

## **A Retrospective Descriptive Study of Healthcare Professional's Adherence to In-Patient Severe Acute Malnutrition Care Guidelines for Children 6-59 Months**

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**ABSTRACT:** *World Health Organization (WHO) developed guidelines for in-patient management of severe acute malnutrition (SAM) in children. These SAM management guidelines aim at supporting metabolism, reversing and repairing altered physiological processes that may cause irreversible complications and death. Up to 90% survival rates are assured with optimal implementation of these guidelines. However, more than 10% of Ghanaian children who suffer from SAM die. The purpose of the study was to assess health professionals' adherence to in-patient management guidelines for children aged 6-59 months admitted with SAM. We conducted a retrospective review of 75 hospital records of children discharged after treatment for SAM and a descriptive analysis of the data with the aid of SPSS version 20. The findings show that assessment, prevention and treatment of SAM related health problems are partially aligned with WHO recommended guidelines. 88% of patients were treated for presumed infections. Over 97% of patients were given therapeutic diets (F-75), and 90.7% of patients were assessed for dehydration. However, only one (1.3%) of the children checked their blood glucose levels on admission. None 0(0%) of the children were given 10% IV glucose to prevent hypoglycaemia on admission, and only 21.2% of patients with dehydration received the recommended ReSoMal. There is inadequate adherence to the recommended guidelines for the in-patient management of children with SAM. The latter requires exploring explanations to inform strategies that promote compliance.*

**KEYWORDS:** Severe acute malnutrition; children; in-patients; guidelines; adherence

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## **INTRODUCTION**

Severe acute malnutrition (SAM) in children aged 6-59 months is described as mid-upper arm circumference less than 115 mm, or weight for length or height Z-scores of <- 3, or bilateral oedema [1]. It is estimated that about thirteen to twenty-one million children under five years suffer

from SAM, and over four million are from Africa [2]. SAM contributes to 1.7 million child deaths per year in sub-Saharan Africa [3]. SAM remains a serious health challenge in Ghana, especially in the three Northern Regions. In Ghana, 6.2% of children under five years suffer from SAM in the form of wasting, whilst that of the three northern regions affects 8.2% of children under five years [4]. The WHO guidelines for managing SAM in in-patients settings aim to improve the recovery of children and reduce the impact of SAM [5]. Several studies have demonstrated that adherence to the guidelines positively impacts the mortality and recovery rate of children with SAM [6]–[8]. [9] demonstrated that with adequate utilisation of the guidelines, mortality associated with SAM should not surpass 10% in practice [9]. However, the Ministry of Health in Ghana and its agencies have adopted the WHO guidelines for managing SAM [10] report that mortality among hospitalised children with SAM exceeds 10% [10]. This high SAM related mortality suggests that children may not be receiving optimal in-patient care. However, there is a paucity of literature on health care professionals' adherence to the WHO guidelines for managing children with SAM in hospitals. This study assessed adherence to the first 6- steps of the stabilisation phase of the management of children aged 6-59 months with severe acute malnutrition recommended by WHO.

## METHODS

### Design

Researchers applied a quantitative retrospective descriptive design in reviewing hospital records of children aged 6 – 59 months who were discharged from the Upper East Regional Hospital after being treated for SAM. We used a retrospective approach to obtain the estimated sample size that could enable us to meet the study objective within the time permitted for the study. This study was part of an academic exercise with a specific timeline.

### Setting and population

The study was conducted in the Upper East Regional Hospital in Ghana, a referral hospital for six District Hospitals and served an estimated population of 1,110,863. It is 220 beds capacity hospital. Thirty-three of the beds is in the Paediatric ward. The annual hospital report for 2017 prior to this study shows an average yearly admission of 3296 children aged 0 to 13 years to the Paediatric ward, and SAM accounted for 0.9%. The study population was all children aged 6-59 months admitted with SAM to Upper East Regional Hospital between 1<sup>st</sup> January 2016 to 30<sup>th</sup> April 2018.

