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WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF MEDICINE

ASSESSMENT OF MANAGEMENT OUTCOME OF SEVERE ACUTE MALNUTRITION
AND THEIR DURATION OF STAY IN WARD AT WUSTH, SOUTH WEST ETHIOPIA

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ABSTRACT

Back ground:-

Malnutrition is the intake of an insufficient, surplus or disproportionate amount of energy and /or nutrients. Severe acute malnutrition affects nearly twenty million children under 5years, causing up to 1 million deaths each year by increasing susceptibility to death from severe infection.

Objectives:-

To assess the clinical outcome of patient managed for sever acute malnutrition and duration of stay in nutritional rehabilitation unit, wolkite University Specialized Hospital.

Method:-

A retrospective analysis of the hospital records on the cases of severe acute malnutrition from August 2012 to August 2014 was done.

Result:

Total of 169 patients charts who were admitted to NRU from August 2012 to August, 2014 were revised. Among these majority of them are in age range of 5 to 59 months(57%), followed by those who are 5 to 10 years accounting 24.9% and those who are less than 6 months are 16%.

Among admitted patients the most common admission criteria was major medical complications which accounts for about 71%, followed by failed appetite test which is 22.5%,age <6 month accounts for 4.1% and grade 3 edema accounts for 2.4%.

Among admitted patients 9.5%(16) of them had treatment failure and the most common cause of treatment failure is AGE which accounts for 50%(8) of treatment failure. Among admitted patients there was a total of 7 death and the most common cause of death is sepsis.

Conclusion:

Our finding has shown that edematous SAM is more common form of malnutrition at WUSTH. It is common in 6-59 mo male patients. There is considerable rate of treatment failure and death, 9.5% and 4.1% respectively. Majority of the cases (81%), the duration of stay in the in patient management is less than 10 days, and the rest cases are still spending longer duration (> 10 days) in hospital. So efforts should be taken to optimize the management and follow-up.

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ACRONYMS

AGE: acute gastroenteritis

CAP: community acquired pneumonia

CHF: congestive heart failure

CBE: community based Education

CBTP:-Community Based Training Program

CFR: Case fatality rate

CTC: community based therapeutic care

GDP:- Growth development product

MUAC: mid upper arm circumfrence

NNP: national nutritional program

NRU: Nutritional Rehabilitation Unit

OTP:-Out patient therapeutic program

PEM:- Protein energy Malnutrition

SRP:- Student Research program

TTP:-Team training program

WHO: World Health Organization

CHAPTER – ONE

INTRODUCTION

1.1 Back ground information

Malnutrition is the intake of an insufficient, surplus or disproportionate amount of energy and or nutrients(1). Malnutrition is a significant global public health burden with greater concern among children under five years(2). Over nutrition is also becoming of problem in developing countries and we will focus on under nutrition.

The immediate causes of malnutrition and child death are the mutually reinforcing Conditions of inadequate dietary intake and infectious disease; the underlying causes are household food insecurity, inadequate maternal and child care, and inadequate health services and health environment; and the basic causes include formal and non-formal institutions, political, economic, and ideological structures and systems—representing the perennial political, economic, and institutional conflicts that public nutrition programs must work within(3)

The new classification is based on the presence or absence of edema. If the edema is present it is edematous malnutrition if not it is nonedematous malnutrition. This is because the pathophysiologic process of this separate entities are not clearly identified (4).

Severe acute malnutrition (SAM) is defined by two distinct clinical entities;1 severe wasting (MUAC<11.5) in children 6-59 months or weight –for-height/length<-3 scores according to the 2006 WHO growth standards) in children aged 0-59 months 2.nutritional edema(bilateral pitting edema)(7)

Considering the high burden of the problem, the seriousness and complicated condition, and the management and outcome, children with severe acute malnutrition should be properly and promptly treated in a suitable health facility at therapeutic feeding centers.(6)

Malnutrition also leads to fewer years of completed schooling on average due to late enrollment, increased grade repetition, absenteeism, and earlier dropout. This, as well as the impaired cognitive development mentioned above, means that malnourished children end up as less productive adults.(5)

On discharge there are a certain rules that should be followed .improvement on admission criteria(edema disappear, complication has resolved), health education and immunization should be completed (3).

The management of this patients should be assessed by performance indicators. This are recovery rate, defaulters, non responders rate, transfer out mean length of stay and the mean rate of weight gain(3).

1.2 Statement of the problem

Malnutrition in all of its forms is major public health problem and is underlying factors in over 50% of the 10-11 million deaths in children under 5 years of age who die each year from preventable causes. It is both a medical and social disorder often routed in poverty contributing to a down wards spiral that is fuelled by an increased burden of disease, stunted development and reduced ability to work, poor water and sanitation are important determinants in this connection. It affects all age groups especially common among the poor and those with inadequate access to health education and to clean waters (4). The most susceptible age for malnutrition is 6 to 8 months(when growth velocity and brain growth are specially high); however with low income setting introducing solids to children as young as two months, it is increasingly recognized that SAM may occur in infants aged <6months (8).

More than 70% children with PEM live in Asia, 26% in Africa 4% in Latin American and the Caribbean (6). In Sub Saharan Africa this problem is over whelming recurrent wars poor leadership, poor working habit of the society and some natural problems like flooding, disturbance of weather contributes for these problems. In 2015, SSA accounted more than 30% of global underweight burden(7). Additionally, in 2018, despite a worldwide decline in childhood stunting, Africa witnessed a rise in the relative figure from 50.3 million to 58.8 million children(8). Within the sub region variation in malnutrition are reported.

