 weeks, and > 50 - 70%, respectively, and considered as alarming when < 8 g/kg/day, > 6 weeks, and < 40% respectively [4]. Weight gain during rehabilitation is defined as Poor, Moderate and Good if weight gain is < 5 g/kg per day, 5 - 10 g/kg per day and > 10 g/kg per day respectively [21]. However, evidences regarding the treatment out come and its determinant in the study area are unknown.

Childhood undernutrition is a major global health problem contributing to childhood morbidity, mortality and impaired intellectual development. Of the 7.6 million deaths annually among children who are under 5 years of age approximately 35% are due to nutrition-related factors and 4.4% of deaths have been shown to be specifically attributable to severe wasting [1].

In Ethiopia despite the improvement made in child health and nutritional interventions the 2019 EMDHS indicates that overall, 7% of children in Ethiopia are wasted, and 1% are severely wasted. Regional variations exist, with the highest percentages of children who are wasted in Somali (21%), Afar (14%) and Gambela (13%), and the lowest percentages of wasted children in Addis Ababa (2%) and Harari (4%) [3].

Children with SAM are nine times more likely to die than well-nourished children as a direct result of malnutrition itself. There are also indirect deaths as a result of childhood illnesses like diarrhea and pneumonia among malnourished children [1].

The WHO indicates that, by following its inpatient management guidelines, less than 10% of children with complicated severe acute malnutrition should die. However, despite reported compliance with these guidelines, health centers in sub-Saharan Africa have reported mortality rates of 10 - 40% among severely malnourished hospitalized children [13].

The cure rate in SAM children was low relative to sphere standard guideline. Prognosis for SAM treatment largely depends on the presence of other comorbidities at admission. Available intervention modalities needed to address coexisting morbidities to achieve a better cure rate in SAM children [14].

Even though malnutrition is one of the major public health problems in Ethiopia, limited information is available on inpatient treatment outcome of SAM and associated factors in AHMC. Besides, the high percentage of death rate in some hospitals in the country is alarming which needs further study to describe the treatment outcome of SAM in other hospitals to assess the factors contributing to the treatment outcome. The study therefore, is aimed at describing the treatment outcome among children of age less than five years and identifies factors contributing to the treatment outcome. It is also intended to forward doable recommendations to health institutions and policy makers on the way to improve treatment outcome of children with severe acute malnutrition.

SAM still contributes to inpatient morbidity and mortality in Ethiopia. There is no recently published research regarding recovery of management of SAM in the study area. The study will help on comparison of the treatment outcome of the study area from other areas in Ethiopia. This study will also contribute on the outcomes of management of SAM in the study area by comparing key clinical outcomes to known international standards. It will contribute to have knowledge on the risk factors associated with the outcomes of treatment of SAM in the study area. The findings from this study will help the Zonal health office, for the health institution, administrators and other non - governmental organization working on therapeutic feeding program service to give great emphasis to the problem of SAM, to identify the gaps on the management of SAM and measure the effectiveness of inpatient therapeutic feeding program of SAM and develop best interventional approaches in the future.

Conceptual frame work

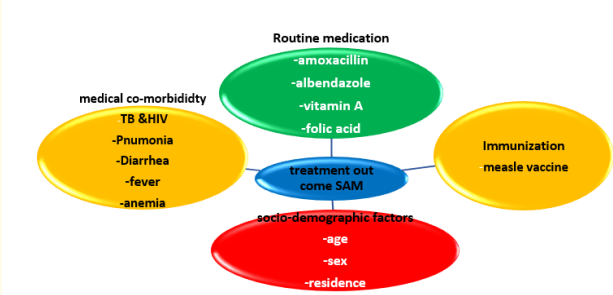

Figure 1

Conceptual frame work of treatment outcome and associated factors of under five children with SAM admitted to TFP at AHMC. Developed from the National Guideline for the Management of Acute Malnutrition in Ethiopia, 2019 [2].

Methods and Participants

Study area and period

The study was conducted in Adama Hospital medical college (AHMC), Adama town, Central part of Ethiopia.

Study design

The study was facility based cross sectional study design.

Source population

All under-five children who were admitted to AHMC pediatric ward with the diagnosis of severe acute malnutrition from September, 2018 to September, 2019.