### Sample/ sampling

Initially, we divided the study population into three strata according to their ages in months. This includes 6 – 23 months, 24 – 41 months, and 42 – 59 months to randomly select participants in each stratum. This was to ensure the inclusion of these groups with their associated reasons for SAM. However, the numbers admitted within the period were not more than the sample. Therefore, all available folders of children admitted with SAM in the facility between the periods 1<sup>st</sup> January 2016 to 30<sup>th</sup> April 2018 that met the inclusion criteria were included in the study. Seventy-five (75) children represented by their folders were enrolled in the study.

### Data collection

A checklist developed from the WHO guidelines collected data from retrieved patients' files and admission books. A pilot review with the checklist was done to obtain its suitability. The first section of the checklist was used to collect demographic and anthropometric data of participants, whilst the second section of the checklist was used to collect data on the assessment, prevention and treatment of the main SAM related health problems: hypoglycemia, hypothermia, dehydration, infection, electrolytes, micronutrients and initial re-feeding.

### Analysis of data

Demographic data, information on assessment, prevention and treatment of SAM related health problems were collected from patients' folders and examined the data for completeness. SPSS version 20 was used for statistical analysis using We described the data using frequency and presented findings in tables. Random data checks were performed to ensure validity.

### Ethical consideration

We obtained clearance to conduct this study from the Ghana College of Nurses and Midwives Academic Board Research Sub-Committee and obtained administrative permission from the Regional Directorate of Health Service. However, we maintained the confidentiality of the data by not adding any identifiable information of the children to the data we extracted. We could not trace the families of the children to obtain consent for the use of the information.

## RESULTS

### Demographics and anthropometric data

As shown in table 1, seventy-five (75) folders of discharged children were included in the study, with the majority (54.7%) being females. Seventy-six per cent were in the age of 6-23 months. The mean age of the study population was 19.2 months. Ninety-six per cent (96%) of the children had their mid-upper arm circumference (MUAC) measurement taken, and only 5.3% of them had their weight-for-height/ length measured.

**Table 1 Demographic characteristics of studied patients (n = 75)**

Demographic	Number	Percent
<b>Age in months</b>		
6-23	57	76
24-41	11	14.7
42-59	7	9.3
<b>Sex</b>		
Female	41	54.7
Male	34	45.3
<b>Measurement</b>		
Weight	75	100
MUAC	72	96
Weight-for-height/length	4	5.3

**Adherence to SAM guidelines**

The WHO guidelines on SAM recommend careful clinical assessment of children's health problems with SAM. This ensures early prevention or treatment of health issues common to children with SAM, such as hypoglycaemia, hypothermia, dehydration, electrolytes imbalance, infections and micronutrient deficiencies [1].

**Assessment of SAM related Health problems**

The first activity in the management of SAM is to assess the sick child for health problems that commonly result in SAM related complications and death. There was a general mixed level of assessment of the children's health problems. For instance, 75(100%) of the children's temperatures were checked on admission, only 1(1.3%) of the children had their blood glucose levels assessed. Table two shows details of the SAM related health problems that were assessed.

**Table 2: Assessment of SAM related health problems**

Recommended guideline activity	Yes (%)	No (%)
Blood glucose level measured on admission	1 (1.3)	74 (98.7)
Child temperature check on admission	75 (100)	0 (0)
Assessment for dehydration	68 (90.7)	7 (9.3)
Checking of electrolytes	2 (3)	73 (97)
Child assessed for vitamin A deficiency on admission	1 (1.3)	74 (98.7)

**Prevention of SAM related health problems**

An essential recommendation in managing SAM in children is preventing related health problems such as hypothermia, hypoglycaemia, and dehydration. The aim of this is to prevent related complications. Our review of the children's records shows that most of these health problems related to SAM were not prevented. The records show that none of the children's 75(100%) was given 10% glucose immediately on admission to prevent hypoglycaemia as recommended by WHO. However, 66(88%) of the children were given antibiotics for presumed bacterial infection. Table 3 shows details of the interventions to prevent SAM related health problems.