Recently endorsed 2019 food and nutrition policy aims to achieve optimal nutritional status throughout the life cycle via coordinated implementation of nutrition specific and nutrition sensitive interventions. To acceleration reduction in malnutrition, Ethiopia developed the national nutritional programme (NNP) I (2008-2015) and the NNP II (2016-2020) with a specific focus on multisectorial coordinationof nutritional interventions.(9). This problem affects all parts of the country and it is not new that every year we have millions who safer from shortage of foods for which we are accustomed to see the hands of the westerns. The prevalence of malnutrition among under five children living in Guraghe zone is as high as 38.8%. This public health problem was associated with utilization of unimproved sanitation, maternal disempowerment, food insecurity and not practicing exclusive breast feeding.(10)

Malnutrition in general gave along term and short term sequeale among the short term, it requires long hospital stay which in turn has high cost for the family and health system. The attendants came from remote areas and stay long in the hospital. Activities at home will be left unhandled and income generation will be affected. They finish what they have in their stay. This creates economic instability and food insecurity at home which in turn adds another malnourished child to the health system.

Long term hospital stay by itself can be complicated by hospital acquired infection which adds another cost and time in the management process and contributes a lot for mobility and mortality. Health system spends more many and effort for this problem, this shares the money that should be spent for economic development of the country, So the GDP will not be changed and the individual economic status remains low which intern results in house hold food insecurity. This vicious cycle will continue. Stunting is one of the long term squeal of malnutrition which can reduce economic productivity of individual, Some of the nutritional problems such as micronutrients deficiency can cause pelvic deformity as in Vitamin D deficiency and creates problem during labor. Eye problems like in Vitamin A deficiency.

Among 12.9 million deaths occurring annually in children under five years of age over 25% related to underlying malnutrition. This is due to decreased in cellular immunity one of the most frequent causes of mortality and malnutrition is diarrhea 3 million deaths among children under 5 years are caused by diarrhea which accounts for 25% of all deaths among children.

There are many patients present to the pediatric OPD with this problem. Among this those who fulfill the criteria of admission will be admitted. They will be started on milk and other management as to the protocol. Many problems faced on their management some of this are inadequate or inappropriate administration of therapeutic milk. Even if the amount is appropriate child may refuse to take it all, so families start to give additional food and the child will continue in this way. They contributes to a long term hospital stay, morbidity and mortality. In those who took RUTF attendants usually share their food. The Child will not get enough calories to maintain his/her daily requirements and to gain weight. This also contributes for long stay. Sometimes there

may be a shortage of milk or RUTF and if the child dislike the available alternative, especially if this is storage of milk management process will be seriously affected.

In general malnutrition is a common problem in developing countries, it is both medical and social problem. It hampers the economic growth of the country. It has both long term and short term sequeale for the affected individual. There are also different obstacles in the inpatient management of this individuals which alters the outcomes of the managements. In WUSTH too, these problems are expected to prevail due to same or some other problems. The outcomes of the management in the hospital is the focus of this study

1.3 Significance of the study

This study is used to assess the management of patients admitted to pediatric NRU ward, it will try to identify factors which affect this process. It also assess the complications, treatment failure, mortalities and possible causes of death in this group of patients. It will also be used as a source of information for the hospital (department of pediatrics), students, health care providers and any other researchers who wants to study in areas related to this problems. It also help the unit to improve the quality of care that it gives for this patients. The copy of this document will be provided to pediatrics department so that these findings are considered to improve the care.

CHAPTER TWO

LITERATURE REVIEW

Most malnourished persons live in developing countries, about 30% each in Africa and Asia (Far east) and 15% each in Latin America and the near east. Long term analysis shows decade by decade gradual improvement in the prevalence of child malnutrition if countries are not disturbed by natural and man-made disaster such as droughts, desertification, wars and economic crisis(13).

SAM remains a global problem and a persistent threat to millions of children's lives(11). The relative frequency of SAM shows considerable geographic variation. Nationwide prevalence often are of little value in defining, causing malnutrition. Breast feeding and weaning practice play an important role in determining the age distribution and the type of malnutrition observed. Infantile marasmus is more common in Chile and other Latin America countries where early weaning is common. Recent reports from Africa however indicates changing pattern with a decline in kwash and marasmus. This has been attributed to the changing trends infant feeding practice. In India and other Asian countries where prolonged breast feeding is common PEM is seen after one year, kwash and marasmus being equally common (12).

However the total number of malnourished children has not decreased because of the rise in population in the countries where malnutrition is highly prevalent diseases of children in the subtropics and tropics (12).

In developed countries primary PEM is seen mainly among young children of the lower socioeconomic groups, the elderly who live alone and adults addicted to alcohol and drugs (12).

CFR(code of federal regulation) among 23511 severely malnourished children treated in 21 CTV(children's television) program operating in Malawi, Ethiopia and Sudan between 2001 and 2005 where 4.1% with recovery rate of 79.4% and defaulter rate of 11%.Transfer out and non recovery rates where 3.3% and 2.2% respectively. Seventy six percent of these severely malnourished children were treated solely as out patients. CTC(community based therapeutic care)out comes of severely malnourished children age < 59 month presented to CTC program between Sep. 2000 to Dec. 2005 are as follows(6):

On study done in Hadiya from Sep 2000 to Jan 2001 170 under five children were presented and 100% of them were admitted to OTP+Sc (outpatient therapeutic program, stabilization care), 85% of them had recovered, 4.7% of them were defaulters, 4.1% of them had died, 65% didn't recover and no transfer out. (13)

In a similar research conducted on South Wolo from Feb. 03 to Dec. 03 590 under five children presented to OTP+SC, and 95% were admitted, out of which 74.6% had recovered, 9.7% were defaulters, 7.5% had died, 8.3% doesn't recover and no transfer. On the same area study conducted from Jan 05 to May 05, 856 under five children were included and 90% were admitted, 83.4% of them had recovered, 4.2% were defaulter, 4.9% had died, no transfer and 8.2% didn't recover. (14)

In a study done on Wolayita from Apr 03 to Dec 03, 194 patients were presented and 24% of them were admitted out of which 83.9% of them had recovered, 5.4% were defaulters, death rate was 1.9%, 8.9% of them had transferred out. In a research conducted in Hawassa from Jun 05 to Oct 05, 353 under five children were included, 92% were admitted, 95% had recovered, 3.9% were defaulters, 1.1% had died, and no transfer outs. In a similar study conducted in Hararge from Mar 04 to Oct 04, 1086 patients were included and 89% of them are admitted, 76% had recovered, 18% were defaulters, 2% had died and 0.4% didn't recover and 3.9% were transferred out (3/15).