Study subjects

Medical records and cards of the under-five children who were admitted to inpatient therapeutic feeding units of AHMC from September, 2018 to September, 2019.

Inclusion criteria

Based on Federal Ministry of Health of Ethiopia admission criteria for SAM Failed appetite test WFH < 70% or WFH less than -3 Z-score or WFL < 70% or WFL less than -3 Z-score or MUAC < 115 mm with length > 65 cm or presence of bilateral pitting edema/complication treated in therapeutics feeding units from September, 2018 to September, 2019.

Exclusion criteria

The records of children's chart with incomplete data like children whose treatment outcome not recorded and children whose admission date and discharge date not recorded.

Sample size

sample size for magnitude of treatment outcome

The sample size for magnitude of treatment outcome is determined using the sample size determination formula for single population proportion. A study done in Wolaita zone showed recovery rate of 75.6% and two different other studies in DebreMarkos and Woldia showed recovery rate of 77.9% and 85% respectively. For this calculation, the proportion that gives the highest sample size is taken from study done at Arsi zone showed recovery rate of 74.4% [7]:

$$n = \frac{\left(Z\frac{\alpha}{2}\right)^2 P(1-P)}{d^2}$$ Where, n = sample size derived from estimation formula

Zα /2 = the value of Z at confidence level of 95% = 1.96.

P= is recovery rates of children who had been managed for SAM 0.744 (74.4%).

d = is margin of error to be tolerated and taken as 5%.

By adding 10% contingency for missing data the final sample size for determining the treatment success rate are 321. From a total of already managed 410 children in the year September, 2018 to September, 2019 only the data of 375 has complete medical records and 31cases charts were not found. Since the difference between the calculated sample size (321) and total admitted with complete data and charts cases (344) was small, all SAM cases were considered in this study.

Sample size for associated factors

The required sample size was calculated by taking into account the major associated factor and using the Statistical program of the EPI INFO unmatched case- control study. Comorbidities and antibiotics use are taken as major associated factor from all factors to be studied and sample size were calculated. Since the sample sizes are below 344 (Table 1) sample size calculated for treatment outcome is taken.

Variables	Power	Odd ratio (OR)	Confidence Interval (CI)	Case control Ratio	% outcome unexposed	Sample size case+control
Comorbidities	80%	0.2	95%	2:1	74.3	134
Antibiotics use	80%	4.8	95%	2:1	93.2	159

Table 1: Sample size calculation for associated factor for malnutrition.

Operational definitions

- **Treatment outcome**: Grouped as good and poor from SAM management at inpatient therapeutic feeding units in this study.
- **Good:** Children with severe acute malnutrition declared as cured in the registration book of inpatient therapeutic feeding units.
- **Poor:** Children discharged from inpatient therapeutic feeding units with outcome other than cured in this study (death, default or non-responder).
- **Under-5 mortality:** The probability of dying between birth and the fifth birthday.
- **SAM:** The presence of bilateral pitting edema or severe wasting (MUAC < 11.5 cm or a WFH < -3 z-score [WHO standards]) in children 6-59 months old.

- **Inpatient Management**: Management of SAM of children of 6 - 59 months with medical complications or failed appetite test and infants < 6 month.
- **Underweight**: A composite form of undernutrition including elements of stunting and wasting and is defined by a weight-for-age (WFA) < -2 z-score (WHO standards).
- **Wasting**: A form of acute malnutrition which is defined by a MUAC < 12.5 cm or a WFH < -2 z-score (WHO standards) in children 6-59 months.
- **Stunting:** Shows chronic undernutrition and it presents as low height-for-age (HFA). It is defined by an HFA z-score below two SDs of the median (WHO standards).
- **Cured:** Has reached the discharge criteria for SAM treatment.
- **Died:** Dies while receiving SAM treatment.
- **Defaulted:** Absent from treatment for two consecutive days.
- **Non-responder:** Patient who remained in SAM treatment but does not reach the SAM discharge criteria after 16 weeks (4 months) in treatment.
- **Transferred-out:** Moved to another facility for further medical care *or* moved out to receive care in another health facility.

