UTILIZATION OF GUIDELINES FOR MANAGEMENT OF SEVERE ACUTE MALNUTRITION IN CHILDREN AGED 6-59 MONTHS IN BUSIA COUNTY REFERRAL HOSPITAL

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DECLARATION

This dissertation is my original work submitted in partial fulfillment of the requirements for the award of degree of Master of Science in Nursing of University of Nairobi. It has not been presented for a degree award in any other university.

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DEDICATION

I dedicate this dissertation to my dear parents for their material, emotional and spiritual support through the course of my studies. Your prayers and encouragement means a lot to me.

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LIST OF ABBREVIATIONS/ACRONYMS

AIDS   Acquired immunodeficiency virus

B D   *bis in die*

BS   Blood slide

CI   Confidence interval

CMV   Combined mineral vitamin mix

CXR   Chest X ray

DHIS   District Health Information System

FAO   Food and Agriculture Organisation

GXM   Grouping and cross match

Hb   Haemoglobin level

HIV   Human immune deficiency virus

H. pylori   Helicobactor pylori

I.U.   International units

IFPRI   International Food Policy Research Institute

KDHS   Kenya Demographic and Health Survey

KNBS   Kenya National Bureau of Statistics

LFT   Liver function tests

MoH   Ministry of Health: Kenya

MUAC   Mid-upper arm circumference

O D   Once daily

OR	Odds ratio
ORS	Oral rehydration solution
PEM	Protein-Energy Malnutrition
PITC	Provider-initiated counseling of HIV/AIDS
RBS	Random blood sugar
ReSoMal	Rehydration Solution for Malnutrition
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SD	Standard deviation
SPSS	Statistical package for social sciences
Stat	*satim;* immediately or without delay
UECs	Urea, electrolytes and creatinine
UNICEF	United Nations Children's Fund
URTI	Upper respiratory tract infection
UTI	Urinary tract infection
WHO	World Health Organisation
WHZ	Weight for height Z score (standard deviation from the mean)

DEFINITION OF TERMS

Catch-up growth: refers to acceleration of the growth rate following a period of
growth retardation caused by a secondary deficiency, such as acute
malnutrition-Mosby's Medical Dictionary, 8th edition. © 2009,
Elsevier

F-75   is the "starter" formula used during initial management of
malnutrition, beginning as soon as possible and continuing for 2-7
days until the child is stabilized.
(http://motherchildnutrition.org/malnutrition-
management/info/feeding-formulas-f75-f100.html)

F-100   is the "catch-up" formula use as soon as the child is stabilized on
F-75 to rebuild wasted tissues.

Guidelines: information intended to advice health workers on how to assess,
manage and monitor children with severe acute malnutrition.

Hypoglycaemia: Blood glucose level is < 3 mmol/litre (< 54 mg/dl).

Hypothermia: refers to the axillary temperature < 35 °C (< 95°F) or that does not
register on a normal thermometer; when rectal temperature is <
35.5 °C or < 95.9 °F

Severe acute Malnutrition: severe wasting (weight-for-height < -3 standard deviations) or the
presence of bilateral pitting oedema. In children aged 6–59
months, an arm circumference of < 115 mm is indicative of severe
acute malnutrition (WHO).

Undernutrition: a situation in which the body's requirements are not met, due to
underconsumption, or to impaired absorption and use of nutrients.
Undernutrition commonly refers to a deficit in energy intake, but

can also refer to deficiencies of specific nutrients, and can be either acute or chronic.

Utilization: to use or apply the guidelines for management of children with severe acute malnutrition.

ABSTRACT

Background: Malnutrition is responsible for 35% of deaths among children under five years of age globally (Black et al., 2008). It causes 2.8 million deaths in children per year (WHO/FAO, 2014). The prevalence of severe acute malnutrition in Kenya is estimated to be 6% (MoH, 2009). In Busia County Referral Hospital case fatality rate for children with severe acute malnutrition in 2014 was 26% (DHIS Kenya). World Health Organization (WHO) has developed guidelines for the management of severe acute malnutrition in children (WHO, 1999). The use of these guidelines in treatment of children with malnutrition reduces mortality related to malnutrition.

Objectives: The objective of the study was to assess the utilization of guidelines for management of severe acute malnutrition in children aged 6-59 months in Busia County Referral Hospital.

Methods: This was cross-sectional, descriptive study. Participants were recruited from the paediatric ward. Purposive sampling was used to select the study sample. A checklist was used to check documentation of guidelines for management of malnutrition in children from the in-patient files and implementation by the caretakers. Key informant interviews were conducted to obtain data on the supply of essential nutritional commodities in the study sites involved in the care of children. Descriptive data was analysed using mean, mode and median. Findings were presented in form of frequency tables and bar charts. An overall guidelines utilization scoring tool was developed and used to rate the overall utilization of the guidelines.

Results: A total of ninety six (96) participants were recruited for the study. The mean age of the participants was 21.85 months. There was significantly higher proportion of children with MUAC less than 11.5cm among 6 to 12 months 20(69.0%) [OR=9.26; 95%CI=2.82-30.39; P<0.001] and 13 to 24 months 16(44.4%) [OR=3.33; 95%CI=1.10-10.09; P=0.033] compared to those aged 25 to 59 months 6(19.4%). Mean weight had increased from 7.97Kg at admission to 8.45Kg at 7 days and this differences was significant (p<0.0001) after *paired samples t test* was computed. The average utilization of the guidelines was 86.4%.

Conclusion and recommendations: Guidelines for management of severe acute malnutrition are adequately utilized in Busia County Referral Hospital. Commodities needed for management of children with severe acute malnutrition, particularly F75 and F100 are available at the hospital. Periodic training of all health workers involved in the care of children with severe acute malnutrition is recommended to ensure optimum utilization of the guidelines for management of severe acute malnutrition.

CHAPTER I: INTRODUCTION

1.1 Background information

It is estimated that 162 million children under five years suffered from stunting while 51 million suffered from wasting worldwide in the year 2013 (IFPRI, 2014). Malnutrition is responsible for 35% of deaths among children under five years of age (Black et al., 2008). Malnutrition causes 2.8 million deaths per year (WHO, 2014). The median case fatality rate for severe acute malnutrition ranges between 30-50% (Deen *et al.,* 2003).

In Kenya 35% of children under five years of age are stunted while 14 % are severely stunted (KNBS, 2008-09). In Western Kenya 14.8% of children under five years of age are severely stunted while 34.2% of children in the same age group are stunted (KNBS, 2008-09). The same study shows that 3.9% of children under five years are severely underweight whereas 11.8% of children in the same age bracket are underweight. The prevalence of severe acute malnutrition in Kenya is estimated to be 6% (MoH, 2009).The prevalence of wasting and severe wasting in the Western Kenya is 2.3 % and 1% respectively (KNBS, 2008-09). In Busia County Referral Hospital case fatality rate for children with severe acute malnutrition is above the target of 3% (DHIS Kenya. MoH 2009)

Malnutrition means "bad nutrition". It includes both over- and under- nutrition (Luchuo *et al.,* 2013). Malnutrition takes the form of undernutrition, overweight or obesity, or micronutrient deficiency (KNBS, 2010). Malnutrition is defined as "a state in which the physical function of an individual is impaired to the point where he/she can no longer maintain adequate bodily performance processes such as growth, pregnancy, lactation, physical work, and resisting and recovering from disease," (MoH, 2009). Malnutrition is categorized into two: Acute Malnutrition and Chronic Malnutrition. Acute malnutrition is further divided into Moderate Acute Malnutrition (MAM) and Severe Acute Malnutrition (SAM) depending on the patient's degree of wasting (MoH, 2009). Severe acute malnutrition (SAM) or severe wasting is defined by very low weight-for-height (below -3 Z scores of the median WHO child growth standards), a mid-upper arm circumference < 115 mm, or by the presence of nutritional edema (WHO, 2013). SAM is a

major killer of children under five; it contributes to approximately 2.8 million child deaths every year (WHO, 2014). Globally, it is estimated that 26 million children under five years are severely acutely malnourished (WHO, 1999).

In 1999 the World Health Organization (WHO) developed guidelines for the management of severe acute malnutrition in form of a manual designed for use by physicians and other senior health care providers (WHO 1999). The guidelines identify 10 steps that are followed in the treatment of a child with severe acute malnutrition. Management of the child with severe malnutrition is divided into three phases comprising the ten steps (Appendix V). In the initial phase of treatment, life-threatening problems are identified and treated in a hospital or a residential care facility (Manary and Sandige, 2008). Also specific deficiencies are corrected, metabolic abnormalities are reversed and feeding is begun (WHO, 2013). In rehabilitation phase intensive feeding is given to recover most of the lost weight, emotional and physical stimulation are increased, the mother or carer is trained to continue care at home, and preparations are made for discharge of the child (MoH, 2009). The child and the child's family are followed after discharge to prevent relapse and assure the continued physical, mental and emotional development of the child (WHO, 1999).

Kenya adopted the WHO guidelines for the management of malnutrition in 2008. Evaluation of the application of these guidelines in the management of children with acute malnutrition has been done in several sites in Kenya. In Garissa Provincial General Hospital, for example, adherence to National guidelines for Integrated Management of Acute malnutrition was documented in five out of the eight steps (Warfa *et al.,* 2013). Management of children with severe acute malnutrition was inadequate at Garissa Provincial General Hospital (Warfa *et al*. 2013). In Kenyatta National Hospital, the care of children with acute malnutrition often did not follow the WHO guidelines (Nzioki *et al.,* 2008).

1.2 Problem statement

Malnutrition affects all age groups, but infants and young children are the most vulnerable to malnutrition because of their high nutritional requirements for growth and development (Blössner and de Onis 2005). It is estimated that the national prevalence of severe acute

malnutrition in Kenya is 6% (MoH, 2009). According to Nungo *et al.* (2012), the Nutrition status of children was poor in Nambale area, Busia County. The prevalence of stunting, underweight and wasting were 26.6%, 13.9%, and 10.1% respectively (Nungo *et al.* 2012). Data retrieved from the District Health Information System shows that there were 114 new admissions of children with severe acute malnutrition in Busia County Referral Hospital in the year 2014. Of all the inpatient beneficiaries attended at the hospital in 2014, 75 patients recovered. This represents a recovery rate of 50%. A total of 39 deaths of children with severe acute malnutrition were reported at the same facility in the same year representing a case fatality rate of 26%. The target recovery rate set by the Ministry of Health (MoH 2009) is >75% while the mortality rate for children admitted for nutritional interventions is <3%. Utilization of guidelines for management of severe acute malnutrition can reduce mortality rate in children admitted with severe acute malnutrition to less than 10% (Ashworth *et al.* 2004). The investigator set out to assess the utilization of national guidelines for management of severe acute malnutrition in children aged 6-59 months admitted in Busia County Referral Hospital.

1.3 Justification of the study

The mortality related to severe acute malnutrition is high compared to the target of less than 3%. Assessment of utilization of guidelines for management of severe acute malnutrition can reveal gaps in the treatment of children with malnutrition at Busia County Referral Hospital. It can also show some of the challenges the health workers encounter when managing such children. This can then serve as a basis for laying down strategies to improve the care of children admitted at the hospital with severe acute malnutrition so as to reduce mortality and improve other health outcomes in children admitted with severe acute malnutrition.

1.4 Research question

Are the WHO guidelines for management of severe acute malnutrition utilized in management of children aged 6-59 months in Busia County Referral Hospital?

1.5 Broad Objective

To determine the implementation of WHO guidelines for management of severe acute malnutrition in management of children aged 6-59 months in Busia County Referral Hospital

1.6 Specific Objectives

1. To establish utilization of WHO guidelines for management of severe acute malnutrition in children aged 6-59 months admitted to Busia County Referral Hospital.

2. To identify factors that influence utilization of the national guidelines for management of malnutrition in Children aged 6-59 Months admitted to Busia County Referral Hospital.

3. To suggest possible interventions to improve the utilization of the National guidelines for management of malnutrition in children aged 6-59 months admitted to Busia County Referral Hospital.

1.7 Hypothesis

National guidelines for management of severe acute malnutrition are not utilized in management of children with severe acute malnutrition in Busia County Referral Hospital.

1.8 Purpose of the study

The purpose of the study was to determine if guidelines for management of children with severe acute malnutrition are utilized in Busia County Referral Hospital. This was done through identifying existing practice of use of guidelines for management of severe acute malnutrition.

1.9 Theoretical Framework

The conceptual framework of the study is based on the Donabedian Model for assessing health care quality (McDonald *et al.* 2007). The model proposes three concepts i.e. structures, processes and outcomes. Donabedian defined structures of health care as the physical and organizational aspects of care settings for example facilities, equipment, personnel, operational and financial processes supporting medical care, etc (McDonald *et al.* 2007). Process refers to the method by which health care is provided. Processes are performed in order to improve patient health in

terms of promoting recovery, functional restoration, survival and patient satisfaction. Processes depend on the structures to provide resources and mechanisms for participants to carry out patient care activities. According to Donabedian's model, processes are constrained by the structures in which they implemented. Outcome is the consequence of the health care provided. Outcomes include morbidity, mortality and patient experiences and satisfaction (McDonald *et al.* 2007). The Donabedian model is represented in the figure below.