**Table 3: Prevention of SAM related Health problems**

Recommended Guideline activity	Yes (%)	No (%)
Child given 10% glucose or sucrose solution immediately on admission	0 (0)	75 (100)
Extra potassium	2 (3)	73(97)
Antibiotics given for presumed bacterial infection	66 (88)	9 (12)
HIV testing done on admission	41 (54.7)	34 (45.3)
Vitamin A given to patient on admission	0 (0)	75 (100)

**Treatment of SAM related health problems**

The WHO guidelines recommend that SAM related health problems be treated within the recommended periods to take advantage of the window of opportunity to prevent malnutrition complications and mortality. Compared with the assessment and prevention of SAM-related health problems, the data showed relatively high compliance in children's treatment of SAM-related problems. 48 (100%) of children who had comorbidities were treated with antibiotics and 73 (97.3%) of the children were started with therapeutic diets (F-75). Table 4 presents details

**Table 4: Treatment of SAM related Health problems**

<b>Recommended Guideline activity</b>	<b>Yes (%)</b>	<b>No (%)</b>
Patients treated for dehydration on admission	33 (44)	43 (56)
Use of ReSoMal to rehydrate patients	7 (21.2)	26 (79)
Use of IV fluids to rehydrate patients	14 (42.4)	19 (58)
Use of ORS to rehydrate patients	12 (36.4)	21 (64)
Administration of extra magnesium	0 (0)	75 (100)
Co-morbidities in the child treated	48 (100)	0 (0)
Iron has given during the stabilisation phase	1 (1.3)	74 (98.7)
The child started on a therapeutic diet	73 (97.3)	2 (2.7)
Body weight monitored daily during initial re-feeding	64 (87.8)	9 (12.3)
Use of F-75	73 (97.3)	2 (2.7)
2-4 hourly feeding	49 (67.1)	24 (32.9)

The results generally suggest low adherence to the WHO guidelines for managing children in the stabilisation phase.

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## DISCUSSIONS

In this study, we conducted a retrospective review of children's records under five years to describe health care professionals' compliance with WHO recommendations for managing severe acute malnutrition in hospital settings. The 6- steps guidelines for managing the stabilisation phase were assessed. Our findings suggest partial adherence to the WHO guidelines in the first 6-steps of the stabilisation phase of in-patient management of children 6-59 months with severe acute malnutrition.

The fewer children assessed for SAM related health problems support our first finding that health professionals caring for children with severe acute malnutrition do not adequately assess the children for SAM related health problems. This includes the absence of a record on the immediate checking of blood glucose, electrolytes and vitamin A deficiency-related issues during the stabilisation phase. Assessing the health problems in in-patient children with SAM helps health professionals decide the immediate actions to reestablish the impaired physiological and metabolic processes in malnutrition. Immediate identification and treatment of altered body functions promote quick recovery in malnourished sick children [11]. Although there is limited literature on the level of compliance of the assessment of children with SAM, Studies such as that of Anthony (2013) in South Africa reported that only 57% of malnourished child patients had a blood sugar check on admissions [12]. Meanwhile, Bachou (2008) reported that inadequate assessment of severely ill hospitalised children positively impacts their quick recovery [13]. The low adherence to the assessment of sick children and the certainty of its importance in determining the presence and level of severity of health problems that require urgent attention suggests that children may suffer from complications due to low identification of SAM related health problems.

We also found that the prevention of SAM-related health problems in the first six stabilisation phases was inadequate. Though hypoglycaemia and hypokalemia are among the commonest cause of death in in-patient children with SAM, glucose and extra potassium are required to restart physiological processes [14], none of the children in the study received prophylactic IV glucose for hypoglycaemia. We also found substantial deviation in the recommended administration of extra potassium in the stabilisation phase of SAM management. In this study, only 3% of patients received extra potassium. An equally low administration of potassium was reported in Kenya, where only 3.1% of SAM patients on admission received extra potassium [15]. The recommendation for administering extra potassium and magnesium from the first day of admission is to prevent deficiencies in these electrolytes resulting in the body's inability to balance its fluids and failure to control neuromuscular function and osmotic pressure [1]. Other authors have reported the inadequate prevention of SAM related health problems. Prevention of health problems in children with SAM is a vital part of the care that ensures speedy recovery. A study in Sudan found 13.9% of SAM cases with hypokalemia on admission dying compared to 3.1% of cases with normal potassium levels [16]. Considering the significance of prevention, the WHO guidelines indicate that even when parameters of some indicators such as blood glucose level cannot be measured, children with SAM ought to be given IV glucose or fed immediately on admission to prevent hypoglycemia.