In one study conducted for one month (Hidar 2003 E.C) as an audit report at JUSH NRU showed that most of this patients came from Dedo 27.2%, Sheka (6%) Bonga (2.3%) and other accounts the rest. The additional diagnosis that was observed were AGE 22%, pneumonia 18%, DTP, 18%, anemia (5/44 patients), RVI (3/44 patient), LONS (3/44 patient), kwashiorkor (2/44 patients), AOM (2/44 patients). Among the causes of treatment failure AGE were more common followed by pneumonia then TB, UTI and most of them were started on family diet. All were non edematous and at the end of the month 50% of them were discharged improved (15).

In one study conducted to see the effect of HIV on management of SAM about 4891 children's where involved of whom 29.2% where HIV +VE. HIV infected children were significantly more likely to die than HIV uninfected children (30.4% vs 84%) HIV-VE children treated with in community based therapeutic care programmed got lower mortality 4.3% than those treated with in an inpatient nutritional rehabilitation unit (15.1%). There were no significant difference in mortality for HIV-infected children with SAM treated in the CTC 30% or NRU 31.3% (15).

A prospective cohort study measured mortality during nutritional rehabilitation among HIV infected and uninfected children aged 4 months with SAM. Children were tested for HIV and CD4% on admission to the nutritional rehabilitation unit. Mortality was assessed by following children up to 4 months after discharge from NRU or died. If ARTs over 211, mortality was 14.8% and HIV prevalence was 17.4%. HIV infected children were significantly more likely to die than uninfected children (35.4%) Vs 10.4%, 5.4% death occurred in children with CD4% less 20%. Forty % of HIV infected children died in contrast to 15% of HIV infected children with a CD4 % > 20% (16).

In general SAM is common in developing countries; and different studies showed that early detection and management reduce the morbidity and mortality associated with this condition. Testing and treatment for HIV among all malnourished children is necessary to improve quality of care and reduce mortality among children with SAM.

CHAPTER THREE

OBJECTIVES

3.1 General objectives

To Assess the 2 years clinical outcome of the in patients' management of SAM and their duration of stay at WUSTH pediatric NRU, Wolkite, Ethiopia, 2022.

3.2 Specific Objectives

- 3.2.1 To assess recovery rate of SAM management at NRU, WUSTH.
- 3.3.2 To assess treatment failure of SAM management at NRU, WUSTH.
- 3.2.3 To assess the possible complications of SAM at NRU, WUSTH.
- 3.2.4 To assess mortality rate and its causes during SAM management at NRU, WUSTH.
- 3.2.5 To assess duration of stay of SAM at NRU, WUSTH

CHAPTER 4

METHODS AND MATERIALS

4.1 Study area

The study was at WUSTH pediatric department, NRU, which is found in SNNPR, Gurage Zone, Wolkite town 152 km to South west of Addis Ababa.

The hospital has pediatric division which has 7 division ward, which are, Critical ward, Surgical ward, Neonatology, OPD, Emergency OPD and NRU. NRU had 3 rooms, 15 beds.

The wards have nurses, general practitioners, interns (medical) and the senior.

4.2 Study design and period

A retrospective cross-sectional analysis of the hospital records cases of SAM from August 2012 to August 2014 was conducted to analyze the management outcomes in the inpatient management of SAM and their duration of stay in the hospital.

4.3 Study variables

- Age of the child
- Sex
- Admission criteria
- Type of SAM
- Presence of complication at admission
- Treatment outcome
- Duration of stay in the hospital

4.4 Population

4.4.1 Source population

- were those patients admitted to WUSTH pediatric, NRU from August 2012 to August 2014

4.4.2 Study population

Were those patients with a diagnosis of SAM which were treated as in patient who may be discharged or dead.

4.5 Sample technique and sample size

All admitted patients in the study period were included.

4.6 Data collection

Data was collected by medical interns from the hospital medical record charts using the pretest and structured checklist. The reason for choice of medical interns is that they have better knowledge and experience in this topic. So that their involvement in data collection could validate the accuracy of information to be obtained.

4.7 Data quality control and analysis

Before data collection, a 2hours orientation was given to data collectors on the purpose of the study and how to fill the responses on structured (formulated) checklist. So that we would have common understanding of the objectives and each of the questions. This could also minimize the personal variation on interpretation.

The data collection process was supervised by the principal investigator. The collected data will be checked for completeness and accuracy on daily bases.

The completed checklists were cleaned coded daily and entered to computer. The collected data was cleaned, checked for completeness, coded and analyzed manually. Results are presented in tables, and statements.

4.8 Ethical considerations

Official letter was sent for the WUSTH and department of pediatrics and Child Health, confidentiality, accountability and neutrality will be kept throughout the study.

4.9 Dissemination of the results

The results of the study will be disseminated to WU Medical School, to the department of pediatrics and to any other bodies who are interested in the research.