Figure 1: Donabedian's Quality Framework (McDonald *et al.* 2007).
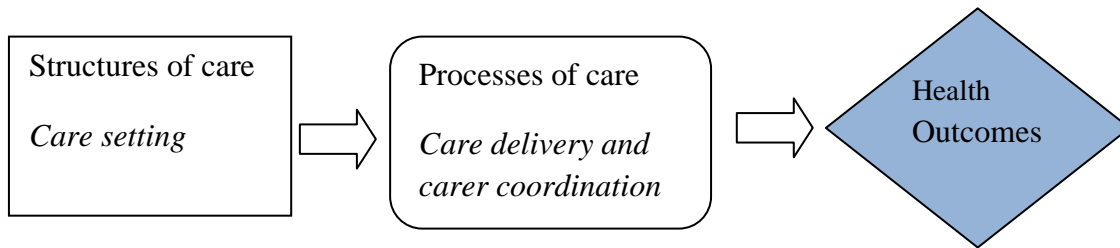
1.10 Conceptual Framework

Independent Variables   **Dependent Variable**

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┌─────────────────────────────────────────┐
│ Staff knowledge and skills on management │
│ of SAM                                   │
└─────────────────────────────────────────┘

┌─────────────────────────────────────────┐
│ Availability of Guidelines on management │
│ of SAM                                   │
└─────────────────────────────────────────┘

┌─────────────────────────────────────────┐        ┌──────────────────────┐
│ Equipment and instruments necessary for  │        │ Total utilization of │
│ management of SAM. E.g. height board,     │  ⟹    │ guidelines           │
│ Salter scales, infant scales, MUAC tapes, │        └──────────────────────┘
│ baby scales,                              │
└─────────────────────────────────────────┘

┌─────────────────────────────────────────┐
│ Essential supplies e.g. F75, F100,        │
│ ReSoMal, Ringers lactate, 10% dextrose    │
│ and medicines e.g. antibiotics, Potassium │
│ Chloride, Iron and vitamin A.             │
└─────────────────────────────────────────┘

┌─────────────────────────────────────────┐
│ Infrastructure-malnutrition care room     │
└─────────────────────────────────────────┘
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Confounding Variables

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┌─────────────────────────────────────────┐
│ Cultural factors                          │
│                                           │
│ Staff motivation                          │
│                                           │
│ Attitude of staff                         │
│                                           │
│ Workload of staff                         │
│                                           │
│ Adequate space for counseling             │
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CHAPTER II: LITERATURE REVIEW

2.1: Burden of Malnutrition

It is estimated that 162 million children under five years suffered from stunting while 51 million suffered from wasting in the world in 2013. Malnutrition is responsible for 35% of deaths among children under five years of age (Black et al. 2008). This translates to 2.8 million deaths per year (WHO 2014). The median case fatality rate for severe acute malnutrition ranges between 30-50% (WHO 1999, Deen *et al*. 2003).

In Kenya 35% of children under five years of age are stunted while 14 % are severely stunted. It is estimated that 14.8% of children under five years of age are severely stunted in Western Kenya while 34.2% of children in the same age group are stunted. The same study shows that 3.9% of children under five years are severely underweight whereas 11.8% of children in the same age bracket are underweight. Studies show that 2.3 % are wasted while 1% are severely wasted in Western Kenya (KNBS 2010). The nutrition status of children under five years in Nambale, Busia County was found to be poor (Nungo *et al*. 2012). The study revealed that 26.6% of the children were stunted, 13.9% underweight, and 10.1% were wasted (Nungo *et al*. 2012).

Malnutrition can arise from primary or secondary causes Fauci *et al.* 2008). Primary malnutrition is due to inadequate or poor-quality food intake. Secondary malnutrition is caused by diseases that alter food intake or nutrient requirements, metabolism, or absorption (Fauci *et al.* 2008). Infants and young children are the most vulnerable as they require extra nutrition for growth and development, have comparatively limited energy reserves and depend on others (Picot *et al*. 2012).

2.2: Forms of malnutrition

Malnutrition can involve macronutrients or micronutrients deficiency. Macronutrient deficiency is commonly referred to as protein energy malnutrition. Protein-energy malnutrition is the most lethal form of malnutrition (World Hunger Service, 2014).There are two major types of PEM

that have been described (Luchuo *et al* 2013). These are Marasmus and kwashiorkor (Fauci *et al*. 2008). When the two types of under nutrition occur together then the condition is referred to as marasmic kwashiorkor (Fauci *et al*. 2008).

2.2.1: Marasmus

Marasmus is a condition primarily caused by a deficiency in calories and energy (Müller O. and Krawinkel M. 2005). Marasmus occurs when virtually all available body fat stores have been exhausted due to starvation (Fauci *et al*. 2008). Marasmus is easily detected because of the patient appears starved. The diagnosis is based on severe fat and muscle wastage. Diminished skin-fold thickness reflects the loss of fat reserves (Shashidhar *et al*. 2014). Reduced mid upper arm muscle circumference with temporal and interosseous muscle wasting reflects the breakdown of protein throughout the body, including vital organs such as the heart, liver, and kidneys (Shashidhar *et al*. 2014).

2.2.2: Kwashiorkor

Kwashiorkor occurs when there is protein deficiency, resulting in an oedema (Shashidhar *et al*. 2014). Initially, the physical findings of kwashiorkor are few and nonspecific. Fat reserves and muscle mass are retained, giving the false appearance of adequate nutrition. Easy hair pluckability, eodema, skin breakdown, and poor wound healing are indicative of kwashiorkor (Fauci *et al.* 2008). In kwashiorkor, there may be reduction of levels of serum proteins such albumin (<2.8 g/dL), prealbumin (<5 mg/dL) and transferrin (<150 mg/dL) or iron-binding capacity (<200 g/dL) (Shashidhar *et al* 2014, Fauci *et al.* 2008). Cellular immunity is depressed, due to lymphopenia (<1500 lymphocytes/L in adults and older children) and lack of response to skin test antigens (anergy).

2.2.3: Marasmic Kwashiorkor

Marasmic kwashiorkor is the combined form of PEM. Marasmic kwashiorkor clinically presents with signs of both Marasmus and kwashiorkor (Müller O. and Krawinkel M. 2005). If kwashiorkor predominates, there is need for vigorous nutritional therapy. If Marasmus predominates, feeding should be more cautious and gradual (WHO 2013).

2.3: Causes of Malnutrition

Several factors can lead to malnutrition. Inappropriate weaning habits especially by young mothers and precipitating infections can lead to increased incidence of malnutrition (Blössner and de Onis 2005). In many developing countries, there is a limited variety of food. This leads to mineral and vitamin deficiency. Generally, infection causes anorexia which results in reduced food intake and that may result in malnutrition. Infections can trigger, or aggravate, or combine with malnutrition (Müller O. and Krawinkel M. 2005). Diarrhoea can cause malnutrition through loss of appetite and weight loss. Infectious diseases that can lead to protein-energy malnutrition include gastroenteritis, respiratory infections, measles, and pertussis (Shashidhar 2014).

Malnutrition occurs commonly during weaning (Kliegman et al 2007). If a low-variety diet, or if weaning foods are introduced only in children older than 8-10 months then malnutrition is likely to arise. The WHO recommends exclusive breastfeeding until age 6 months; then, the introduction of various additional foods is recommended.

2.4: Diagnosis of malnutrition

Generally, clinical evaluation is sufficient for diagnosis and treatment of malnutrition (WHO 2008). Most laboratory results are within the reference range despite significant changes in body composition and physiology. Some laboratory results can be useful to monitor treatment or to diagnose specific complications. Laboratory tests adapted from the WHO include the following: blood glucose, examination of blood smears by microscopy or direct detection test, haemoglobin level, urine examination and culture, stool examination by microscopy and albumin (WHO 2008). HIV test is performed but it is not routinely done. Hyponatremia is a significant finding since most cases of malnutrition have excess sodium in the body. Radiological examinations are rarely used (Shashidhar et al. 2014). Thoracic radiography can show a pulmonary infection despite lack of clinical signs, a primary tuberculosis lesion or cardiomegaly.

2.5: Effects of malnutrition

Pathophysiological changes associated with malnutrition can be categorized into body composition changes, metabolic changes, and anatomic changes (Shashidhar et al. 2014).

2.5.1: Effects on Body Composition

Fat stores can decrease to as low as 5% of the total body weight (Shashidhar et al. 2014). The remaining fat is usually stored in the liver, giving a paradoxical appearance of a fatty liver. This is often observed in kwashiorkor but it also occurs to a lesser extent in Marasmus.

The proportion of water content in the body increases with the increased seriousness of PEM (Marasmus or kwashiorkor). Increase in total body water is associated with the loss of fat mass, which is poor in water. The proportion of extracellular water also increases, often resulting in oedema. Oedema is significant in kwashiorkor. Oedema can also occur in Marasmus or in Marasmic kwashiorkor. During the first days of therapy, part of the extracellular water shifts to the intracellular compartment and part of it is lost in the urine, resulting in the observed initial weight loss with treatment (Rabinowitz *et al.* 2014). Protein mass can decrease as much as 30% in the most serious forms. Muscle tissue gets infiltrated with fat and fibrous tissue. Infants with malnutrition have an increased tendency to hypothermia and hypoglycemia, requiring the frequent administration of small meals (MoH 2009). This can is due to the imbalance of body composition of children with malnutrition in favor of organs that consume a lot of energy, such as the brain and kidney.

Potassium deficiency is common in malnutrition. Total body potassium deficit is associated with decreased muscle mass, poor intake, and digestive losses. Potassium deficit contributes to hypotonia, apathy, and impaired cardiac function. However, intracellular sodium level is elevated in the brain, muscle, and red and white blood cells. When treatment is initiated there is sodium excretion in the first days of recovery as the excess sodium is excreted. Calcium, phosphorus, and magnesium deficiency is also common. Iron deficiency anaemia is common in malnutrition. In severe acute malnutrition iron accumulates in the liver.

Both fat-soluble vitamins and water-soluble vitamins must be administered. Vitamin A is essential to retinal function and it has a trophic effect on epithelial tissues. Vitamin A supplementation results in decreased mortality and morbidity during diarrhoeal disease and measles.

2.5.2: Metabolic Changes

When a child is chronically undernourished, the basal metabolic rate decreases. Linear growth is reduced leading to permanent stunting. When energy intake is reduced, a decrease in physical activity occurs followed by a slower rate of growth. Weight loss initially occurs due to a decrease in fat mass, and afterwards by a decrease in muscle mass. Muscle mass loss results in a decrease of energy use. There is increased risk of hypothermia. Intestinal absorption of amino acids is maintained, despite the atrophy of the intestinal mucosa. Total plasma proteins are decreased, whereas gamma globulins are often increased by the associated infections. When albumin concentration falls below 30 g/L oedema develops from decreased oncotic pressure

The glucose level is often initially low. Glycogen stores are depleted. In the initiation of feeding or in association with diarrhea or infection, a significant risk of hypoglycemia occurs. Small and frequent meals are recommended day and night to avoid death in the early morning. Digestion of starch is impaired by the decreased production of pancreatic amylase. Dietary fats are often malabsorbed in the initial phase of care. Blood lipid levels are usually low.

2.5.3: Anatomic Changes

Anatomic changes occur in many parts of the body. The entire digestive tract is affected. The mucosal surface becomes smooth and thin. Secretory functions are impaired. Gastric hydrochloric acid secretion is reduced (MoH 2009). Intestinal motility is diminished, leading to bacterial overgrowth in the duodenum. Interference with absorption is reduced to moderate levels (MoH 2009). Therefore, early enteral feeding is encouraged because some of the nutrients necessary for the recovery of the intestinal mucosa are used directly from the lumen.

The volume of the liver usually decreases. The synthetic activity of the liver is usually preserved, although protein synthesis is reduced (MoH 2009). Glycogen synthesis and gluconeogenesis in the liver is decreased. This increases the risk for hypoglycemia especially due to infection.

A moderate normochromic or slightly hypochromic anaemia may occur. Iron stores are present in the liver (WHO 2013). Iron supplementation should not be initially implemented. Oral iron is poorly tolerated by the digestive tract. Blood clotting mechanisms are usually maintained (Rabinowitz *et al.* 2014). Immune impairment and infections are usually associated with

malnutrition. Antibody production is maintained. In malnutrition, a general acquired immunodeficiency occurs, with a decrease in secretory immunoglobulin A (IgA). Bacteriemia, candidiasis, and Pneumocystis carinii infection are frequently present. Immunological recovery is generally rapid. Cardiac muscle fiber is thin, and the contractility of the myofibrils is impaired. Cardiac output is decreased in the same proportion as the weight loss. Bradycardia and hypotension commonly occur in severe forms of malnutrition.

Cerebral tissue is usually preserved in undernutrition. Brain atrophy with impairment of cerebral functions occurs only in severe forms of malnutrition. Irritability and apathy are characteristic of Marasmus but improve rapidly with recovery.

2.6: Management of malnutrition

The WHO diagnostic criteria for severe acute malnutrition in children are as follows: weight-for-length/height < -3SD (wasted) or mid-upper arm circumference < 115 mm or oedema of both feet (kwashiorkor with or without severe wasting) (WHO, 2013). The treatment guidelines do not distinguish between kwashiorkor and severe wasting because their treatment is similar (WHO, 2013). Severe malnutrition or malnutrition complicated by a life-threatening condition. Oedema and lack of appetite generally requires inpatient treatment (Manary and Sandige, 2008). Management in both cases is divided into three phases: Phase 1, Transition Phase and Phase 2 (MoH 2009). Phase 1 covers nutrition and medical stabilization, treatment of medical complications, and commencement of nutritional rehabilitation. Transition Phase covers a gradual increase in diet leading to some weight gain while preventing complications of over-feeding. Phase 2 is a rapid weight-gain phase (catchup growth), and covers preparation for discharge (WHO, 2013, MoH 2009, Appendix V). Routine broad spectrum, parenteral antibiotics are used in management of malnutrition (Trehan *et al.* 2013, Manary and Sandige, 2008). Addition of antibiotics to therapeutic regimens for uncomplicated severe acute malnutrition is associated with a significant improvement in recovery and mortality rates (Trehan *et al.* 2013).