Furthermore, to take advantage of the window of opportunity to prevent SAM related mortality, which recommends the immediate treatment of all SAM related health problems. We found that there was a near equal share of treatment and non-treatment of SAM related health problems. We found a 100% treatment of children presenting with comorbidities' clinical manifestations. However, the choice of antibiotics was contrary to the WHO guidelines recommendations. WHO recommends ampicillin and Gentamycin combination to treat presumed sepsis in children admitted with SAM [5]. Contrarily, only 8% of the children received this combination.

Meanwhile, studies have established the clinical safety of Ampicillin and Gentamycin combination in SAM patients and this regimen's ability to reduce mortalities [17]. Mbugua (2015) reported in their study in Kenya that all patients with SAM admitted to a hospital received antibiotics [15]. The rest, sixty-nine (92%) of the in-patient children, were given ceftriaxone, cefuroxime, metronidazole and Co-Amoxiclav. The use of antibiotics in children with SAM stems from the fact that most children with SAM also present with other disease conditions such as bacterial infections, which may not show any clinical features [18]–[20]. This makes the use of antibiotics helpful, as these treatments result in a speedy recovery and decreased days of in-patients treatment [21]. Like this study, other studies suggest that health care professionals are more receptive to the recommendation of giving SAM children antibiotics either as prophylaxis or for the treatment of inconclusive diagnosis of infection. This finding aligns with other findings elsewhere.

We also found that up to 97% of the entire study sample were given an F-75 therapeutic diet in compliance with the WHO guidelines. Feeding SAM patients with F-75 promotes the regain of the body's normal physiology and prevents death due to overpowering the body systems. Appropriate F-75 dietary formula with comprehensive care improves in-patient SAM mortality below 10% [9]. Other studies, such as one conducted in Kenya, equally show a high level of compliance with the feeding of children with SAM with F-75 [15]. Our study found compliance with the timing of feeding as recommended by the in-patient guidelines. Six- seven per cent (67%) of patients were fed every 2- 4hours. Feeding frequently (2-4hours) helps to improve weight gain and promotes better health outcomes in SAM.

Management of fluids is one critical area of treatment of SAM in in-patient children. We found that rehydration was not following the guidelines. Thirty-two (42.4%) and 27 (36.4%) of the child patients with dehydration were treated using normal saline, and ringers lactate intravenous fluids, and the normal Oral Rehydration Salts (ORS), respectively. The guidelines recommend strongly against intravenous fluids unless the child is in shock [22]. This non-compliance to the fluid and electrolytes management recommendations has profound recovery implications for the sick child. However, other authors do not support intravenous fluid restrictions in in-patient SAM children. A systematic review on rehydration of malnourished children by Houston et al. (2017) found no evidence of intravenous fluid-related complications as cautioned by the guidelines [23]. This contrary existing evidence could challenge frontline health professionals who manage children with SAM. In order to prevent the current practice of random administration of fluids, as it appears to be probably due to inconsistencies in the literature, further studies may be required to clarify the benefits or otherwise of various fluids in children with SAM. Though there is a paucity of

primary research evidence on health professionals compliance with treatment SAM related health problems in in-patient sick children, a report from a study conducted in Kenya reports that 19% of SAM patients on admission also received normal saline contrary to the guidelines [15]. This pervasive low compliance in these treatments suggests that many children may suffer the adverse effects of inadequate management of SAM related health problems.