Data collection tool

The data was collected through medical record reviews of pediatric patients, by using a prepared checklist. The checklist addressed all needed information as a data collection tool. It included demography (age, sex and residency), anthropometry (weight and height/length, MUAC), presence or absence of edema, medical diagnosis at admission (co morbidities) and treatment outcome of severe acute malnutrition. It was developed from standard treatment protocol for the management of severe acute malnutrition, SAM registration log book, SAM monitoring multi chart and reviewing related literatures to collect the required individual information from the relevant documents.

Data collection procedure

A total of two data collectors was used, who worked under supervision. Recorded information of the children on the registration book was collected using a checklist.

The registration book consist information filled at admission like sex, address, age anthropometry measurements and date of admission. At discharge it has anthropometry measurements, outcome status and date of discharge.

Data quality control

Check list was prepared after reviewing different literatures to record the necessary information from the registration book. Prior to the start of data collection training was given for the data collectors about study objectives and how to fill the check list. All the data was collected after using a pre tested checklist.

During data collection close super vision was carried out. Before receiving the filled checklist from each data collector thorough check was done to identify incomplete checklist.

Data processing and analysis

Data was checked, coded and entered into Epi-info version 7.2 and was exported and interpreted by SPSS version 20.

Ethical consideration and clearance

This study was carried out after obtaining permission from AHMC pediatric ward department head by taking a permission and support letter from AGHMC. The study was conducted through a review of records, so no consent was obtained from the mothers or caregivers of the study subjects. No personal identifiers were collected with the data to maintain Confidentiality of the information and privacy.

Results

Socio-demographic, admission category, History of immunization and type of severe acute malnutrition

The study included records of 344 under-five children with the diagnosis of severe acute malnutrition admitted to AHMC pediatric ward from September 2018 to September 2019. From all children included in the study younger than six month old children were the largest 94 (27.3%). The mean (± SD) of the age of the admitted children was 13.53 (± 13.01) months. From this study 199 (57.8%) were male and 196 (57.0%) of the admitted children were from urban region. More than two third 306 (89.0%) were new admissions. From those enrolled children into the study most of them 301 (87.5%) are marasmus (non-edematous) and 117 (34.0) were fully immunized (Table 2).

Characteristics		Frequency (n = 344)	Percent (%)
Age group (Months)	< 6 month	94	27.3
	6 - 11 month	90	26.2
	12 - 23 month	90	26.2
	24- 59 month	70	20.3
Sex	Female	145	42.2
	Male	199	57.8
Place of residence	Urban	196	57.0
	Rural	148	43.0
Admission type	New admission	306	89.0
	Re-admission/ transferred	38	11.0
Type of malnutrition	Marasmus (non-edematous)	301	87.5
	Edematous	43	12.5
History of immunization	fully Immunized	117	34.0
	immunized for age	84	24.4
	partially immunized	39	11.3
	Not immunized	104	30.2

Table 2: Socio-demographic characteristics admission category, history of immunization and type of severe acute malnutrition of under five children in the AHMC, pediatrics ward from September 2018 to September 2019.

Comorbidities		Frequency (n-344)	Percent %
Fever	Present	56	16.3
	Absent	288	83.7
Pneumonia	Present	180	52.3
	Absent	164	47.7
Diarrhea	Present	138	40.1
	Absent	206	59.9
HIV	Present	8	2.3
	Absent	336	97.7
Anemia	Present	137	39.8
	Absent	207	60.2
Rickets	Present	60	17.4
	Absent	284	82.6
Others	Present	94	27.3
	Absent	250	72.7
Appetite at admission	Good	10	2.9
	Poor	334	97.1

Table 3: Co-morbidities in children admitted to AHMC pediatrics ward, from September 2018 to September 2019.

Medical co-morbidities

All children admitted in the Nutritional ward had at least one form of comorbidities. The most common comorbidity was Pneumonia (52.3%), followed by Diarrhea (40.1%) and Anemia (39.8%). The identified co morbidity specified as others include cardiac illness (congenital or heart failure), meningitis, TB, malaria and shock, which accounts for 27.3% totally. Regarding the HIV status of the children only 2.3% were diagnosed as positive. Around 97.1% of children had poor appetite at admission.