4.10 Operational definitions

- Recovery rate = $\frac{\text{No of patients discharged}}{\text{Total n}^{\circ} \text{ of exits}} \times 100$
- Death rate = $\frac{\text{No of patients died}}{\text{Total n}^{\circ} \text{ of exits}} \times 100$
- Defaulter rate = $\frac{\text{No of true defaulters}}{\text{Total n}^{\circ} \text{ of exits}} \times 100$
- No respondents = $\frac{\text{No of non-respondents}}{\text{Total n}^{\circ} \text{ of exits}} \times 100$
- Transfer out = $\frac{\text{No of Pt transferred out}}{\text{Total n}^{\circ} \text{ of exits}} \times 100$
- Death = Those patients died during the management process due to any cause
- Recovery = Those patients who achieve ----- weigh (W/HT >-3Z score at time of discharge.
- Defaulter = Those Pt who stopped to take Nutritional therapy between achieving the weight
- Non respondents = A patient that has not reached the discharge criteria after six weeks in the inpatient program.

- Transfer out = Those Pt who are transferred out to their health facility due to any cause
- Treatment failure = Primary = Failure to regain appetite on day 4
- Failure to start loose of edema on day 4
- Edema still present on day 10
- Failure to enter to phase 2
- Gain more than 5 mg / kg/ day on day 10
- Secondary = causes are identified.

CHAPTER FIVE

RESULT

Total of 169 patients charts who were admitted to NRU from August 2012 to August, 2014 were revised. Among these, more than half of them are in age range of 5 to 59 months (57%), followed by those who are 5 to 10 years accounting 24.9% and those who are less than 6 months are 16%. And prevalence in adolescent is 1.8%.

	Frequency	Percent
< 6month	27	16
6-59 month	97	57.4
5-10 years	42	24.9
>10 years	3	1.8
Total	169	100

Table1. distribution of SAM patients by age, those Who were admitted to WUSTH from August 2012 to August 2014

Edematous SAM is the common one which accounts for 71.6% and non edematous SAM accounts for about 28.4%.

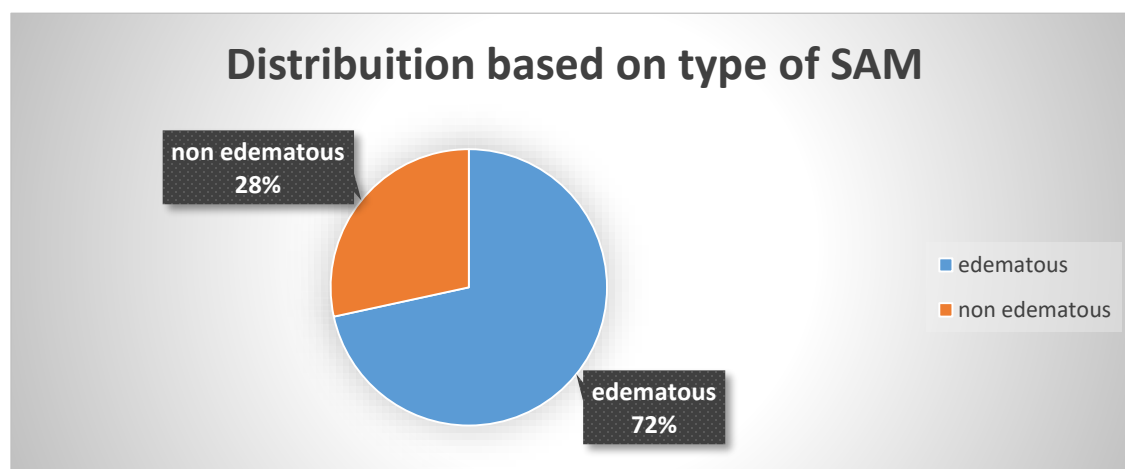


Figure1. distribution of SAM patients based on type of SAM those who were admitted to WUSTH from 2012 to 2014.

Among admitted patients the most common admission criteria was major medical complications which accounts for about 71%, followed by failed appetite test which is 22.5%, age <6 month accounts for 4.1% and grade 3 edema accounts for 2.4%.

	frequency	Percent
Failed appetite test	38	22.5
Major medical complication	120	71
Grade 3 edema	4	2.4
Age < 6 months	7	4.1
total	169	100

Table 2. distribution of SAM patient who were admitted WUSTH based on admission criteria from August 2012 to August 2014.

Among admitted patients 9.5%(16) of them had treatment failure and the most common cause of treatment failure is AGE which accounts for 50%(8) of treatment failure followed by CAP(7) which is 43.8% and CHF accounts for 6%(1) of treatment failure.

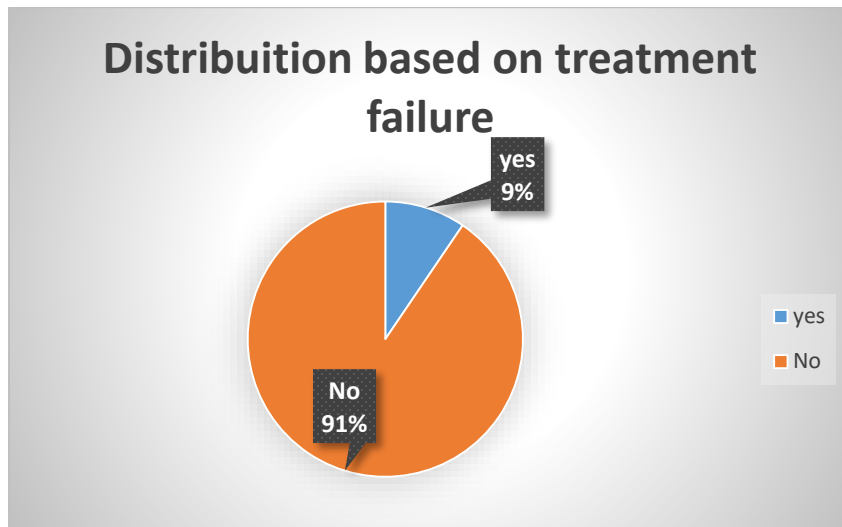


Figure2: distribution of SAM patients who were admitted to WUSTH NRU based on treatment Failure from 2012 to 2014

Thirteen percent(16) of admitted patients with edematous SAM had treatment failure and 0%(0) of non edematous SAM had treatment failure.