The results showed that Oral Rehydration Salt (ORS) in managing dehydration for SAM in-patient children in the study was inconsistent with the recommended guidelines. Twenty-seven (36.4%) of in-patients children treated for dehydration in the study received the standard ORS with high sodium level while 21.2% received the recommended ReSoMal, a solution lower in sodium and higher in potassium. It is not clear what would have contributed to this non-compliance. Published evidence on some of the recommended guidelines could have contributed to this practice. Tickell & Denno (2016) found that up to 48.5% of the WHO recommendations on in-patient SAM management were not supported by available relevant published data [5]. Most authors found the standard ORS safer than the recommended ReSoMal in managing dehydration in SAM patients [22], [24]. There is a need to clarify the existing evidence with whom recommendations ought to be urgent to ensure apt management of children with SAM considering its implications on children's health, life span, and growth and development.

The essence of in-patient management of severe acute malnutrition is to ensure that the WHO recommended guidelines, which have proven to reduce SAM-related complications and mortalities, are applied. The in-patient SAM management guidelines aim to quickly restore the sick child's collapsing system to function effectively for the child's recovery. The findings of this study have demonstrated a high level of non-compliance with recommended inpatient SAM management, which defeats the rationale for the compulsory in-patient management.

All health care professionals who manage children with SAM are expected to be well informed about the aim of SAM treatment and apply the recommended guidelines to achieve its aims. However, our study did not explore the factors that influence the implementation of the guidelines. This study is therefore limited in providing explanations for the poor compliance. Nurses who appear to be with children admitted for the management of SAM may have to deliberate actions to ensure that all children with SAM are treated based on recommended guidelines. However, Nurses' knowledge of the recommended guidelines and skills for managing SAM has not been established. There is also currently no evidence of the level of pre-service and intra- service training of health professionals who work with children with SAM to empower them to manage children with SAM effectively. Investigating nurses' knowledge of SAM management and implementing the WHO guidelines may help understand empowering health professionals. Refresher courses could be organised for critical nurses who have been exposed to SAM management, whilst familiarization training on case management of SAM is conducted for nurses who currently work with children but have never been exposed to the guidelines for managing children with SAM may be helpful.



Generally, nurses, physicians and dieticians need to work together as the frontline health professionals in caring for children with SAM. This requires effective interprofessional collaboration in the management of these children. Nonetheless, it is unclear whether there is interprofessional collaboration in this context. There is also limited evidence on interprofessional training of the heterogeneous health workers who are expected to work together in cases like in-patient SAM management. This may require a review of the curriculum of the health professionals' trainees to include interprofessional collaboration education, which has been identified as an effective way of preventing the omission of care to patients and maintenance of safety in caregiving. Additionally, regular auditing of children's records on admission with SAM could help identify omissions immediately, and therefore design strategies that may help reduce non-compliance with care.

## CONCLUSION

Our study undoubtedly contributes knowledge to the management of malnutrition in children by presenting a picture of the care children with severe acute malnutrition receive during hospital admissions. However, it does not provide readers with explanations associated with the non-compliance that the study has highlighted.

Additionally, due to the retrospective nature of this study, there may be documentation omissions, which could skew the findings. We also acknowledge that the study site was one in-patient unit with its peculiarities, and the sample is not representative enough. Therefore, it may be challenging to generalise these findings for other in-patient SAM care settings. Nonetheless, the findings provide insight into in-patient care guidelines for managing severe acute malnutrition in children 6 to 59 months.

However, the review of factors influencing compliance is indispensable for finding strategies for promoting compliance in SAM care. Although there are indications of compliance with the in-patient management of children with SAM, this paper shows that there is generally low compliance with the recommended guidelines. Complete compliance with the WHO guidelines is required for the child's recovery with SAM without sequelae that may affect the adult potential of such children.

### Data Availability

The observational data used to support this study finding are available from the corresponding author upon request

### Conflict of interest

The authors declare that they have no competing interests.

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### Supplementary Materials

There is no supplementary material related to this manuscript.

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