Routine medication

Admitted cases with SAM were managed in accordance with federal ministry of health of Ethiopia guideline protocol for treatment of severe acute malnutrition. Out of 344 children whose medication records were available for review, the most prescribed medications were IV antibiotics (78.2%) followed by other medications (48.9%) which includes Anti TB, Lasix, spironolactone, HAART and Anti-Malaria commonly. Both IV antibiotics and amoxicillin were given for 56 (17.4%) of the children. Of the total 29.0% of the children received RESOMAL and, 22.4% received folic acid.

Treatment outcome

Among 344 records of children with the diagnosis of SAM included in this study 269 (78.2%) had good outcome with 95% CI (73.5%, 82.6%) from this the average weight gain is 11.01 g/kg/day and the average duration of stay in the hospital was 52.5 days. The remaining 75 (21.8%) had poor outcome with 95% CI (17.4%, 26.5%) which is 35 (10.2%) and 40 (11.6%) of the cases were defaulters, and those who died respectively (Figure 2). From the children with good outcome only 32.4% have good weight gain (> 10 g/kg/day) (Figure 3).

Factors associated with treatment outcome

Socio demographic of children, type of SAM, Duration of stay, history of Immunization, co morbidities, and routine medication

Medication given		Frequency (n-344)	Percent %
Iv fluid	Given	14	4.1
Antibiotics	Iv Antibiotics given	270	78.5
	Amoxicillin	91	26.5
	Both	56	16.3
	Not given	39	11.3
Vitamin A	Given	4	1.2
Folic acid	Given	77	22.4
Albendazole/ Mebendazole	Given	2	0.6
Measles vaccine	Given	3	0.9
Paracetamol	Given	28	8.1
Resomal	Given	103	29.9
Other medications	Given	164	47.7

Table 4: Medication provided, and mineral supplementation given in the AHMC pediatric ward, from September 2018 to September 2019.

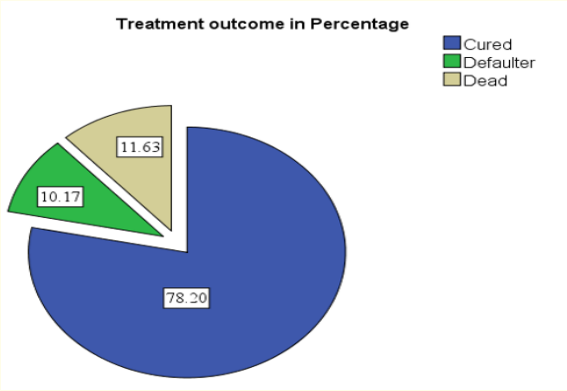

Figure 2: Treatment outcome in percent of children admitted to AHMC pediatric ward, from September, 2018 to September, 2019.

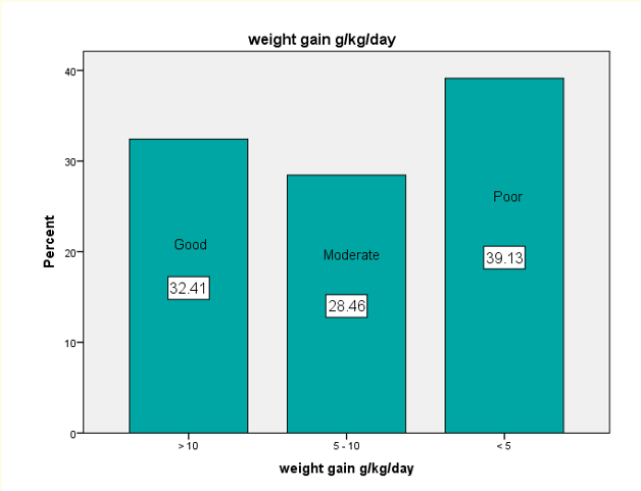

Figure 3: Percent of weight gain of SAM children in g/Kg/day treated at AHMC pediatric ward, September 2018 to September 2019.

were tasted for their association with treatment outcome of severe acute malnutrition among under five children by bivariate logistic regression analysis. First the association of each variable with treatment outcome among under-five children was assessed by the binary logistic regression and then variables which were significant at the level of 0.25 were entered into the final model (multivariate analysis) to control confounding factors (Table 5).