2.6.1: Nutritional management of the acute phase of severe malnutrition
This period corresponds to maintenance of vital functions and tissue renewal. During this period, the electrolyte imbalance, infections, hypoglycemia, and hypothermia are treated and feeding is

started. Oral feeding of a child with malnutrition should be started as early as possible, as soon as the child is stable and the fluid and electrolyte imbalances are corrected (WHO 2013). Enteral feeds decrease diarrhoea and prevent bacteriaemia resulting from bacterial translocation.

Children with malnutrition are usually unstable (Rabinowitz *et al.* 2014). Therefore clinical care must be well adapted to meet the needs of these children. Children admitted with malnutrition should be grouped, constantly monitored, and frequently evaluated during the first days of care. Patients with malnutrition should be isolated from other infectious patients (WHO 2013). Treatment areas should be as warm as possible, and bathing should be avoided to reduce risk of hypothermia. Therefore, when possible, the hospital structure is best adapted for the treatment of severe malnutrition.

In cases of shock, intravenous rehydration is recommended using a Ringer-lactate solution with 5% dextrose or a mixture of 0.9% sodium chloride with 5% dextrose (MoH, 2013). Oral hydration using ReSoMal should be started as early as possible, preferably at the same time as the IV solution (MoH, 2013). In the initial phase of rehydration, a nasogastric (NG) tube is used. Breastfeeding should be continued except in case of shock or coma. It is recommended that other food be commenced after 3-4 hours of rehydration. Nasogastric tube insertion is essential for both initial treatment (i.e., rehydration, correction of electrolyte disturbances) and rehabilitation (i.e., to provide the child the correct amount of diet every 2-4 h, day and night). The first step is often simply rehydration. Dehydration in children with malnutrition is difficult to evaluate, is overdiagnosed, or is misinterpreted as septic shock (WHO 2013). Rehydration should be enteral (by mouth or by nasogastric tube) except in case of coma or shock, when intravenous therapy is required.

The overall goal of nutrition rehabilitation is to overcome the anorexia often associated with malnutrition and avoid the causes that lead to anorexia. Another goal is to avoid cardiac failure while providing enough energy to avoid catabolism. The goal usually is to provide 80-100 kcal/kg/d in 12 meals per day or continuously by nasogastric tube to avoid hypoglycemia. This amount of calories should be reached progressively in a few days to avoid life-threatening problems such as cardiac failure or hypokalemia.

The WHO recommends the use of the liquid products, such as the F75 solution, which provides 75 kcal/100 mL, mainly as carbohydrates (WHO, 2013). This solution provides a limited amount of fat, which is often malabsorbed because of the associated pancreatic insufficiency, and a limited amount of proteins, which can precipitate renal failure during initial refeeding of children with malnutrition. F75 is available as a ready-to-use formula. In the rehabilitation phase of treatment, nutritional intake can reach 200 kcal/kg/d. The goal is to reach a continuous catch-up growth in weight and height in order to restore a healthy body weight. Children on nasogastric tube feeding are not considered to be in the rehabilitation phase. Specific goals of rehabilitation phase are to encourage the child to eat as much as possible, to restart breastfeeding as soon as possible, to stimulate the emotional and physical development and to actively prepare the child and mother to return to home and prevent recurrence of malnutrition.

During the rehabilitation phase the F100 formula is used. F100 has a higher protein than F75. As Use of the F75 formula in this phase only leads to a fat increase. There is a risk providing insufficient nutrients to meet metabolic needs and sustain a weight gain in this phase. Iron supplementation is started in this phase to meet the increased iron needs associated with the rapid muscle growth and formation of haemoglobin.

Emotional and physical stimulation is important during rehabilitation period. With resumption of nutrition in a child with malnutrition, psychomotor inhibition rapidly improves. Rehabilitation practices that should be implemented in children with malnutrition include physiotherapy, sensory stimulation, and massages. They should be implemented with or by the mother.

2.6.2: Management of acute complications of malnutrition
Mortality of hospitalized children with malnutrition is high, especially during the first few days of rehabilitation. Mortality rates can vary from less than 5% to more than 50% of children, depending on the quality of care (Manary and Sandige, 2008). Death is usually caused by infections. These include diarrhea and dehydration, pneumonia, gram-negative sepsis, malaria, urinary infection. Other causes of death at this stage include heart failure associated with anemia, excess of rehydration solution, or excess of proteins in the first days of treatment, hypothermia, hypoglycemia, hypokalemia and hypophosphatemia.

Every child admitted to hospital with malnutrition is considered as having a bacterial infection irrespective of whether they are symptomatic or not (MoH 2009). Sepsis occurs in 15-60% of children with complicated severe malnutrition (Manary, and Sandige, 2008). Treatment of bacterial infections prevents the development of septic shock, improves the response to nutritional rehabilitation, and decreases mortality. WHO recommends use of broad-spectrum antibiotics for treatment of children with malnutrition (WHO 2013). In Kenya, if the child doesn't have clinical sign of infection, amoxycillin is recommended as the first line antibiotic to give systemically (MoH 2009). A child who presents with clinical signs of infection, hypoglycemia, or hypothermia must be considered as having a serious infection. Such a patient should be treated with parenteral ampicillin and gentamicin (WHO 2013). The duration of treatment with amoxicillin and ampicillin is five days while gentamicin should be given for seven days (WHO 2013). If the child does not improve rapidly, chloramphenicol should be added (MOH 2009). Antimalarial treatment is necessary in malaria endemic areas. All patients with malnutrition who are at risk of malaria should be tested before starting antimalarial treatment (MoH 2009).

Severe and symptomatic anemia (< 4 g/dL) with signs of heart failure should be treated with a blood transfusion of packed red cells (Rabinowitz *et al*. 2014). A maximum of 10 mL/kg administered over at least 3 hours (MoH 2009). Cardiovascular tolerance to transfusion should be closely monitored to avoid cardiac overload.

Application of the WHO guidelines for management of SAM is feasible (Ashworth *et al*. 2004). The guidelines have been proved to have enormous benefits in improving health outcomes when used in the management of children with severe acute malnutrition. However the use of these guidelines has been reported as inadequate in several health care setups as mentioned hereinafter.

Use of the WHO guidelines in the management of SAM reduced the case fatality rate in hospital setting by up to 55% (Ashworth *et al*. 2004). Survival and case-management of malnourished children improves greatly if the WHO guidelines are followed systematically (WHO 2005). A halving of deaths, from 40% to 20% has been regularly reported when the guidelines are followed significantly. Mortality can be reduced to below 10% when the guidelines are fully and consistently followed (Ashworth *et al.* 2004). A decrease in the mortality rate from 7.8% to 4.0%

over a period of four years was reported in Turbo, Colombia as staff complied with the WHO guidelines (Bernal *et al.* 2008). Similarly, at Mary Theresa Hospital, South Africa, case-fatality rates fell from 46% before implementation to 21% after implementation of the WHO guidelines in the year 2000. At Sipetu Hospital, South Africa, the rates fell from 25% to 18% during the same year (Ashworth *et al.* 2004).

In Garissa Provincial General Hospital for example, it was found out that the use of these guidelines was inadequate (Warfa *et. al,* 2013). The first three steps of stabilization, which were essential for the survival of children with malnutrition, were poorly implemented and inappropriately provided in Mbagathi District Hospital (Wangeci 2013). The supplies needed for the care of these children were largely available at the hospital (Wangeci 2013). Similar findings were reported in Kenyatta National Hospital where the essential supplies were mostly available (Nzioki *et al* 2008). The availability of essential supplies for the care of children with malnutrition does not necessarily translate to good standard of care as the above findings show.

In Kenyatta National Hospital, 67.2% of the mothers gave three hourly feeds and 68.9% gave the correct volumes of milk per feed (Nzioki *et al* 2008). Only 18% of mothers provided psychological stimulation to children through play and personal interaction with child (Nzioki *et al* 2008). This step was not evaluated in Garissa Provincial General Hospital (Warfa *et. al*, 2013).

CHAPTER III: RESEARCH METHODS

3.1 Study design

The study was cross-sectional, descriptive study to establish utilization of guidelines for management of severe acute malnutrition in children aged 6-59 months admitted to Busia County Referral Hospital, Kenya.

3.2 Study area

The study was conducted in Busia County Referral Hospital, Kenya. Busia County Referral Hospital is located in Busia County in the former Western Province. The hospital has a bed capacity of 185. The hospital offers in-patient and outpatient services, Family Planning, HIV Counseling and Testing and Immunization among others.

3.3 Study population

The standard guidelines for management of SAM were studied in children aged 6-59 months admitted to Busia County referral Hospital with severe acute malnutrition. Children of this age are more prone to malnutrition due to early cessation of breastfeeding and wrong weaning practices. They are also at a high risk of childhood diseases such as diarrhoea, respiratory tract infections and parasitic infections which predispose them to undernutrition

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion Criteria

1. All children aged between 6-59 months with severe acute malnutrition admitted to Busia County Referral Hospital for treatment.

2. Consenting parents/guardians

3.4.2 Exclusion criteria

1. Children aged between 6-59 months who had chronic illness precipitating malnutrition at the time of the study were excluded from the study.

2. All participants whose guardians/ caretakers refused to consent for the study were excluded from the study.

3.5 Sample size determination

Sample size was calculated using Fisher's et al 2003, formula: $n = [t^2 \times p (1-p)]/m^2$; where n = minimum sample size required, t = confidence level at 95% (standard value of 1.96), p = estimated prevalence of severe acute malnutrition in Kenya is 6% (MoH, 2009)) and m= margin of error at 5% (0.05)

Sample size = $[1.96^2 \times 0.06(1-0.06)] /0.05^2$

$$=86.67$$

$$=87$$

3.6 Sampling procedure

Purposive sampling was used to recruit participants from the paediatric ward when they were admitted for management of severe acute malnutrition.

3.7 Data collection

Data was obtained at admission and on the seventh day after admission for each participant. A checklist was used to confirm documentation and implementation of guidelines for management of malnutrition in children by clinical staff and the guardians. A research assistant was recruited to help with data collection. Prior to the actual data collection, the research assistant was trained on how to collect data using the checklists.

Key informant interviews were conducted to obtain data on the supply of nutritional commodities in the study sites involved in the care of children within the hospital. The participants to the key informant interviews were given an information sheet explaining the purpose of the interview. They were then given a consent form which they signed voluntarily before participating in the interviews. An audio recorder was used to capture the proceedings of the interview.

Data concerning preparation of feeds by the clinical staff and nutritionists and measurement of feeds by the guardians was obtained by observation. An observation checklist was used to collect data at the feed preparation area. Parent/ guardians were observed as they collected for their children the feeds to see if they measured the right type and amount of feeds to give to the children.

3.8 Data Analysis and Data presentation

Data was first checked for accuracy and completeness when the checklists were filled. Audio tapes were transcribed to extract data obtained through key informant interviews. All quantitative data was entered into the computer using Microsoft excel. It was later analysed using statistical package for social sciences (SPSS) version 20. The findings were presented using frequency tables, charts and graphs.

An overall guidelines utilization scoring tool (Appendix VII) was developed. The overall guidelines utilization score was computed using twenty (20) elements extracted from the guidelines for management of severe acute malnutrition. The score 1 was given to the option "yes" while score 0 on the scale represented the category "no".

3.9 Ethical Considerations

Clearance was sought from Kenyatta National Hospital /University of Nairobi Ethics and Research Committee. Permission to conduct research in Busia County was obtained from the Busia County Hospital administration. A written informed consent to participate in the study was obtained from the parents/guardians. The data obtained was kept in confidence with only the researcher having access to the checklists and key informant interview recordings. All checklists were coded. The research assistant was required to take a confidentiality pledge before data collection commenced.

CHAPTER FOUR: RESULTS

4.0 Introduction

A total of ninety six (96) children with severe acute malnutrition were included in the study. Key informant interview were conducted with a nurse and two nutritionists. The results are presented in tables and bar graphs.

4.1 Demographic data of the participants

The mean age of the participants in this study was 21.85 months. The proportions of the participants in the age groups (6-12), (13-24) and (25-59) months were almost equal representing 29(30.2%), 36(37.5%), 31(32.3%) respectively. Majority 62(64.4%) of the participants were males. The highest percentage 39(40.6%) of the participants were from Matayos Sub-county, which hosts Busia County Referral Hospital, followed by 30(31.3%) from Teso South Sub-county which borders Matayos Sub-county to the north. (Table 4.1)

Table 4.1: Demographic data of the participants

Demographic data	Frequency, (n=96)	Percent (%)
Mean age in months (+SD) 21.85(+13.98)		
Age in months		
6 to 12	29	30.2
13 to 24	36	37.5
25 to 59	31	32.3
Sex		
Male	62	64.6
Females	34	35.4
Sub county		
Matayos	39	40.6
Samia	4	4.2
Teso South	30	31.3
Butere Mumias	4	4.2
Siaya	4	4.2
Uganda	15	15.6

4.2 Anthropometric measurements among the participants

The anthropometric measurements among the participants are presented in Table 4.2. The distribution of mean weight on admission, weight on day 7, weight gain, height and mid upper arm circumference (MUAC) among the participants who participated in the study was 7.97kg, 8.44kg, 0.47kg, 76 cm and 11.6 cm respectively. More than half 54(56.3%) had a MUAC score of greater or equal to 11.5cm compared to 42(43.8%) who had less than 11.5cm. Out of the 96 participants, 57(59.4%) had a weight for height Z score (WHZ) of less than -3SD while 19(19.8%) had WHZ less than -1SD.