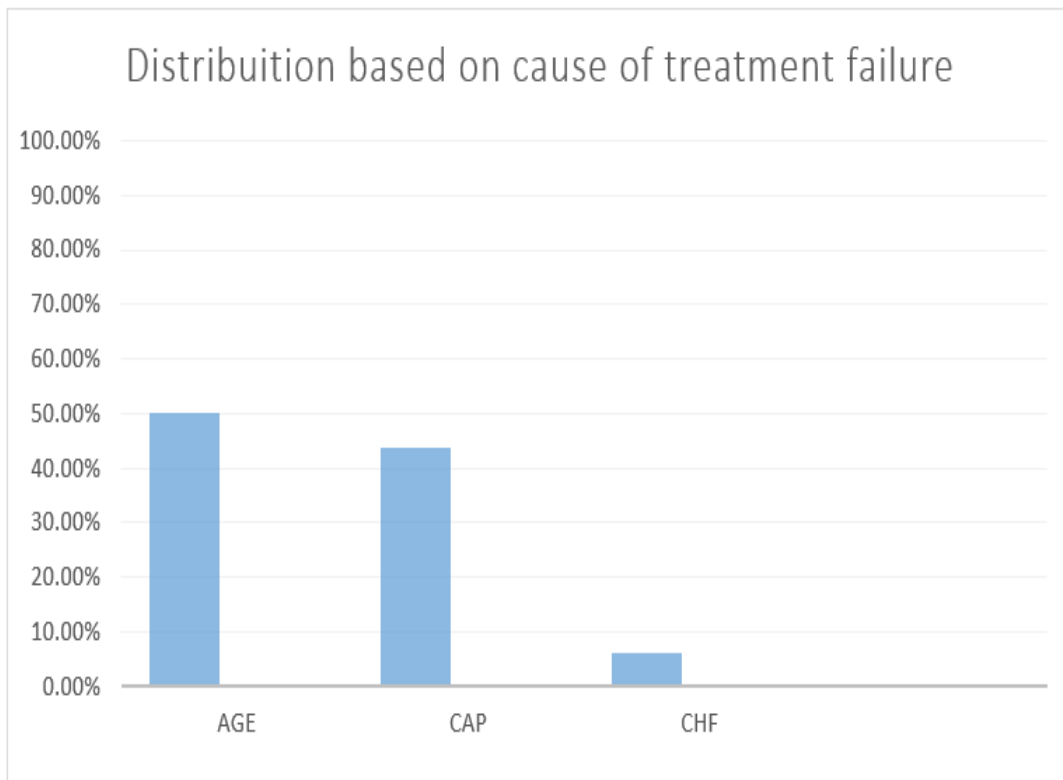


Figure 3. Distribution of SAM patient who were admitted to WUSTH NRU based on cause of treatment failure from 2012 to 2014.

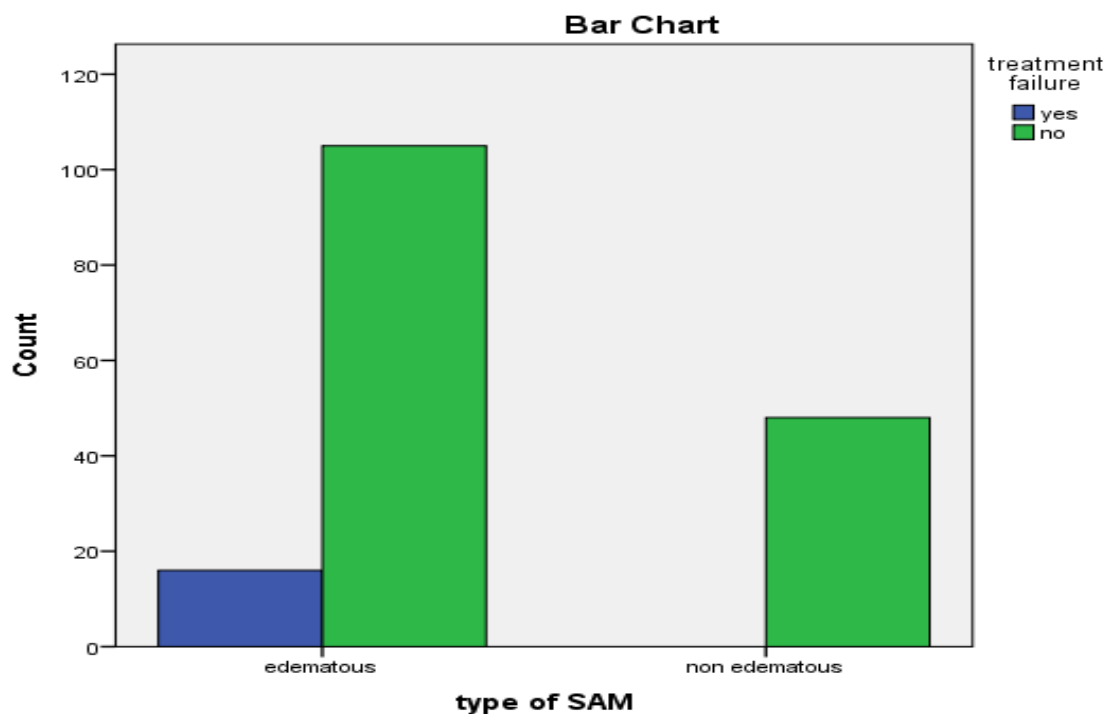


Figure 4. Distribution of SAM patients who were admitted to WUSTH NRU based on type of SAM and treatment failure from 2012 to 2014.

Ninety seven percent (164) of admitted patients had at least one major medical complication and 3%(5) of admitted patients had no medical complication.