The variables that were selected as candidates for multi-variable cox-regression during bivariate analysis were age, appetite at admission, admission type, type of malnutrition, history of immunization and comorbidities (Pneumonia, fever, Rickets and other diseases), from medication provided Iv fluid, Folic acid and iv antibiotics were incorporated. In multivariable cox-regression analysis with the significance level at 95% CI and p-value < 0.05 were considered as an independent predictor of treatment outcome (Table 6).

Children who have poor appetite at admission have 5.2 times [AOR 5.2 (95% CI (1.25 - 22.26)] Poor treatment outcome than others with good appetite. And also children who have Rickets and other disease can have increase poor treatment outcome by 6.9 [AOR 6.9 95% CI (1.5, 30.7)] and 0.47 [AOR 0.47 95% CI (0.25 - 0.88)] times respectively. Children who took Folic acid supplement had better outcome than those who didn't get supplement [AOR 0.44 95% CI (0.18 - 1.0)].

Variables Frequency (n-344) %			Good outcome		Poor outcome		Unadjusted OR (95% CI)	p- value
			Frequency (n-344)	%				
Sex of the child	Female		110	32.0	35	10.2	1	
	Male		159	46.2	40	11.6	1.2 (0.7, 2.1)	0.37
Age group	< 6 months		70	20.3	24	7.0	0.5 (0.2, 1.2)	0.13
	6 - 11 months		65	18.9	25	7.3	0.4 (0.22, 1.07)	0.73
	12 - 23 months		75	21.8	15	4.4	0.9 (0.39, 2.1)	0.87
	24 - 59 months		59	17.2	11	3.2	1	0.14
Place of residence	Urban		154	44.8	42	12.2	1	
	Rural		115	33.4	33	9.6	0.9 (0.5, 1.59)	0.84
Admission type	New admission		237	68.9	69	20.1	1	
	Readmission/ transfer		32	9.3	6	1.7	1.5 (0.6, 3.8)	0.34
Type of malnutrition	Non Edematous		239	69.5	62	18.0	1	
	Edematous		30	8.7	13	3.8	1.6 (0.8, 3.3)	0.15
Appetite at admission	Good		5	1.5	5	1.5	1	
	Poor		264	76.7	70	20.3	3.7 (1.06, 13.3)	0.04
History of immunization	Fully immunized		103	29.9	14	4.1	1	0.01
	Immunized for age		58	16.9	26	7.6	0.3 (0.14, 0.6)	0.001
	Partially Immunized		31	9.0	8	2.3	0.5 (0.2, 1.3)	0.189
	Not immunized		77	22.4	27	7.8	0.3 (0.19, 0.78)	0.009
Co Morbidities	Fever	Absent	222	64.5	66	19.2	1	0.259
		Present	47	13.7	9	2.6	1.5 (0.72, 3.3)	
	Pneumonia	Absent	122	35.5	42	12.2	1	0.104
		Present	147	42.7	33	9.6	1.5 (0.9, 2.5)	
	Diarrhea	Absent	158	45.9	48	14.0	1	0.41
		Present	111	32.3	27	7.8	1.2 (0.7, 2.1)	
	HIV	Absent	262	76.2	74	21.5	1	0.52
		Present	7	2.0	1	0.3	1.9 (0.2 , 16.3)	
	Anemia	Absent	162	47.1	45	13.1	1	0.97
		Present	107	31.1	30	8.7	0.99 (0.5, 1.67)	
	Rickets	Absent	211	61.3	73	21.2	1	0.002
		Present	58	16.9	2	0.6	10.0 (2.3, 42.1)	
	Others	Absent	209	60.8	41	11.9	1	0.00
		Present	60	17.4	34	9.9	0.3 (0.2, 0.59)	