Table 4. 2: Anthropometric measurements among the participants

Variables	Mean($\pm$SD)	Frequency, (n)	Percent, (%)
Mean weight on admission in kg	7.97($\pm$3.10)	-	-
Mean weight on day 7 in kg	8.44($\pm$3.02)	-	-
Mean weight gain in kg	0.47($\pm$0.59)	-	-
Mean height in cm	76($\pm$13.92)	-	-
Mean of MUAC in cm	11.6($\pm$1.53)	-	-
MUAC			
<11.5	-	42	43.8
$\geq$11.5	-	54	56.3
WHZ score			
-3SD	-	57	59.4
-2SD	-	20	20.8
-1Sd	-	19	19.8

4.11 Comparison of mean weight between admission and day 7

Table 4.3 shows the mean weight between the time of admission and at 7 days. Mean weight had increased from 7.97Kg at admission to 8.45Kg at 7 days and this differences was significant (p<0.0001) after *paired samples t test* was computed.

Table 4. 3: Comparison of mean weight between admission and day 7

Variable	Mean weight on admission	Mean weight on day 7	Paired t test (P value)
Weight in Kg	7.97	8.45	<0.001

4.3 Socio-demographic characteristics of guardians to the participant

Table 4.4 summarizes the socio-demographic characteristics among guardians who participated in this study. The mean age of the guardians was 30.3 years. The findings also show that about one third of the guardians 36(37.5%) and 37(38.5%) were within the age groups of 17-24 years and 25-34 years respectively. However, about a quarter 23(24.0%) were 35 years and above. Most of the guardians were females 88(91.7%) and Christians 83(86.5%). Majority 63(65.6%) of the guardians attended primary school. About two thirds 56(60.2%) of the guardians were housewives.

Table 4. 4: Socio-demographic characteristics of parents/guardians to participant

Socio-demographic data	Frequency, (n)	Percent, (%)
Mean age in years (+SD) 30.30(+11.74)		
Age in years		
17-24	36	37.5
25-34	37	38.5
35 and above	23	24
Sex		
Male	8	8.3
Female	88	91.7
Level of education		
None	15	15.6
Primary	63	65.6
Secondary	18	18.8
Religion		
Christian	83	86.5
Muslim	13	13.5
Occupation		
Housewife	56	60.2
Jua Kali	6	6.5
Housemaid	7	7.5
Student	8	8.6
Business	16	17.2
Missing	3	

4.15 Association between socio-demographic characteristics of the participants and their MUAC

Table 4.5 presents the relationship between socio-demographic characteristics and MUAC among participants with severe acute malnutrition. There was significantly higher proportion of children with MUAC less than 11.5cm among 6 to 12 months 20(69.0%) [OR=9.26; 95%CI=2.82-30.39; P<0.001] and 13 to 24 months 16(44.4%) [OR=3.33; 95%CI=1.10-10.09; P=0.033] compared to those aged 25 to 59 months 6(19.4%). Parents/guardians who never

attended school and those who attended primary education had more children with MUAC less than 11.5cm than those who attended secondary school. This difference was not statistically significant.

There was no significant association (P<0.05) observed between the other socio-demographic characteristics and level of MaUAC.

Table 4. 5: Association between socio-demographic characteristics and MUAC of participants with severe acute malnutrition

Socio-demographic characteristics	MUAC		OR	95%CI		test
	<11.5, n(%)	>11.5, n(%)		Lower	Upper	P value
Child's age in months						
6 to 12	20(69.0%)	9(31.0%)	**9.26**	**2.82**	**30.39**	**<0.001**
13 to 24	16(44.4%)	20(55.6%)	**3.33**	**1.10**	**10.09**	**0.033**
25 to 59	6(19.4%)	25(80.6%)	1.00			
Child's Sex						
Male	24(38.7%)	38(61.3%)	0.56	0.24	1.31	0.178
Females	18(52.9%)	16(47.1%)	1.00			
Guardian's age in years						
17-24	15(41.7%)	21(58.3%)	1.63	0.54	4.95	0.386
25-34	20(54.1%)	17(45.9%)	2.69	0.90	8.07	0.078
35 and above	7(30.4%)	16(69.6%)	1.00			
Guardian's sex						
Male	3(37.5%)	5(62.5%)	0.75	0.17	3.35	0.710
Female	39(44.3%)	49(55.7%)	1.00			
Guardian's level of education						
None	8(53.3%)	7(46.7%)	4.00	0.89	18.01	0.071
Primary	30(47.6%)	33(52.4%)	3.18	0.94	10.74	0.062
Secondary	4(22.2%)	14(77.8%)	1.00			
Guardian's religion						
Christian	39(47.0%)	44(53.0%)	2.96	0.76	11.52	0.106
Muslim	3(23.1%)	10(76.9%)	1.00			
Guardian's occupation						
Housewife	24(42.9%)	32(57.1%)	1.25	0.40	3.92	0.702
Jua Kali	3(50.0%)	3(50.0%)	1.67	0.25	11.07	0.597
Housemaid	5(71.4%)	2(28.6%)	4.17	0.61	28.62	0.147
Student	2(25.0%)	6(75.0%)	0.56	0.08	3.69	0.543
Business	6(37.5%)	10(62.5%)	1.00			

4.4 Diagnostic and laboratory investigations

Figure 4.1 shows that urinalysis and haemoglobin level tests were the common diagnostic and laboratory investigations carried out for the participants.
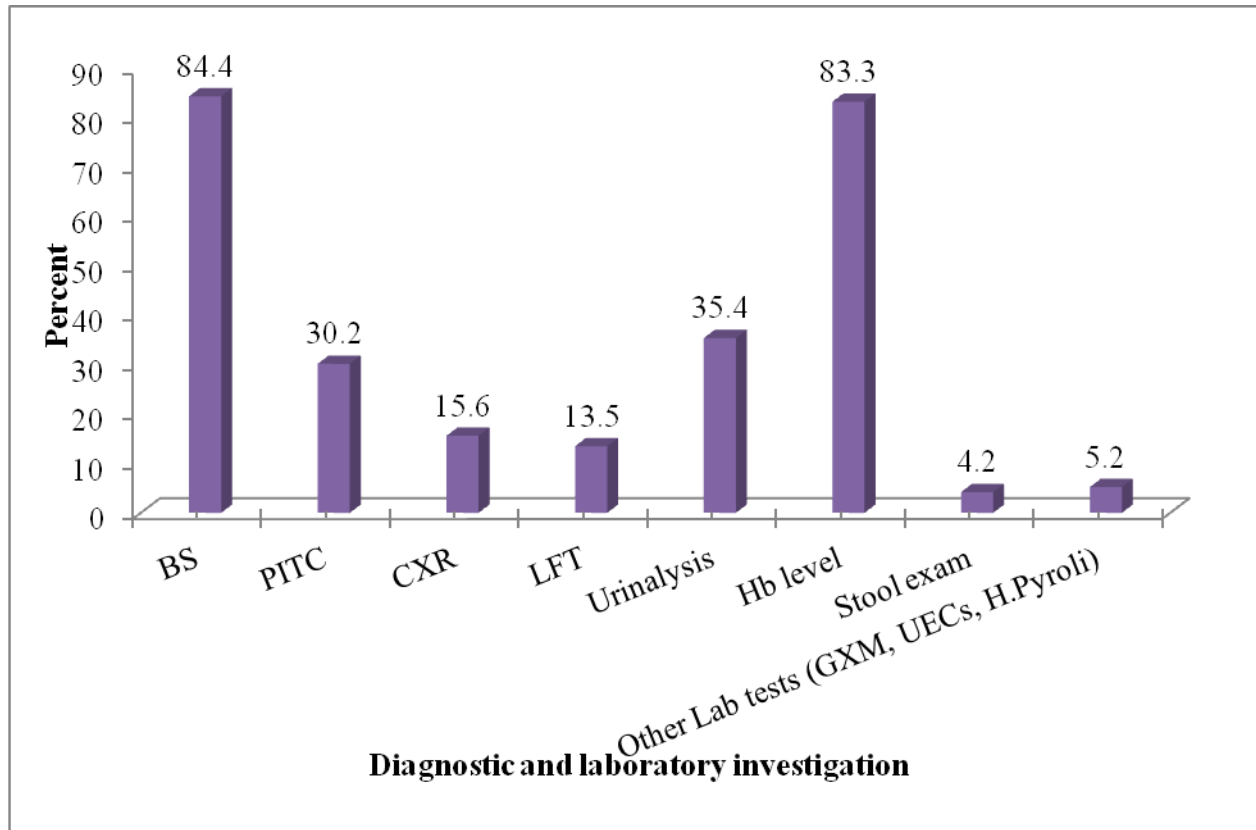
Figure 4. 1: Diagnostic and laboratory investigation of the participants

N.B: The percentages are taken on the total responses as some respondents had multiple responses.

4.5: Comorbidities

Diarrhoea was the main comorbidity 19(27.5%) and among the multiple comorbidities diarrhoea and malaria were 8(11.6%) as illustrated in Figure 4.2.
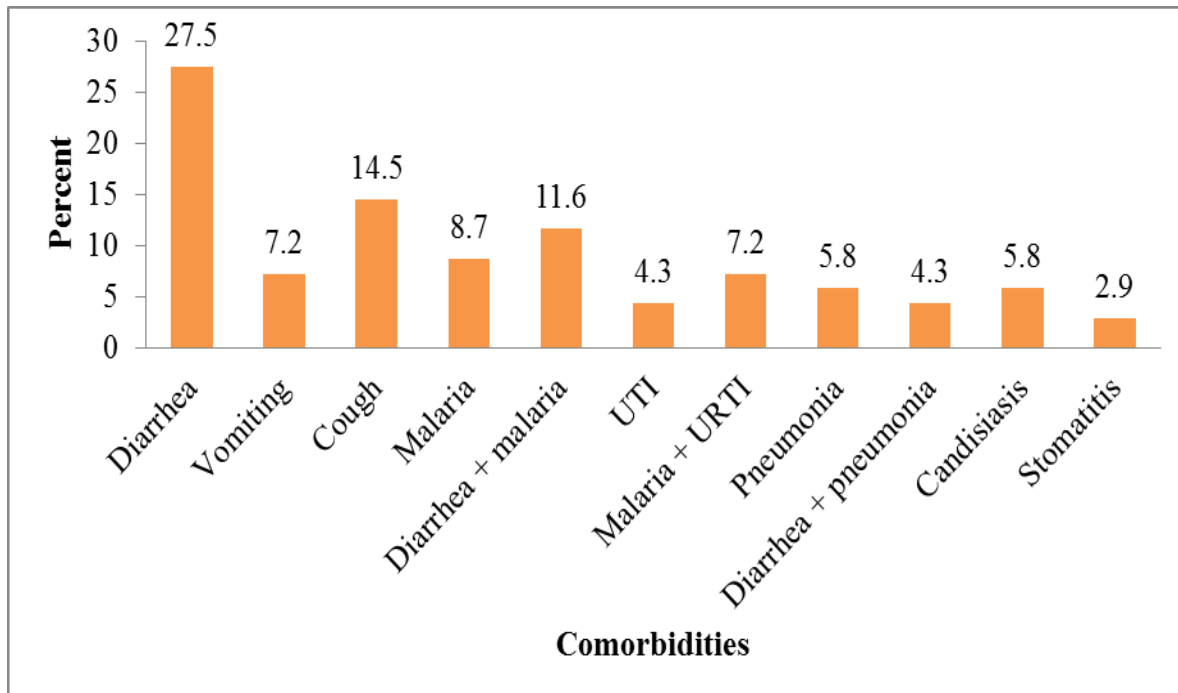
Figure 4. 2: Comorbidities

4.6 Prevention/ treatment of hypoglycaemia

Random blood sugar (RBS) level investigation on admission was not carried out for most 80 (83.3%) of the participants. Among those who had RBS level measured, the majority 14(87.5%) had RBS level greater or equal to 3 mmol/litre while only 2(12.5%) were diagnosed with hypoglycaemia (RBS <3 mmol/litre). RBS level was repeated in 30 minutes for all who diagnosed with hypoglycaemia. About three quarters 82(77.1%) of the participants were started on feeding within 30 minutes and F75 was the main type of feed used for 80(97.6%) children to initiate feeding immediately on admission (Table 4.6).

Table 4. 6: Prevention/treatment of hypoglycaemia

Variable	Frequency, (n)	Percent (%)
Measuring of RBS on admission		
Yes	16	16.7
No	80	83.3
RBS level in mmol/little		
<3	2	12.5
≥3	14	87.5
Not applicable	80	
Repetition of RBS level in 30 minutes if diagnosed hypoglycaemia		
Yes	2	100.0
No	0	0.0
Immediate initiation of feeding within 30 minutes		
Yes	82	77.1
No	14	22.9
*Type of feed used to initiate feeding immediately on admission		
10% dextrose	7	8.5
Other feed (F75)	80	97.6
Not applicable	14	

* The percentages are taken to the total responses as some respondents have more than one response.