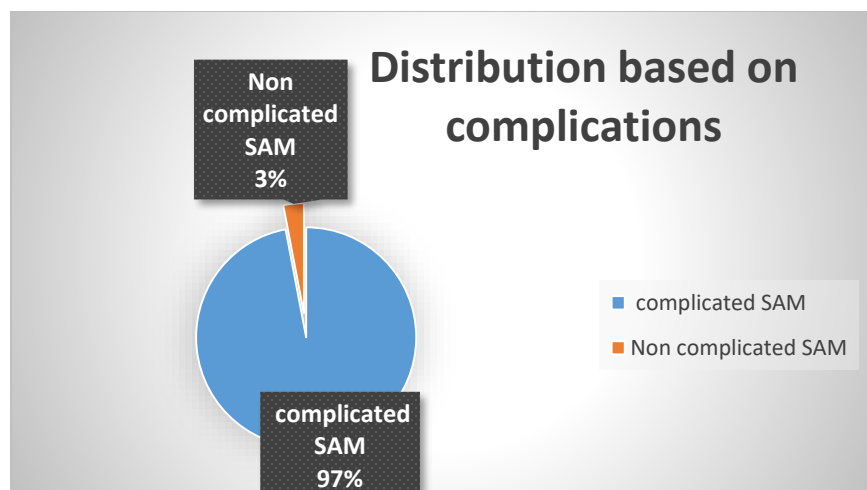


Figure 5. Distribution of SAM patients who were admitted to WUSTH NRU based on presence or absence of complications from 2012 to 2014.

Among admitted patients there were 7 deaths and the most common cause of death is sepsis which accounted for 57.1%, followed by CHF which accounted for 28.6% and others 14.3%.

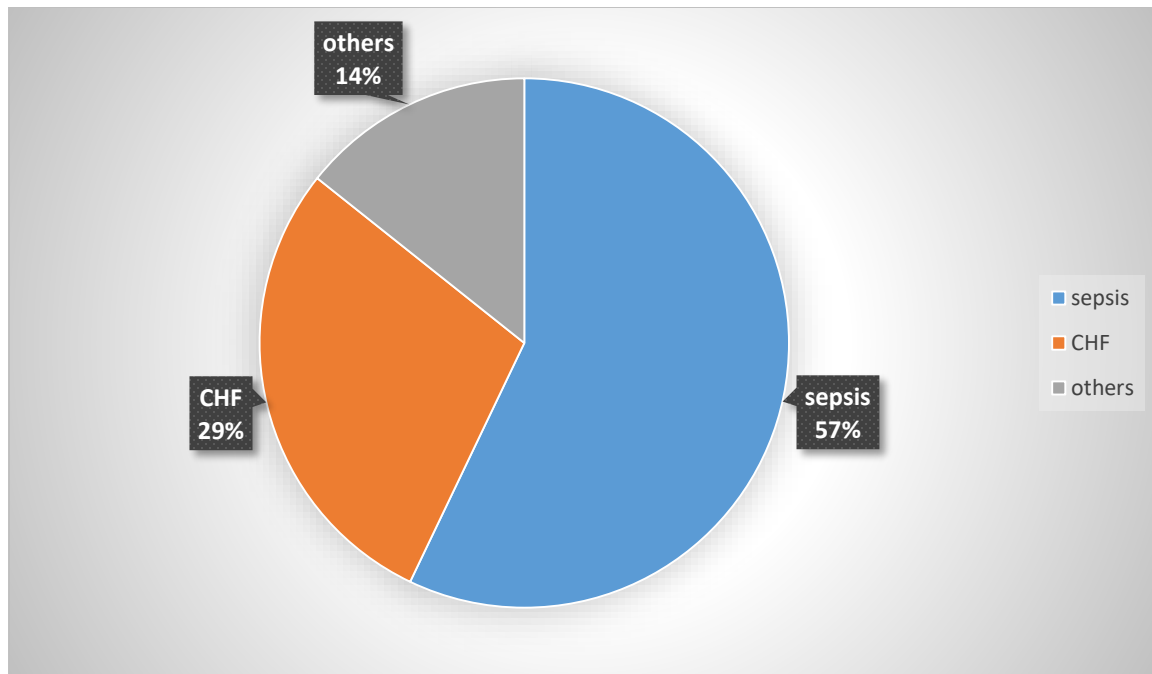


Figure 6. distribution of SAM patients who were admitted to WUSTH NRU based on cause of death from 2012 to 2014.

Among total number of deaths (7), the larger portion is accounted by non edematous SAM patients which is 57.1%(4) and the remaining part is accounted by edematous SAM patients which is 42.9%(3).