Routine medications	IV fluid	Given	5	1.5	9	2.6	1	0.01
		Not given	264	77.6	66	19.2	7.2 (2.3, 22.2)	
	Iv antibiotics	Given	215	62.5	55	16.0	1	0.22
		Not given	54	15.7	20	5.8	0.69 (0.38, 1.2)	
	Amoxicillin	Given	74	21.5	17	4.9	1	0.40
		Not given	195	56.7	58	16.9	1.3 (0.7, 2.3)	
	Vitamin A	Given	0	0.0	4	1.2	1	0.99
		Not given	269	78.2	71	20.6	0.000	
	Measles vaccine	Given	2	0.6	1	0.3	1	0.99
		Not given	267	77.6	74	21.5	0.000	
	Folic acid	Given	69	20.1	8	2.3	1	0.08
		Not given	200	58.1	67	19.5	0.34 (0.15, 0.7)	
	Albendazole/ Mebendazole	Given	2	0.6	0	0.0	1	0.99
		Not given	267	77.6	75	21.8	0.00	
	Paracetamol	Given	20	5.8	8	2.3	1	0.36
		Not given	249	72.4	67	19.5	1.4 (0.62, 3.5)	
	Resomal	Given	81	23.5	22	6.4	1	0.89
		Not given	188	54.7	53	15.4	0.9 (0.5, 1.6)	
	Others	Given	124	36.0	40	11.6	1	0.26
		Not given	145	42.2	35	10.2	1.3 (0.8, 2.2)	

Table 5: Results of binary logistic regression analysis of factors associated with treatment outcomes under-five children admitted with SAM to AHMC Pediatrics ward, September 2018 to September 2019.

Variables		Good outcome		Poor outcome		Unadjusted OR (95% CI)	Adjusted OR (95% CI)	P value
Frequency		%	Frequency	%				
Appetite at admission	Good	247	76.9	64	19.9	1	1	
	Poor	5	1.6	5	1.6	0.2 (0.07, 0.9)	5.2 (1.25-22.26)	0.023
Admission type	New admission	237	68.9	69	20.1	1	1	
	Readmission	32	9.3	6	1.7	1.5 (0.6, 3.8)	1.6 (0.5, 4.9)	0.38
Type of Malnutrition	Non Edematous	239	69.5	62	18.0	1	1	
	Edematous	30	8.7	13	3.8	1.6 (0.8, 3.3)	0.6 (0.18, 1.03)	0.25
Age group	<6 mon	70	20.3	24	7.0	0.5 (0.2, 1.2)	1.05 (0.4, 2.7)	0.91
	24-59 mon	59	17.2	11	3.2	1	1	

History of immunization	Fully immunized	103	29.9	14	4.1	1	1	
	Immunized for age	58	16.9	26	7.6	0.3 (0.14, 0.6)	0.7 (0.28, 2.0)	0.58
	Partially Immunized	31	9.0	8	2.3	0.5 (0.2, 1.3)	1.1 (0.55, 2.5)	0.67
	Not immunized	77	22.4	27	7.8	0.3 (0.19, 0.78)	0.4 (0.19, 0.98)	0.46
Fever	Absent	222	64.5	66	19.2	1	1	
	Present	47	13.7	9	2.6	1.5 (0.72, 3.3)	2.0 (0.8, 4.9)	0.13
Pneumonia	Absent	122	35.5	42	12.2	1	1	
	Present	147	42.7	33	9.6	1.5 (0.9, 2.5)	0.78 (0.41, 1.5)	0.46
Rickets	Absent	211	61.3	73	21.2	1	1	
	Present	58	16.9	2	0.6	10.0 (2.3, 42.1)	6.9 (1.5, 30.7)	0.01
Others	Absent	209	60.8	41	11.9	1	1	
	Present	60	17.4	34	9.9	0.3 (0.2, 0.59)	0.47 (0.25, 0.88)	0.02
IV fluid	Given	5	1.5	9	2.6	1	1	
	Not given	264	77.6	66	19.2	7.2 (2.3, 22.2)	7.3 (1.68, 32.2)	0.08
Iv antibiotics	Given	215	62.5	55	16.0	1	1	
	Not given	54	15.7	20	5.8	0.69 (0.38, 1.2)	0.85 (0.42, 1.7)	0.67
Folic acid	Given	69	20.1	8	2.3	1	1	
	Not given	200	58.1	67	19.5	0.34 (0.15, 0.7)	0.44 (0.18, 1.0)	0.04

Table 6: Multivariable logistic regression analysis for factors associated with treatment outcomes of children admitted to AHMC, 2020.