4.6.1 Reasons for not initiating feeding immediately

Half of the respondents indicated that there was no reason for not initiating feeding immediately. The reasons mentioned by the respondents were that the participants had to be taken for laboratory investigations 5(35.7%) while others said the participants 3(14.3%) were vomiting and hence the participants could not take anything orally (Figure 4.3).
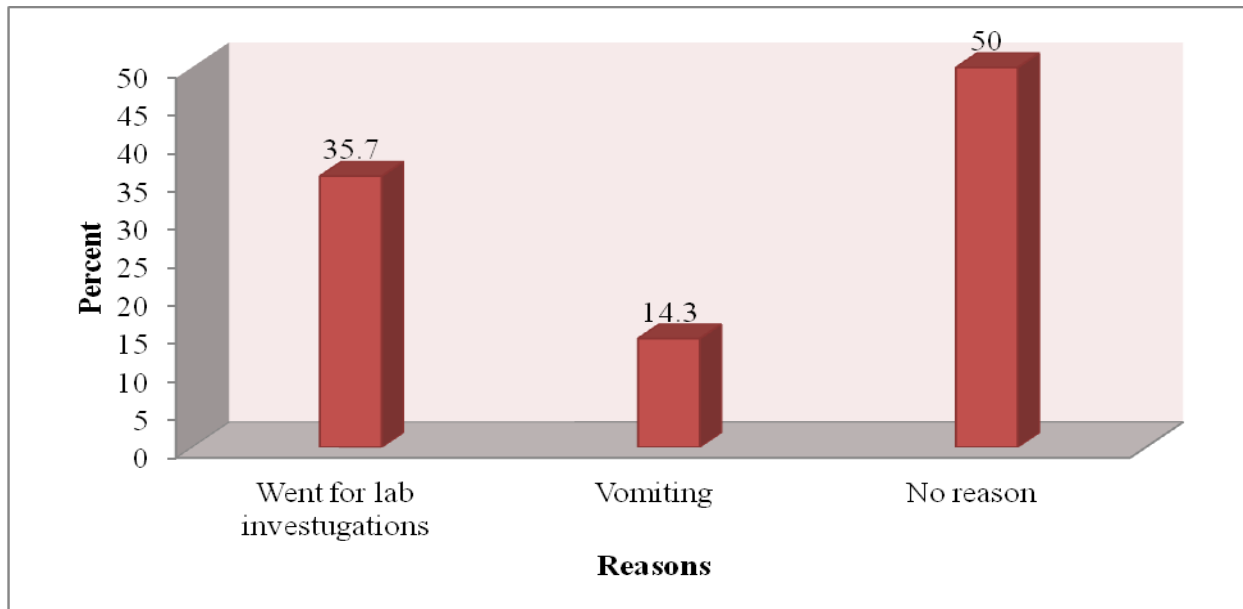
Figure 4. 3: Reasons for failure to initiate feeding immediately

4.7: Prevention/ treatment of hypothermia

Table 4.7 demonstrates the guidelines of prevention or treatment for hypothermia among severely acute malnourished children. Temperature on admission was taken for the majority 80(83.3%) of the participants while for 16(16.7%) it was not taken. The mean temperature reading for those whose temperature was taken on admission was 37.3 degree centigrade (^{o}C). Two participants 2(2.5) had hypothermia. The table further shows all the guardians/caretakers were advised to keep child warm, to keep baby and bed dry. Similarly, all the participants were bathed while in the ward; all were kept warm by caretaker and all protected from draught. Most of the respondent 81(84.4%) used towels to dry the baby after taking a bath.

Table 4. 7: Prevention /treatment of hypothermia

Variable	Frequency, (n)	Percent (%)
Measuring of temperature on admission		
Yes	80	83.3
No	16	16.7
Mean temperature reading on admission (^{o}C) 37.3(0.51)		
Temperature reading on admission (^{o}C)		
<35	2	2.5
35-37.5	52	65.0
>37.5	26	32.5
Not applicable	16	
Advice given to caretaker to keep child warm		
Yes	96	100.0
No	0	0.0
Keeping baby warm by caretaker		
Yes	96	100.0
No	0	0.0
Protecting child from draught		
Yes	96	100.0
No	0	0.0
Advice to keep baby and bed dry		
Yes	96	100.0
No	0	0.0
Whether child is bathed while in the ward		
Yes	96	100.0
No	0	0.0
Frequency of bathing the baby in the wards		
Once	76	79.2
Twice	18	18.8
three times	2	2.1
Drying the child after bathing		
Yes	96	100.0
No	0	0.0

4.8 Prevention /treatment of dehydration

The result for prevention / treatment of dehydration among the participants is presented in Table 4.8. All participants were assessed for dehydration and majority 77(86.5%) were diagnosed with dehydration. Locally made ReSoMal was the main fluid used for rehydration of most 68(88.3%) participants with dehydration and all of them were given ReSoMal orally. Forty two (43.8%) of the participants were in hypovolaemic shock and all of them were treated through the

intravenous route. Thirty four (80.9%) of the participants in hypovolaemic shock were treated using Ringers lactate with 5% dextrose while 8(19.1%) were treated using normal saline.

Table 4. 8: Prevention/treatment of dehydration

Variable	Frequency, (n)	Percent, (%)
Assessment for dehydration		
Yes	96	100
No	0	0
Diagnosis of hypovolaemic shock		
Yes	42	43.8
No	54	56.3
Route used to treat hypovolaemic shock		
Intravenous	42	100
Not applicable	54	
Fluid used for treatment of hypovolaemic shock		
NS	8	19.1
Ringers lactate with 5% dextrose	34	80.9
Whether the child was diagnosed with dehydration		
Yes	77	86.5
No	19	13.5
Type of fluid used for rehydration of the child		
ReSoMal	68	88.3
ORS	9	11.7
Not applicable	19	
Route used to treat dehydration		
Oral	77	100
Not applicable	19	
Was Starter F-75 given on alternate hours during the period of rehydration?		
Yes	76	91.6
No	7	8.4
Missing	13	
For participants who are still breastfeeding, was the mother advised to breastfeed during therapy?		
Yes	26	92.86
No	2	7.14

4.8.1 Monitoring of respiration, pulse, urine output and weight gain during rehydration
Figure 4.4 shows that about half of the participants were monitored for respiration and pulse during rehydration. However, 94.4% and 65.0% of the participants were not monitored for weight gain and urine output respectively during rehydration.
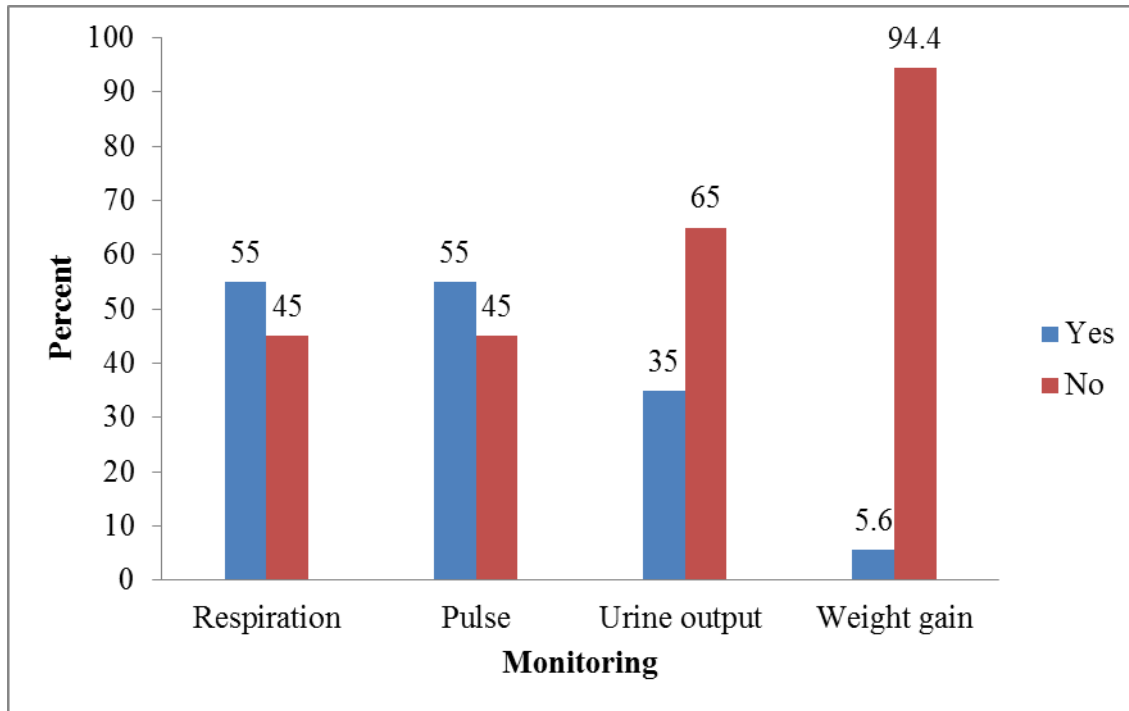
Figure 4. 4: Monitoring of respiration, pulse, urine output and weight gain during rehydration

4.9 Correction of electrolyte balance

As indicated in table 4.9, all of the participants did not receive magnesium supplementation. Only, 3(3.1%) of the participants were supplemented with potassium.

Table 4. 9: Correction of electrolyte balance

Variable	Frequency, (n)	Percent, (%)
Supplementation of potassium		
Yes	3	3.1
No	93	96.9
Supplementation of magnesium		
Yes	0	0.0
No	96	100.0

4.10 Checking for infection

All the participants were treated for presumed bacterial infection. Benzyl penicillin and gentamycin were the main 75(78.1%) drugs given to the participants. Almost all 94(97.9%) the participants were also monitored for increased desire to feed while undergoing treatment (Table 4.10).

Table 4. 10: Checking for Infection

Variable	Frequency, (n)	Percent (%)
Treatment for presumed bacterial infection		
Yes	96	100
No	0	0
Antibiotics used for presumed bacterial infection		
Benzyl penicillin	5	5.2
Gentamycin	14	14.6
Benzyl penicillin and Gentamycin	75	78.1
Ceftriaxone	2	2.1
Treatment for other infection		
Yes	15	100
No	0	0
Whether the child was monitored for increased desire to feed		
Yes	94	97.9
No	2	2.1

4.11 Monitoring of micronutrients

Monitoring of micronutrients among the participants with severe malnutrition is presented in Table 4.11. All the participants were clinically assessed for micronutrient deficiency and all of them were on F75/F100. However, large percentage 86(89.2%) of the participants were not supplemented with micronutrient. Among those who were treated for micronutrient deficiency, 2 participants (20%) received folate together with zinc, 2 (20%) received a single dose of vitamin A, 3 (30%) got multivitamin syrup while the rest 3 (30%) were give high dose vitamin A (day 1, 2 and 14) together with multivitamin syrup and zinc.

Table 4. 11: Monitor of Micronutrients

Variable	Frequency, (n)	Percent, (%)
Clinically assessed for micronutrient deficiency		
Yes	96	100
No	0	0
Whether child was on F75/F100		
Yes	96	100
No	0	0
Micronutrient supplementation		
Yes	10	10.8
No	86	89.2
Dosage of the micronutrients given		
Folate 1mg, Zinc 20mg od	2	20
Multivitamin, 5mls bid	3	30
Vitamin A 200000 i.u. stat	2	20
Vitamin A 200000i.u. day 1, 2, 14. Multivitamin 5mls bid, Zinc 20mg od	3	30

4.12 Initial re-feeding

As shown in table 4.12, all the participants were started on re-feeding and majority 72(75.0%) were fed every 3 hours. F75 was the most common type of feed 86(89.6%) used for initial re-feeding. All of the participants were monitored for daily body weight and vomiting during initial re-feeding. However, more than half 55(57.3%) were not monitored for frequency and consistency stool during initial re-feeding.

Table 4. 12: Initial re-feeding

Variable	Frequency, (n)	Percent, (%)
Whether child was started on re-feeding		
Yes	96	100
No	0	0.0
Feed used for initial re-feeding		
F75	86	89.6
F100	7	7.3
PlumpyNut	3	3.1
Frequency of feeding		
Every 1 hour	3	3.1
Every 2 hours	21	21.9
Every 3 hours	72	75.0
Monitoring of vomiting during initial re-feeding		
Yes	96	100
No	0	0
Monitoring of frequency and consistency stool during initial re-feeding		
Yes	41	42.7
No	55	57.3
Monitoring of daily body weight during initial re-feeding		
Yes	96	100
No	0	0

4.13: Monitor Catch-up growth

Among those who given F75 for initial re-feeding, F100 was used for replacement in the transition phase. The volume of the replacement feed was increased after one day for most 79(91.9%) of the participants. Most 82(95.4%) of the participants had their replacement feed increased by 10ml daily. Majority 70(81.4%) of the participants were not monitored for congestive heart failure during transition phase. Daily weighing in the morning before feeding was done for all participants. However, none of the participants had the weight gain calculated and recorded (Table 4.13).