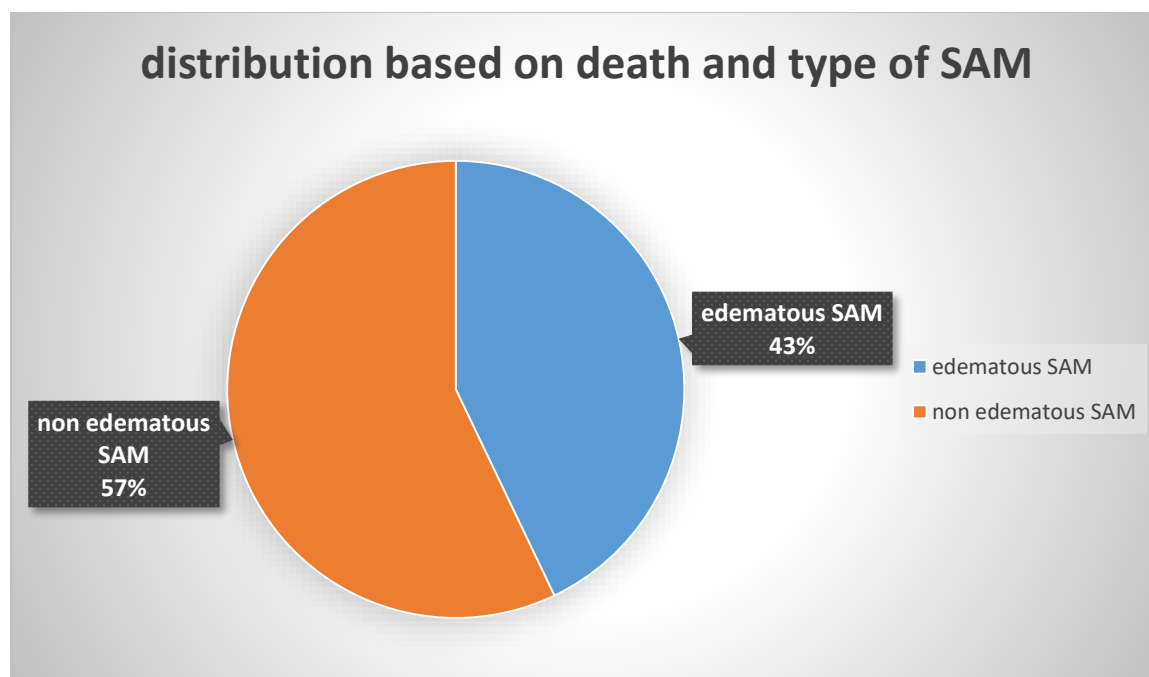


Figure7. distribution of SAM patients who admitted to WUSTH NRU based on death and type of SAM from 2012 to 2014

Among admitted severe acute malnutrition patients most of them (81.1%) of patients stayed at NRU for < 10 days and the rest (18.9%) stayed for ≥ 10 days. This described in the following figure.

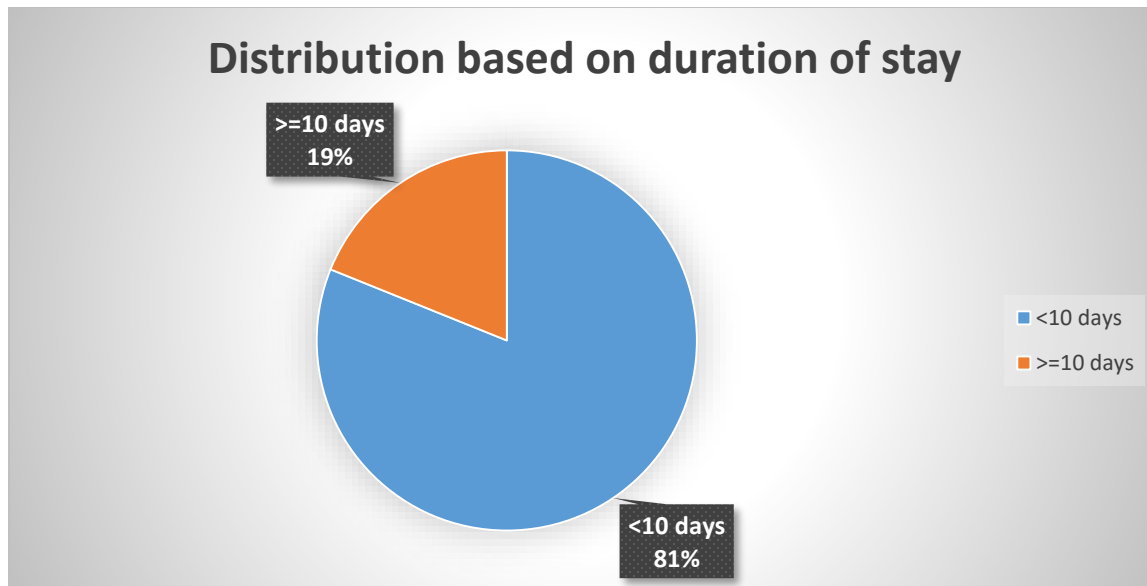


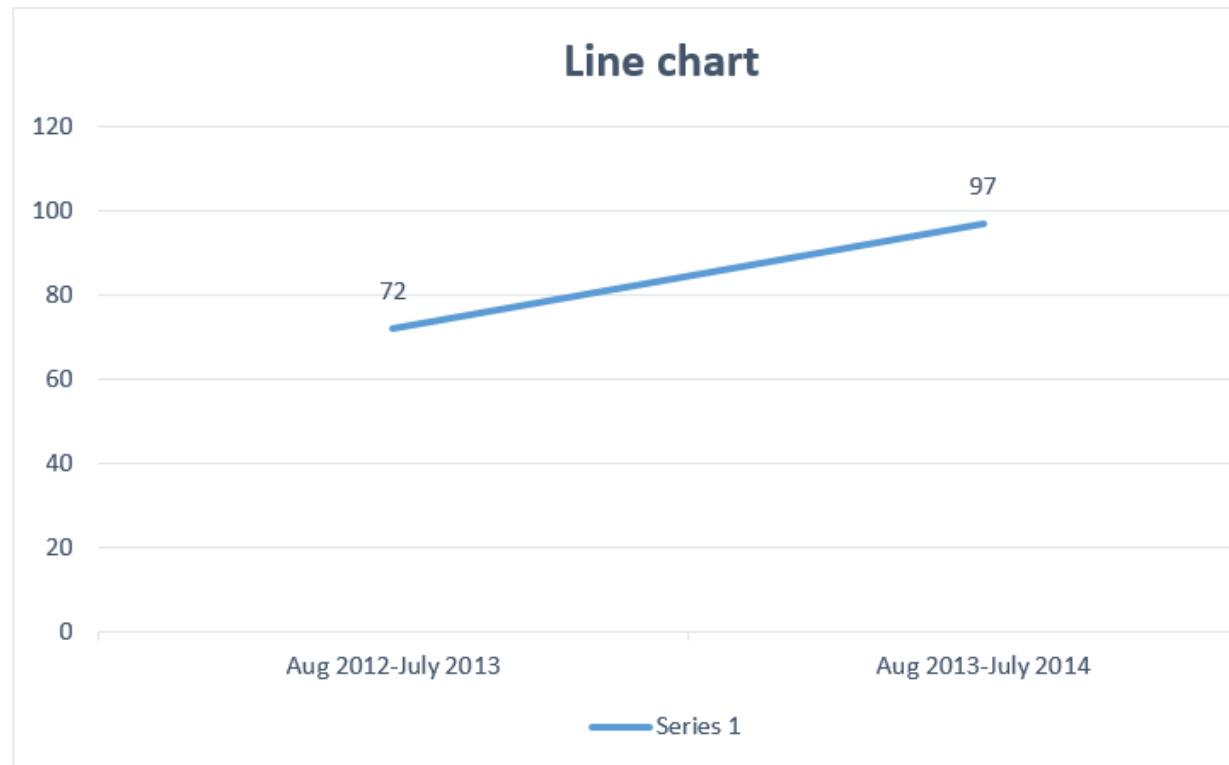
Figure 8. Distribution of SAM patients who were admitted to WUSTH based on duration of stay at NRU from 2012 to 2014.