Discussion

This study investigated the treatment outcome of SAM and identified factors associated with treatment outcome among under five children who were admitted at AHMC pediatric ward. The major finding of the study showed that among children treated for SAM, 78.2% had good outcome. The proportion of recovery in this study was in the recommended level from sphere standard which is > 75% [4]. But it is lower than the finding from Woldia hospital (85%) [12]. However this finding is higher than previous study done in Uganda (66.9%) and Tigray (61.7%) [8,15]. The finding from Sudan, Arsi Zone, Wolaita and DebreMarkos, and FinoteSelam were consistent with the finding of this study [6,7,13,17]. The good outcome of the children can be due to the presence of many specialized doctors that work in the hospital. This study found high proportion of death (11.6%) which is higher than the recommended minimum sphere standard which should be < 10%. It is also higher than previous findings in Sudan, Wolaita and DebreMarkos, and FinoteSelam [6,13,17]. However it is consistent with study done in Uganda [15]. In this study the proportion of death was higher, which could be mainly due to most children reach the referral hospitals late after developing complications. The other reason may be due to inappropriate management of children such as, partial prescription of routine medication and high prevalence of co morbidities [21].

The proportion of defaulted children was 10.2%. It is almost similar with the finding from Wolaita (10.0%) [13] and it is in the acceptable range of the sphere standard. It is also lower than the study conducted in Arsi Zone [7]. The average length of stay for recovered children in the TFU of 52.5 days was much higher than the international standard (Sphere) set for the management of SAM [4] and most studies. This longer length of stay could be from poor management and patient follow up or because most children presented with severe complications [2]. The average weight gain of 11.01 g/kg/day was also agree with the minimum international

standard set for the management of SAM which is >8 g/kg/day [4] and it also higher than similar studies in Woldia (9.86 g/kg/day) [12].

The study finding showed the children admitted to therapeutic feeding center are almost equal from rural and urban area and even the children from rural area are lower in number (148 (48%)) which is different from the study done in DebreMarkos and FinoteSelam hospital, and Arsi zone [6,7]. The mean age of the children at admission was 13.5 (± 13.0) months, similar with the finding at DebreMarkos and FinoteSelam hospital (13 month) [6]. However, it was less than studies conducted in Uganda (24.2 month), Sudan (22.3 month) and Woldia hospital [10,15,17]. The high proportion of cases of SAM are among the age group less than 24 months which could be due to sub optimal breast feeding and poor complementary feeding practices of the community and the dependence of the children on their parents for feeding.

This study finding showed that all the study subject have at least one form of co morbidities at admission other studies done in different area had also indicated these co morbidities are common in children with severe acute malnutrition [6,7]. This finding showed that there was no significant association between treatment outcome and type of malnutrition. This result was similar with the finding from Arsi zone [7]. However it differs from previous finding conducted at Wolaita Zone in which children with the diagnosis of kwashiorkor had 2.6 times more likely to recover than non-edematous child [11].

Folic acid supplementation was positively associated with recovery time from SAM. Children who didn't take folic acid supplement had lower probability of recovery from SAM compared to children who took folic acid supplement [AOR 0.44 95% CI (0.18 - 1.0)] which is similar in the DebreMarkos and FinoteSelam hospital study (AOR = 0.35, 95% CI: 0.14 - 0.89) [6]. This could be due to the fact that folic acid supplementation prevents anemia.

Children who have poor appetite at admission have poor treatment outcome. Having rickets increase the chance of having poor outcome which can be due to the loss of appetite that can be caused by rickets and the chance of developing pneumonia is higher.

Conclusion

Proper management of severe acute malnutrition and high proportion of recovery has huge contribution to save the lives of many children. This study tried to assess treatment outcome of severe acute malnutrition among children under the age of five years. Accordingly, proportion of recovery was within the acceptable range of global Sphere standards which is > 75%; however, death rate is higher than the acceptable range. Children who have Good appetite, who are immunized for age can have more good outcome than others, Also having no Rickets, other disease and received IV fluid can increase good treatment outcome.

Limitations of the Study

This study has some sort of limitations. Since it used the recorded data of the discharged children, factors such as, distance from the hospitals, education and economic status of parents, maternal nutritional status and babies feeding practice which might contribute on treatment outcomes were not addressed in this study.

Bibliography

1. WHO. Guideline updates on the management of severe acute malnutrition in infants and children. Geneva: World health organization (2013).

2. Government of Ethiopia, Federal Ministry of Health: National Guideline for the Management of Acute Malnutrition. Addis Ababa: FMOH (2019).