Table 4. 13: Monitor Catch-up growth

Variable	Frequency, (n)	Percent, (%)
Criteria for transferring patient from stabilisation to rehabilitation		
Return of appetite	91	94.8
No episodes of hypoglycaemia (metabolically stable)	4	4.2
Reduced or disappearance of all oedema	70	72.9
Feed used to replace starter F75		
F100	86	100.0
Not applicable	10	
After how long is the replacement feed increased?		
1 day	79	91.9
2 days	7	8.1
Amount of increase in the replacement feed		
5ml	4	4.6
10ml	82	95.4
Monitoring for congestive heart failure during transition phase		
Yes	16	18.6
No	70	81.4
Parameters used to monitor the child for early signs of congestive heart failure during transition		
Pulse	16	18.6
Respiration	16	18.6
Breath sounds	0	0.0
Heart sounds	0	0.0
Jugular venous pressure	0	0.0
Size of the liver	0	0.0
Oedema	0	0.0
Daily weighing in the morning before feeding		
Yes	96	100.0
No	0	0.0
Weight gain calculation and recording		
Yes	0	0.0
No	96	100.0

4.14: Assure sensory stimulation and Prepare for follow up

Data was sought as to whether the hospital exposes children with severe acute malnutrition to structured play, duration of structured play if it is provided and whether the children are provided with suitable toys for play. All these were not available in the hospital. Preparation for follow up was done to all the children admitted with severe acute malnutrition by discharging them through the nutrition clinic where the parents/guardians were informed of the follow up schedule. The participants were also issued with nutritional supplements on discharge from the inpatient care.

4.15: Level of utilization of guidelines

Twenty (20) variables regarding the utilization of guidelines for severe acute malnutrition were used to determine the level of utilization. The method of computing the overall level of utilization of guideline is presented in Appendix VII.

The overall scores for utilization of guidelines ranged from 16 to 20 and the percentages for the scores are presented in Figure 4.5. The average utilization of the guidelines was 86.4%. Moreover, there was high (62.5%) and very high (37.5%) utilization of the guidelines among the children with severe acute malnutrition.
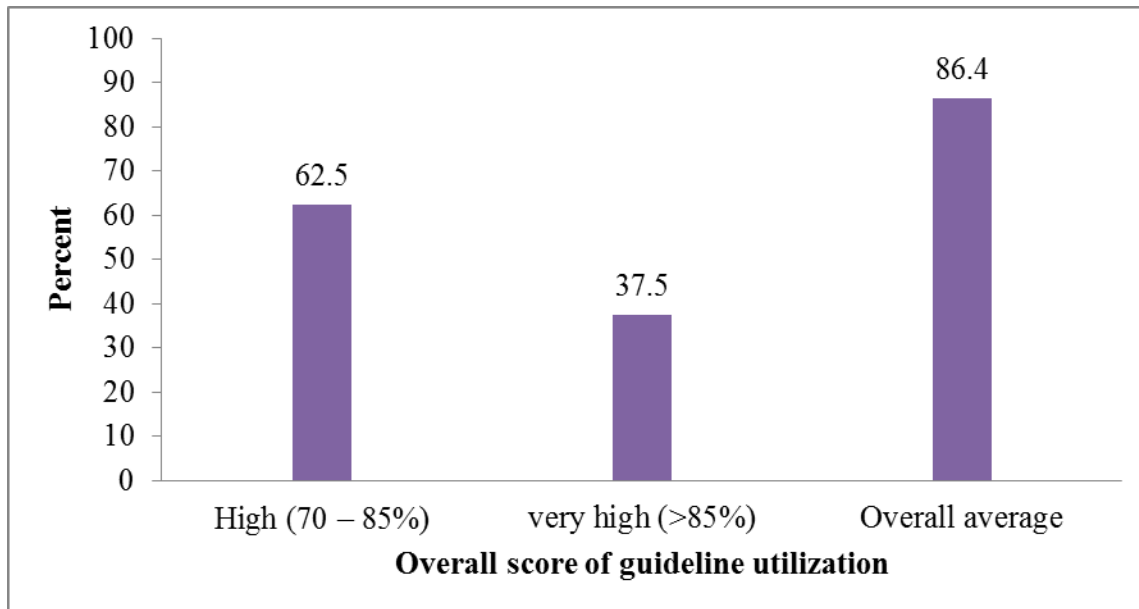
Figure 4. 5: Level of utilization of guidelines

4.16. Qualitative Data Analysis

This section presents data obtained through key informant interviews. Key informant interviews were conducted with two nutritionists and a nurse in charge of the paediatric ward. Data was sought as to whether the guidelines for management of severe acute malnutrition are followed, commodities and equipments available for management of SAM, adequacy of health workers training on management of SAM in the facility, challenges faced in management of SAM and suggestions for improvement management of SAM.

4.16.1: Utilization of guidelines and availability of commodities and equipments for management of SAM.

Key informant interviews (KIIs) were conducted to determine whether guidelines for management of severe acute malnutrition are utilized in the Busia County Referral Hospital. It was indicated that the guidelines are utilized in management of children with severe acute malnutrition. The interviewees reported that most of the commodities and equipments needed for management of severe acute malnutrition were available in the hospital most of the time. These commodities include F75, F100, ReSoMal or ingredients for making resomal locally. Equipments such as height boards and MUAC tapes were also available. However, it was stated that the casualty department did not have height boards and MUAC tapes

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4.16.2: Adequacy of health workers training on management of SAM in the facility

It was pointed out that not all health workers involved in care of children with SAM are adequately trained on management. It was said that 10 staffs comprising clinical officers, nurses and nutritionists had been trained on management of malnutrition in the year 2013. Other health workers may not have got specific training on management of malnutrition other than the basic training in tertiary institutions.

4.16.3: Challenges faced in management of SAM

Many challenges in management of SAM were reported. These include inconsistent supply of commodities. It was reported that supply of F75 and F100 is sometimes very erratic. Lack of knowledge and skills among staff was mentioned as one of the challenges. Pilferage of plumpy nut and plumpy soy was also reported. It was also reported that shortage of health workers, especially nursing staff in the paediatric ward, hindered optimal implementation of the guidelines. In addition, lack of knowledge among parents/guardians on need for nutritional therapy and regular feeding of the children admitted in the ward was reported as a challenge. Lastly, language barrier was stated as a challenge particularly among parents/guardians who came from Uganda.

4.16.4: Suggestions for improvement of management of SAM

Capacity building for health workers in the hospital, community health workers and support staff and consistent supply of commodities needed for management of SAM were the main suggestions mentioned for improvement of care for children with SAM in the key informant interviews. Community outreach programme was also mentioned as a way of improving care for children with severe malnutrition by teaching communities on child nutrition.

CHAPTER V: DISCUSSION

5.0: Introduction

This chapter discusses the key findings in utilization of guidelines for management of children with severe acute malnutrition in Busia County Referral Hospital. Guidelines for management of severe acute malnutrition were not fully utilized in Busia County Hospital. The major areas where deficiencies in the utilization were found include treatment/prevention of hypoglycaemia, prevention/treatment of hypothermia, prevention/treatment of dehydration and monitoring of catch up growth.

5.1.1: Step 1: Treatment/prevention of hypoglycemia

Random blood sugar level investigation on admission was not carried out for most of the participants (83.3%) in this study. This finding compares with a study carried out at a national referral hospital in Kenya where random blood sugar was measured for 29.9% of the participants (Nzioki *et. al.* 2008). As indicated by KIIs, the hospital may at some point in time have lacked a working glucometer and glucostrips for measurement of random blood sugar explaining why random blood sugar was done for only a few patients. The participants found to have hypoglycaemia (12.5%) were appropriately treated with 10% dextrose and random blood sugar repeated after thirty (30) minutes of treatment. Initiation of feeding was done immediately on admission for most participants (77.1 %) as required by the Ministry of Health, Kenya (MoH, 2013). This is in contrast to the finding at Kenyatta National Hospital where feeding was delayed for a median waiting time of 14.7 hours (Nzioki *et al.*, 2008) and Garissa where feeds were initiated after an average of 2.6 hours (Warfa *et al.,* 2013). Availability of feeds and efforts by the nutritionists in the hospital may have contributed to the early initiation of feeding. Hypoglycaemia as well as hypothermia, dehydration and severe infections occur soon after admission of severely malnourished children (MoH, 2013). These complications should be addressed urgently to prevent death (MoH, 2009).

5.1.2: Step 2: Treatment/prevention of hypothermia

In this study temperature on admission was taken for the majority of the participants (83.3%). This is consistent with the guidelines which require all children with severe acute malnutrition to be monitored for hypothermia. In children suffering from severe acute malnutrition, both heat

generation and heat loss are impaired; the child becomes hypothermic in a cold environment and hyperthermic in a hot environment. These findings are different from results at Kenyatta National Hospital where monitoring of temperature was rarely done at admission or during hospitalization (Nzioki *et al.*, 2008). The two (2) participants detected with hypothermia were appropriately managed using a heater available in the ward. However, subsequent monitoring for hypothermia was not done for them and other participants admitted to the ward as was the case in Kenyatta National Hospital (Nzioki *et. al*, 2008). This can be attributed to knowledge and skill gap since not all health workers involved in care of children with malnutrition are trained on management of severe acute malnutrition (KII 1&2). All the guardians/caretakers in this study were appropriately advised to keep the participants warm as outlined in the guidelines (MoH 2009) by heavily dressing the children. This doesn't compare at all with Garissa where only 11.1% of OPD patients and 10 % of in-patients had "keep warm" prescribed in their treatment (Warfa *et. al,* 2013). This finding can be due to the availability of clinical staff and nutritionists in Busia county Referral Hospital who are trained in the management of severe acute malnutrition.

5.1.3: Step 3: Treatment/prevention of dehydration

This study shows that all participants were assessed for dehydration and majority 77(86.5%) were diagnosed with dehydration. The percentage of participants diagnosed with dehydration is close to the findings in Garissa where 65% had dehydration at the time of admission (Warfa *et. al,* 2013). A lower percentage of participants (27.5%) in this study had diarrhoea when compared to findings from Kenyatta National Hospital where 64 out of 101 children had diarrhoea (Nzioki *et. al*, 2008). Eight participants (19.1%) in hypovolaemic shock were incorrectly treated using normal saline in Busia County Hospital which reflects a lower rate of inappropriate treatment for hypovolaemic shock when compared to the practice in Kenyatta National Hospital where most children in hypovolaemic shock were treated with normal saline contrary to the guidelines(Nzioki *et. al*, 2008). This disparity may be due to increased knowledge on management of severe acute malnutrition in Busia County Hospital over time since the two studies were done some (7) years apart.

Correct treatment for dehydration using locally made "resomal" was done for 68 (88.3%) of the participants with dehydration. This correlates with the availability of locally made "resomal" in

Busia County Referral Hospital. However, not all participants were monitored during rehydration. Slightly more than half of the participants (55%) treated for dehydration had pulse and respiration monitored during rehydration therapy as per the guidelines. This compares fairly to finding in Garissa where correct monitoring of rehydration was done for 43.3% of patients in the ward (Warfa *et al.,* 2013) and contrasts findings in Kenyatta National Hospital where monitoring for signs of over hydration was rarely done (Nzioki *et. al*, 2008).

5.1.4: Step 4: Correction of electrolyte imbalance

Children having severe acute malnutrition often have a serious electrolyte imbalance which may manifest at any time during treatment. Treatment of electrolyte imbalance is done using F75 which contains macro- and micronutrients in quantities that are enough to correct the imbalance. In this study only 5 (5.2%) participants with severe acute malnutrition were investigated for electrolytes while 3(3.1%) of the participants were supplemented with potassium. In a study done in Pakistan, 93 (63.3%) of children were investigated for electrolyte imbalance which represents a big difference compared to this study (Younas *et al.* 2012). All participants in our study were appropriately treated with F75 without supplementation of magnesium. This shows an improved utilization of guidelines when compared to Kenyatta National Hospital where approximately 56(55%) of participants were given commercially prepared F75 (Nzioki *et. al*, 2008).

5.1.5: Step 5: Checking for infection

All severe acute malnourished children are treated with antibiotic upon admission, regardless of whether they have clinical signs and symptoms of systemic infection or not. The antibiotic administered for such routine treatment must be active against small bowel bacterial overgrowth (MoH 2009). In this study, all the participants were given drugs for presumed bacterial infection as recommended in the guidelines. Younas *et al.* (2012) found the same rate of treatment for presumed bacterial infection whereby all children having severe acute malnutrition received broad spectrum antibiotics at admission. However Nzioki *et al.*, (2008) in their study reported a slightly lower percentage of children getting routine treatment for presumed bacterial infection since only 90% of children received broad spectrum antibiotics as per WHO recommendations. Since the prescription of antibiotics is done by the doctor who examines the child, it is likely that

this step would not to be missed and hence all the participants were given treatment for presumed bacterial infection.

5.1.6: Step 6: Correction of micronutrient deficiencies

F75, F100, RUTF and locally-developed milk with combined mineral vitamin (CMV) mix provide the adequate amount of Vitamin A to manage mild Vitamin A deficiency and to replace low liver stores of Vitamin A during treatment (MoH 2009). High dose Vitamin A is given if a patient has signs of severe deficiency. In this study 3 (3.1%) were correctly treated with high dose vitamin A while 2 patients were given single doses of vitamin A even without clinical signs of severe vitamin A deficiency at the time of admission. Similarly, 5 (5.2%) patients were given zinc against the guidelines, since the guidelines advise that zinc should not be given to children with malnutrition if they are receiving F75, F100or RUTF. Warfa *et al*. (2013) found out that a higher number of patients 78/96 (81.3%) received correct dose of Vitamin A in Garissa. Likewise 56 (55%) children received high dose vitamin A on day one in Kenyatta National Hospital (Nzioki *et. al*, 2008). These disparities in the use of vitamin A can be due to the availability of guidelines for use in Busia County Referral Hospital which state clearly when these micronutrients should be given to children with severe acute malnutrition. The guidelines were issued by the Ministry of Health (MoH 2009) in the year 2009 and patients at Kenyatta National Hospital may not have benefitted from them when Nzioki *et al.*, (2008) carried out their research.