Among admitted patients to NRU 82.8% of patients recovered, 8.3% defaulted, 4.7% were non responder and 4.1% died.

	frequency	Percent
Recovered	140	82.8
Died	7	4.1
Defaulter	14	8.3
Non responder	8	4.7
Total	169	100

Table 3. distribution of SAM patients who were admitted to WUSTH NRU based on outcome from 2012 to 2014

FIGURE 9. PATERN OF SAM ADMISSION IN THE LAST TWO YEARS



CHAPTER 6

DISCUSSION

The study tried to analyze 169 patients' record. It showed that edematous patients accounted for 121(71.6%) and the rest were non edematous. Most of them were between 6 and 59 months of age. The most susceptible age for malnutrition is 6 to 8 months, worldwide.

Medical complication is most common admission criteria in WUSTH and 97% of admitted patients had atleast one major medical complications.

In WHO criteria, in the management of this patients, treatment failure should not exceed 5% but in this study patients who had treatment failure were in the higher range (9.5%). It is high because of high prevalence of infectious diseases in our set up like AGE which is the most common cause of treatment failure. Most of this patients respond for treatment even it took more time and effort.

The recovery rate in our setup is 87.2% which is comparable to Asian and African countries reported in the range of 25-95%.

Most of SAM children's in our set up stayed at NRU for <10 days and Some of them stayed >10 days .

According to WHO recommendation death rate should be less than 3% but in our setup there is higher death rate which is about 4.1% out of which 57.1% were non edematous SAM followed by edematous SAM patients.

CHAPTER-7

CONCLUSION AND RECOMEDATION

7.1 Conclusion

From the result and discussion held above, it was shown that edematous SAM is common form of malnutrition among malnourished patients admitted to WUSTH nutritional rehabilitation unit. It is common in male patients in age range of 6 months to 59 months. In our findings, the treatment failure was found to be 9.5% and the death is 4.1 %. In the majority (81%) of the cases, the duration of stay in NRU of SAM patients is less than 10 days, but the remaining 19% of cases are still staying in hospital for more than 10 days. So efforts should be taken to optimize the management and follow-up so that standard treatment goals will be achieved and the hospital stay is lowered.

7.2 Limitation of the study

This study is not without limitation, first checklists as data collection tool were designed. But we have faced difficulties in getting access to patients' charts in that we were forced to pay for each charts. Some of the charts had poor documentation and haphazard chart keeping technique which took much of our time in attempting to rearranging the charts.

7.3 Recommendation

The department of pediatrics in WUSTH should work on lowering of treatment failure by thoroughly treating the common causes.

The common causes of death should carefully diagnosed and treated early so that the death rate is lowered.

The patients should be provided with therapeutic feeding by health professionals and the condition of feeding and daily weight gain should closely followed so that duration of stay of some of the optimized (at least <10 days for each patient).

Charts ought to be kept clearly and precisely by responsible physicians and interns.

All SAM patients should be registered on separate registration.

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DATA COLLECTION CHECKLIST

Data collection format on the retrospective analysis of the management outcome of SAM and their duration of stay in the nutritional rehabilitation unit at department of pediatrics, WUSTH from August 2012 to 2014.

1. Identification

- Card No _____
- Age _____
- Sex _____
- Address _____

2. Vaccination status:

Unvaccinated

Not fully vaccinated

Vaccinated for age

Fully vaccinated

3. Mean duration for the edema to disappear:

< 10 days _____

>10 days

Not filled on the chart

4. Duration of stay in the ward after edema disappear

< 10 days _____

≥ 10 days _____

5. type of SAM

Edematous

Non edematous

Marasmic kwashiorkor

6. admission criteria

failed appetite test

medical complication

grade 3 Edema

Age < 6 months

7. cause of SAM

primary

secondary

8. complication

A. AGE

B. DHN

C. CAP

D. PTB

E. DTB

F. UTI

G. Anemia

H. RVI

I. LONS

10. Treatment failure

11. Non responder

12. Cause treatment failure

A. AGE

B. CAP

C. TB

D. UTI

E. Anemia

F. RVI

G. Other

H. Unknown

13. W/H at discharge ≥ -3 Z score

≤ -3 Z score

13. Death

14. cause of death

A. Hypovolemic shock

J. Kwashdermatosis	B. Sepsis
K. Rickets	C. CHF
9. Outcome	D. Respiratory failure
Recovered	E. MOF
Disappeared	F. Others
Defaulter	
Transfer out	
Not documented	
died	