3. Ethiopian Public Health Institute (EPHI) [Ethiopia] and ICF: 2019 Ethiopia Mini Demographic and Health Survey (2019).

4. Sphere Association. The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, fourth edition, Geneva, Switzerland (2018).

5. United Nations Children's Fund (UNICEF), World Health Organization, International Bank for Reconstruction and Development: The World Bank. Levels and trends in child malnutrition: key findings of the 2019 Edition of the Joint Child Malnutrition Estimates. Geneva: World Health Organization (2019).

6. Getnet Mekuria., *et al*. "Treatment outcome and associated factors of severe acute malnutrition among 6–59 months old children in Debre Markos and Finote Selam hospitals, Northwest Ethiopia. Department of Applied Human Nutrition, Bahir Dar Institute of Technology, Bahir Dar University, Bahir Dar, Ethiopia (2017).

7. Misrak Abera. "Treatment outcome of severe acute malnutrition and associated factors among under five children admit-

ted at hospitals in arsi zone, oromia regional state, south east Ethiopia (2018).

8. Yebyo HG., *et al*. "Outpatient Therapeutic Feeding Program Outcomes and Determinants in Treatment of Severe Acute Malnutrition in Tigray, Northern Ethiopia: A Retrospective Cohort Study". *PLoS ONE* 8.6 (2013).

9. Abay Kassa Tekile., *et al*. "Prevalence of malnutrition and associated factors among under-five children in Ethiopia: evidence from the 2016 Ethiopia Demographic and Health Survey. Statistics Department, Science College, Bahir Dar University, Bahir Dar, Ethiopia (2019).

10. Chane T., *et al*. "Treatment Outcome and Associated Factors among Under-Five Children with Severe Acute Malnutrition Admitted to Therapeutic Feeding Unit in Woldia Hospital, North Ethiopia". *Journal of Nutrition Food Science* 4.32 (2014).

11. Admasu A., *et al*. "Survival Status and Its Associated Factors among Under-Five Children Admitted with Complicated Severe Acute Malnutrition in Hospitals of Wolaita Zone, South Ethiopia: Retrospective Cohort Study". *Journal of Nutrition Health and food science* 5.4 (2017).

12. Fasil Wagnew., *et al*. "A meta-analysis of inpatient treatment outcomes of severe acute malnutrition and predictors of mortality among under-five children in Ethiopia. Debre Markos, Ethiopia: Debre Markos University, College of Health Science (2019).

13. Kirkby D Tickella and Donna M Denno. "Inpatient management of children with severe acute malnutrition: a review of WHO guidelines, Department of Epidemiology, University of Washington, Seattle, United States of America (USA) (2016).

14. Wagnew F., *et al*. "Treatment cure rate and its predictors among children with severe acute malnutrition in northwest Ethiopia: A retrospective record review". *PLoS ONE* 14.2 (2019).

15. Richard Nyeko., *et al*. "Treatment outcome among children under five years hospitalized with severe acute malnutrition in St. Mary's hospital Lacor, Northern Uganda, Department of Pediatrics and Child Health, St. Mary's Hospital Lacor (2016).

16. M Muzigaba., *et al*. "Independent and interactive effects of HIV infection ,clinical stage and other comorbidities on survival of children treated for severe malnutrition in rural South Africa, south Africa (2017).

17. Kanan SOH and Swar MO. "Prevalence and outcome of severe malnutrition in children less than five years old in Omdurman Paediatrics Hospital, Sudan". S*udanese Journal of Paediatrics* (2016).

18. Jacqueline L Deen., *et al*. "Implementation of WHO guidelines on management of severe malnutrition in hospitals in Africa, WHO Geneva, Switzerland (2003).

19. Tahmeed Ahmed., *et al*. "Severe acute malnutrition in Asia, Food and Nutrition Bulletin". *The Nevin Scrimshaw International Nutrition Foundation* (2014).

20. Ole Tankoi EO., *et al*. "Determinants of Malnutrition among Children Aged 6-59 Months in Trans-Mara East Sub-County, Narok County, Kenya". *International Journal of Public Health and Safety* 1 (2016): 116.

21. Federal democratic republic of Ethiopia, ministry of health: Pediatric health care Ethiopia pocket book, Guideline for management of common illnesses in hospitals. 2nd Edition, FMOH of Ethiopia (2016).

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