5.1.7: Step 7: Initial re-feeding

In this study, F75 was the most common type of feed 86(89.6%) used for initial re-feeding. This is consistent with the guidelines of the Ministry of Health, Kenya (MoH 2013) which advises use of F75 to initiate re-feeding. These findings are supported by the fact that F75 was available in the hospital during the period of the study (KII 1- Nutritionist; KII -Nursing). Also most of the prescription for F75 was made by the nutritionists in the ward which may imply that since the nutritional care was their responsibility, all the children could benefit from their service. Nzioki e*t at.,*(2008) had different findings in Kenyatta National Hospital where only 55% of children were fed with F75 in the initial phase though premixed formula was available. Warfa *et al.*, (2008) found that on average, children received their first feed 2.6 hours after admission (Warfa

et al 2013). Our study showed more favourable results when compared to that of Warfa *et al*., (2013) since most 82 (77.1%) of the participants received their feed within the first 30 minutes of admission.

5.1.8: Step 8: Monitor Catch-up Growth
In the rehabilitation phase a vigorous approach to feeding is required to achieve very high intakes and rapid weight gain of >10 g gain/kg/d. Milk-based F-100 is recommended in this phase. Among all those participants (86, 87.5%) who were given F75 for initial re-feeding, F100 was used as the replacement feed according to the guidelines, in volumes equal to that of F75 for 48 hours at the end of acute phase. However, the volume of F100 after transition period was routinely increased after one day for most participants. This is inconsistent with the guidelines which recommend that volume of F100 be increased by 10 ml per feed until some feed remains uneaten (MoH, 2009).

Based on the above findings, the hypothesis that national guidelines for management of malnutrition are not utilized in Busia County Referral Hospital is rejected.

5.2: Conclusion:

1. Guidelines for management of severe acute malnutrition were adequately utilized in Busia County Referral Hospital. The overall scores for utilization of guidelines ranged from 16 to 20 and the percentages for the scores are presented in Figure 4.5. The average utilization of the guidelines was 86.4%.

2. Commodities needed for management of children with malnutrition, particularly F75 and F100 were available at Busia County Referral Hospital. Key informant interviews showed that commodities needed for management of severe acute malnutrition in the hospital were in stock most of the time. Also, the ingredients needed for making resomal in the hospital were consistently availed to the nutritionist by the hospital.

3. Some health workers involved in the care of children with severe acute malnutrition in Busia County Referral Hospital were not adequately trained in management of severe acute malnutrition. Integrated case management of acute malnutrition training was

conducted for 10 health workers in 2013. Other health workers have not undergone this training.

4. The severity of malnutrition was associated with the age of the participants. There was significantly higher proportion of children with MUAC less than 11.5cm among 6 to 12 months 20(69.0%) [OR=9.26; 95%CI=2.82-30.39; P<0.001] and 13 to 24 months 16(44.4%) [OR=3.33; 95%CI=1.10-10.09; P=0.033] compared to those aged 25 to 59 months 6(19.4%) as shown in Table 4.5.

5.3: Recommendations

1. Continuous medical education for all health workers on case management of severe acute malnutrition.

2. The hospital management should maintain reliable supply of commodities needed for management of severe acute malnutrition.

3. A study should be done to evaluate the effectiveness of utilization of guidelines for management of severe acute malnutrition with a focus on staff to patient ratios.

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Gantt chart

	ACTIVITY	Year 2014			Year 2015								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1	Concept paper development	■											
2	Proposal Development		■										
3	Research & Ethics Committee review			■	■								
4	Recruitment of research assistants				■								
5	Data collection					■	■	■					
6	Data analysis					■	■	■	■				
7	Dissemination									■	■	■	■

APPENDICES

Appendix I: Checklist

Serial No……………………………………………….   Date   ………………………

Dear Participant

Your child has been selected to participate in a study on UTILIZATION OF NATIONAL GUIDELINES FOR MANAGEMENT OF SEVERE ACUTE MALNUTRITION IN CHILDREN AGED 6-59 MONTHS IN BUSIA COUNTY REFERRAL HOSPITAL, KENYA. The investigator will seek personal information about your child and the treatment the child is receiving in this hospital. The information obtained in this research will help in improvement of care given to children who suffer from the same problem that your child is suffering from. The information that will be collected concerning your child will be kept in confidence so that no one else is able to access it other than the researcher. The information will also be treated in a way that it cannot be linked to your child after it is obtained. The name of your child will not be indicated anywhere in the checklist.

Demographic data of the child (Patient)

[Obtain the socio-demographic data of the child and parent/guardian form the parent or guardian.]

Age (Months) ………………………………………..

Sex   male [   ]   Female [   ]

Home Sub-county

……………………………………………………………………………………….

Socioeconomic status of Parent/ guardian

Age (years)   ……………………………………………………………………….

 Sex   Male [   ]   Female [   ]

Highest Level of Education attained

Primary [   ]   Secondary [   ]   College [   ]   University [   ]

Other   [   ]   None   [   ]

Occupation   ………………………………………………………………….

Religion   ……………………………………………………………………..

Diagnostic findings: Anthropometric measurements of the child on admission

(Recruitment).

[Take these measurements in a treatment room or bedside as appropriate]

Weight   ……….   Kg   Weight on Day 7(Kg) ………

Height/length   ……….   cm

Mid-upper arm circumference   ………..   cm

Weight-for-height/length Z score   ………..   SD

Diagnostic and Laboratory Investigations of the child

[Obtain data for diagnostic and laboratory investigations from the patient's/file care notes]

1.   …………………………………………………………………………

2.   …………………………………………………………………………

3.   …………………………………………………………………………

4.   ………………………………………………………………………….

5.   …………………………………………………………………………

Comorbidities: [Obtain data for this part from the patient's file/care notes]

1. ……………………………………………
2. ……………………………………………
3. …………………………………………….

Implementation of the 10 steps

Step 1: Prevention or Treatment of Hypoglycaemia

[Obtain data for question 1-2 below from patient's file/care notes]

1. Was Blood Glucose level measured on admission?   Yes [   ] No [   ]

[if no move to question 4]

2. What was the blood glucose level?

………………………………………………..mmol/L

3. Was Blood glucose level measurement repeated in 30 minutes (for those diagnosed with hypoglycaemia (RBS <3mmol/L) at first measurement)   Yes [   ]   No [   ]

4. On admission, was the child fed immediately i.e. within 30 minutes (For this question ask the parent/guardian) Yes [   ]   No [   ]

5. If no, why was the child not fed immediately after admission? (For this question ask the parent/guardian)

……………………………………………………
……………………………………………………
……………………………………………………

6. What feed was used to initiate feeding immediately on admission [Obtain data for this question from patient's file/care notes or ask the parent/guardian]

i.10% glucose Yes [ ]   No [ ]

ii.Sucrose Yes [ ]   No [ ]

iii.Other food Yes [ ]   No [ ]

7. How often was the child fed thereafter? (Indicate the frequency of feeding from day 1 until day 7)

……………………………………………………………………….

Step 2: Prevention or Treatment of Hypothermia

8. Was the child's temperature measured on admission? Yes [ ]   No [ ]

9. What was the temperature reading? [^{0}C]

10. Was the temperature taken every 2 hours until it rose to 36.5^{o}C (for those with a temperature of less 35.5^{0}C)?   Yes [ ]   No [ ]   Not applicable [ ]

[For question 11-16 see the patient's care notes and/or confrim the parent/guardian the advice he or she was given by the health care provider and his/her practice to protect the child from hypothermia.]

11. Was the parent/caretaker advised to keep baby warm?

Yes [ ]   No [ ]

12. Did the parent/care taker actually keep the child warm? Yes [ ]   No [ ]

13. Was the child protected from draught? (Observe the care environment/room to see if the child is protected from direct wind) Yes [   ] No [   ]

14. Was the parent/guardian advised to keep the child and bed dry? Yes [   ] No [   ]

Je, (mzazi /mlezi) ulishauriwa kuweka mtoto na kitanda kavu? Ndio La

15. Is the child bathed while in the ward? Yes [   ] No [   ]

Je, (mzazi /mlezi) unamuogesha mtoto wakati akiwa kwenye wodi?

16. If yes, how often is the child bathed? Je, unamuogesha mtoto mara ngapi?

    ……………………………………………………

17. Do you dry the baby/child after bathing? Yes [   ] No [   ]

Je, unamkausha mtoto baada ya kumuogesha? Ndio La

18. If yes how do you dry the baby/child

    Kama ndio, unamkaushaje mtoto?

………………………………………………………………………………………………………
………………………………………………………………………………………………………..

Step 3: Prevention or Treatment of Dehydration

[For step 3-7, extract the data from the patient's file, treatment sheet and observation charts.]

19. Was the child was assessed for dehydration? Yes [   ] No [   ]

20. Was the child diagnosed with shock? Yes [   ] No [   ]

(If no move to question 23)

21. If in shock what route was used for rehydration?

   i) Intravenous   ☐

   ii) Intraosseous   ☐

   iii) Nasogastric tube   ☐

22. Which type of fluid was used for treatment of shock? (Specify)

……………………………………………………………………

23. What amount of fluid was used for treatment of shock?

   (i) In the first 2hours

         ………………………………………..mls

   (ii) In the next 4-10 hours

         ……………………………………….mls

24. Was the child diagnosed with dehydration? Yes ☐   No ☐
 [If not in question 22 above, go to question 29.]
25. What type of fluid was used for rehydration of the child? (specify)
……………………………………………………………………….
26. Which route was used to rehydrate the child with dehydration?
……………………………………………………………………….
27. What was the amount given (Specify rate of infusion and absolute amount given)?

(i) In the first 2hours

………………………………………………………………………………………

(ii) In the next 4-10 hours

……………………………………………………………………………..

28. Was Starter F-75 given on alternate hours during the period of rehydration?

Yes [   ]   No [   ]

29. Monitoring: Were the following parameters monitored during rehydraton?

(i)   Respiration   Yes [   ]   No [   ]

(ii)   Pulse   Yes [   ]   No [   ]

(iii)   Urine output Yes [   ]   No [   ]

(iv)   Weight gain Yes [   ]   No [   ]

30. If yes how often are they assessed on the child during rehydration? (Specify frequency of measurement as recorded in the observation charts)

i) Respiration   ………………………………………………………….

ii) Pulse   ………………………………………………………….

iii) Urine output   …………………………………………………………

iv) Weight gain   …………………………………………………………

31. For children who are still breastfeeding, is the mother breastfeeding during therapy?

Yes ☐   No ☐

32. If no, why was she not breastfeeding?

……

……

Step 4: Correction of Electrolyte balance

33. Is child given extra potassium (other than one contained in refeeding formula, see prescription sheet)?

Yes ☐   No ☐

34. Is child given extra magnesium?   Yes ☐   No ☐

35. Is food for the child made with salted?   Yes ☐   No ☐

Step 5: Checking for Infection

36. Was the child treated for presumed bacterial infection? Yes ☐   No ☐

37. If yes in question 34 above, which antibiotic(s) was used (Specify)?

....

…………………………………………………………………

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38. Was the child treated for other infections? (verify against comorbidities)

Yes [   ]   No [   ]

39. Was child immunized for measles?   Yes [   ]   No [   ]

40. If not in question 38 above, why was the child not immunized for measles?

....

41. Was child monitored for increased desire to feed (appetite test? Yes [   ] No [   ]

Step 6: Monitor Micronutrients

42. Was the child clinically assessed for micronutrient deficiency? Yes [   ] No [   ]

43. Was the child on ready-to-use therapeutic food RUTF? Yes [   ] No [   ]

44. Was the child given any micronutrient supplements? Yes [   ] No [   ]

45. If yes which micronutrients were given? (Specify)

……………………………………………………

…………………………………………………….

…………………………………………………….

…………………………………………………….

46. What were the doses of the micronutrients given?

   (Record each micronutrient and the dosage against it form the patient care records)

   ………………………………………………………………………….

   ………………………………………………………………………….

....

....

Step 7: Initial re-feeding (Therapeutic diet)

47. Was the child started on re-feeding (Therapeutic diet)?   Yes [   ]   No [   ]

48. How long after admission was re-feeding started (indicate time in hours/days)?

....

49. What type of feed was used for initial re-feeding of the child?

....

....

....

50. What was the frequency of feeding (indicate time in hours)?..............................

51. Were the following parameters monitored during initial re-feeding?

   i) Vomiting   Yes [   ]   No [   ]

   ii) Frequency and consistency of stool Yes [   ]   No [   ]

   iii) Daily body weight   Yes [   ]   No [   ]

Step 8: Monitor Catch-up growth

52. Which criteria are used to transfer patient from stabilization to rehabilitation phase?

i.Return of appetite   Yes [   ]   No [   ]

ii.No episodes of hypoglycaemia (metabolically stable) Yes [ ]   No [ ]

iii.Reduced or disappearance of all oedema Yes [ ]   No [ ]

53. What type of feed is used for replacement of starter F-75?

………………………………………..

54. How much feed is used to replace starter F75?

…………………………………………..ml

55. After how long is the replacement feed increased?

…………………………………………

56. What is the amount of increase in the replacement feed?

………………………………….

57. How long does the transition phase last?

……………………………………………………………………………

58. Is the child monitored for congestive heart failure during transition phase?

Yes [ ]   No [ ]

59. If yes, what parameters are used to monitor the child for early signs of congestive heart failure during transition (See the patient care notes for negative or positive findings)?

i.Pulse Yes [ ]   No [ ]

ii.Respirations Yes [ ]   No [ ]

iii.Breath sounds Yes [ ]   No [ ]

iv.Heart sounds Yes [ ]   No [ ]

v.Jugular venous pressure Yes [ ]   No [ ]

vi.Size of the liver Yes [ ]   No [ ]

60. Is the child weighed every morning before feeding (check charts for plotted weight)?

[ ]   [ ]   60

Yes   No

61. Is weight gain calculated and recorded? Yes [＿＿＿＿]   No [＿＿＿＿]

Step 9: Sensory stimulation

For step 9, enquire from the nurse in charge of the care unit/ward about organized play and

stimulation of the child with malnutrition.

62. Is the care environment cheerful and stimulating? Yes [＿＿＿＿]   No [＿＿＿＿]

63. Does the unit expose children to structured play therapy? Yes [＿＿＿＿]No [＿＿＿＿]

64. If yes in question 61 above, how long is the child engaged in the structured play therapy per

day? ………………………..

65. Physical activity as soon as the child is well enough Yes [＿＿＿＿]   No [＿＿＿＿]

66. Does the unit provide suitable toys and play activities for the child? Yes [＿＿＿＿] No [＿＿＿＿]

Step 10: Prepare for follow up

For this part ask the parent/ care giver about discharge instructions.

67. Were you informed about the discharge plan of your child? Yes [＿＿＿＿]   No [＿＿＿＿]

Je, ulipewa taarifa juu ya mpango kumtowa mtoto wako hospitalini? Ndiyo   Hapana

68. Have you been informed about schedule of follow-up visit at the mother and child health

clinic (MCH) or other facility? Yes [＿＿＿＿]   No [＿＿＿＿]

Je, ulipewa taarifa juu ya ratiba ya daktari kumuona mtoto wako katika clinic ya watoto ama

katika kituo kingine cha afya baada kutoka hospitalini?

Thank you for your participation.

Appendix II: Health Workers Declaration and Consent Form

The study above has been explained to me. I have understood its purpose and my rights as a participant in the study. I have been given a chance to ask questions and have been assured that if in future I have any concerns about the study or my rights as a subject, I can ask the investigator. I understand that I can withdraw from the study at any time. I voluntarily agree to participate in the study.

Health worker's signature ………………………. Date ………………

Investigator's signature ………………………. Date ………………

Appendix III: Key informant interview guide

Introduction

Good morning/afternoon and welcome to my interview. Thanks for taking the time to talk with me about management of severe acute malnutrition in your facility.

My name is Samuel Ndere Mbugua. I am a postgraduate student at the University of Nairobi, pursuing a degree of Master of Science in Paediatric Nursing.

The purpose of this interview is to get information about utilization of guidelines in management of children with severe acute malnutrition and the challenges you may be facing as an institution while providing such care.

All your views are important. Please feel free to share your point of view even if it differs from what others may think. Remember that I'm interested in both positive and negative comments.

I have a tape recorder with me. I'll be tape-recording the interview because I don't want to miss any of your comments. The recording will be transcribed to ensure that all of the information that I document is accurate. Anything you tell me will be handled in confidence. Results from interviews will not specifically identify you or any other person interviewed. Rather, the results will be reported collectively.

Your participation in this interview is totally voluntary. Are you willing to participate in this interview? Do you have any questions? Is it okay to begin the interview?

1. What is the proportion of children with malnutrition admitted to your health facility?

2. Do you follow the standard guidelines in management of severe acute malnutrition?

3. Which commodities do you have for the care of children with SAM? What commodities/equipment do you lack most of the time in the management of SAM?

4. Do you think staff in your unit is adequately trained on management of SAM?

5. What are the challenges you face in management of children with severe acute malnutrition (SAM)?

6. How can the care of children with SAM be improved in your unit of care?

7. Do you have any additional comments about management of children with severe acute malnutrition in your unit that I haven't already covered?

Conclusion

Thank you very much for your time. Thank you for sharing with me information about utilization of guidelines in management of children with severe acute malnutrition and the challenges you face as an institution while providing such care. This information will be very useful in informing decision and policy makers on how best the care of children with malnutrition can be improved.

After the entire study is completed, the results will be communicated to this hospital through the administration. You can access the report through the nursing officer in charge of the hospital when it is provided.

Do you have any questions for me?

Again I thank you very much.

Have a good day.

Appendix IV: Observation checklist

Item	Availability	
	Yes	**No**
Equipment		
Scoops		
Measuring jugs		
Storage buckets/containers		
Fridge		
Supplies		
F75		
F100		
ReSoMal		
Boiled/ distilled water		

Appendix V: Parent's/Guardian's Information Sheet

Serial No.   ………………..   Date ……………….

UTILIZATION OF GUIDELINES FOR MANAGEMENT OF SEVERE ACUTE MALNUTRITION IN CHILDREN AGED 6-59 MONTHS IN BUSIA COUNTY REFERRAL HOSPITAL, KENYA

Introduction
Investigator:

Mr. Samuel Ndere Mbugua, Master of Science in Paediatric Nursing student,
University of Nairobi.

Supervisors:

1. Mrs. Angeline C. Kirui, Lecturer, School on Nursing Sciences, University of Nairobi

2. Dr Margaret Muiva, Senior Lecturer, School on Nursing Sciences, University of Nairobi.

I am carrying out a study to determine the care provided to children admitted with severe malnutrition in this hospital. Your child has been diagnosed with severe malnutrition.

I request you to participate in this study. This form provides you with information that you need to know so that you can decide whether to allow your child to take part in the study or not. Allowing your child to participate is wholly voluntary.

Purpose of study

This hospital admits and treats children with severe acute malnutrition. I would like to look at the care given to children like yours admitted into this hospital. Information obtained will enable us assess the care and where possible make improvements.

Procedures

As a part of this study I will refer to your child's hospital file to obtain information about the nutritional status of your child. Such information includes his/her weight and height. I will also interview you to obtain more information concerning the care you are giving to your child while he/she is in the hospital. At the time of discharge I will take the weight and height of the child to know how well he/she will have responded to the care given in our hospital. I will also observe how the child is feeding during his/her stay in the hospital.

Risks

There may be minimal direct risks to your child as a result of taking part in this study. All efforts will be made to protect our child from all harm.

Benefits

This study may not benefit your child directly or immediately. However the information obtained from this study will be used by the hospital to identify any weaknesses in the treatment of severe malnutrition. This will subsequently help to improve the care given to children severe malnutrition.

Confidentiality

Information obtained will be held in confidence. I will not use the name of the child on any documents of the study relating to your child. During the study, the information obtained will be handled in such a way that it cannot be linked to your child.

Rights

Participation in the study is wholly voluntary. You may decline to participate or withdraw your consent to participate at any point during the study. If you withdraw, the care your child will not be affected in any way. You have a right to ask any question or clarifications any time during the study.

Contacts

Principal investigator:

Samuel Ndere Mbugua

School of Nursing Sciences

University of Nairobi

P. O. Box 19676 – 00200 NAIROBI

KENYATTA NATIONAL HOSPITAL

Mobile Phone Number 0723 873716

First Supervisor:

Mrs. Angeline C. Kirui, MSc, BSc (N)

School of Nursing Sciences

University of Nairobi

P. O. Box 19676 – 00200 NAIROBI

Mobile phone number: 0720 440 665

KENYATTA NATIONAL HOSPITAL

Second supervisor

Dr. Margaret Muiva PhD, MSc (N), DAN, RN

School of Nursing Sciences

University of Nairobi

P. O. Box 19676 – 00200 NAIROBI

KENYATTA NATIONAL HOSPITAL

Mobile phone number: 0722 230 680

KNH/UoN Ethics and Research Committee:

The Chairman

 KNH/UoN Ethics and Research Committee

P.O.Box 20723-00202

Nairobi.

Tel: 020-2726300-9 Ext 44102

Email: uonknh_erc@uonbi.ac.ke

Kiambatisho V: Karatasi Ya Habari Kwa Mzazi/Mlezi

Nambari fuatilizi. ....   Tarehe ....

MATUMIZI YA MWONGOZO USIMAMIZI KWA MATIBABU YA UTAPIAMLO

KATIKA WATOTO WENYE UMRI 6-59 MIEZI KATIKA HOSPITALI YA RUFAA YA

GATUZI YA BUSIA, KENYA

Utangulizi

Mpelelezi:

 Bw. Samuel Ndere Mbugua, Mwanafunzi wa Uzamili katika uuguzi, Shule ya Uuguzi,

Chuo Kikuu cha Nairobi.

Wasimamizi:

1. Bi Angeline C. Kirui, Mhadhiri, Shule ya Sayansi za Uuguzi, Chuo Kikuu cha Nairobi

2. Dr Margaret Muiva, Mhadhiri Mwandamizi, Shule ya Sayansi za Uuguzi, Chuo Kikuu cha

Nairobi.

Mimi ninafanya utafiti ili kuamua huduma zinazotolewa kwa watoto waliolazwa na utapiamlo

katika hospitali hii. Mtoto wako amepatikana na utapiamlo.

Naomba wewe kushiriki katika utafiti huu. Fomu hii inakupa taarifa unayohitaji kujua ili uweze

kuamua kama utamruhusu mtoto wako kushiriki katika utafiti au la. Kuruhusu mtoto wako

kushiriki ni hiari kabisa.

Lengo la utafiti

Hospitali hii hulaza na kutibu watoto wenye utapiamlo. Ningependa kuangalia huduma inayotolewa kwa watoto kama wako waliolazwa katika hospitali hii. Habari itakayopatikana itatuwezesha kuthmini huduma na pale ambapo inawezekana kufanya maboresho.

Taratibu

Kama sehemu ya utafiti huu nitaangalia faili ya hospitali ya mtoto wako kupata habari kuhusu hali ya lishe ya mtoto wako. Taarifa hizo ni pamoja na uzito wake na urefu. Pia nitakuhoji wewe ili kupata habari zaidi kuhusu huduma wewe unmpa mtoto wako wakati yeye ako katika hospitali. Wakati wa kutolewa hospitalini, nitapima uzito na urefu wa mtoto kujua jinsi atakavyo kuwa amenufaika na huduma inayotolewa katika hospitali hii. Mimi nitachunguza jinsi mtoto wako analishwa akiwa hospitalini.

Hatari

Yawezekana kukawa na hatari ndogo moja kwa moja kwa mtoto wako kushiriki katika utafiti huu. Juhudi zote zitafanywa kulinda mtoto wako na mabaya yote.

Faida

Yawezekana utafiti huu hauutamfaidi mtoto wako moja kwa moja au mara moja. Hata hivyo habari zilizopatikana kutoka utafiti huu zitatumiwa na hospitali kutambua udhaifu wowote katika matibabu ya utapiamlo. Hii hatimaye itasaidia kuboresha huduma inayotolewa kwa watoto wa na utapiamlo.

Usiri

Habari zitakazopatikana itahifadhiwa kwa siri. Jina la mtoto wako halitatumiwa kwenye nyaraka yoyote ya utafiti zinazohusiana na mtoto wako. Wakati wa utafiti, taarifa zilizopatikana itashughulikiwa hivi kwamba haiwezi kuhusishwa na mtoto wako.

Haki

Kushiriki katika utafiti huu ni hiari kabisa. Unaweza kushuka kwa kushiriki au kuondoa ruhusa yako ya kushiriki katika hatua yoyote wakati wa utafiti. Ikiwh utajiondoa kwenye utafiti huu, huduma kwa mtoto wako haitaathirika kwa njia yoyote. Una haki ya kuuliza swali lolote au ufafanuzi wakati wowote wakati wa utafiti.

Mawasiliano

Mkuu wa uchunguzi:

Samuel Ndere Mbugua

Shule ya Sayansi za Uuguzi

Chuo Kikuu cha Nairobi

S.L.P. 19676-00200 NAIROBI

Hospitali ya Kitaifa ya Kenyatta

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Msimamizu wa Kwanza

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Mweyekiti

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Appendix VI: Parent's/Guardian's Declaration and Consent Form

The study above has been explained to me. I have understood its purpose and my rights as a participant in the study. I have been given a chance to ask questions and have been assured that if in future I have any concerns about the study or my rights as a subject, I can ask the investigator. I understand that I can withdraw from the study at any time. I voluntarily agree to participate in the study.

Parents/Guardians Signature   ……………………….   Date   ………………

Investigator's signature   ……………………….   Date   ………………

Kiambatisho VI: Tangazo Na Idhini Ya Mzazi / Mlezi

Mimi nimeelezwa kuhusu utafiti huu. Mimi nimeelewa madhumuni yake na haki zangu kama

mshiriki katika utafiti. Nimepewa nafasi ya kuuliza maswali na uhakika kwamba kama katika

siku zijazo nina wasiwasi wowote kuhusu utafiti au haki zangu kama mhusika, naweza kuuliza

mpelelezi mkuu. Naelewa kwamba naweza kutoa kutoka utafiti wakati wowote. Mimi kwa hiari

nakubali kushiriki katika utafiti huu.

Sahihi ya Mzazi / Mlezi........................... Tarehe ....

Sahihi ya Mpelelezi/Mpelelezi msaidizi .... Tarehe ....

Appendix VII: Overall score for utilization of guidelines

The overall guidelines utilization score was computed using twenty (20) elements extracted from the guidelines for management of severe acute malnutrition. The score 1 was given to the option "yes" while score 0 on the scale represented the category "no". The following elements of guidelines were assessed;

Prevention/treatment of hypoglycaemia
1. Measuring of RBS on admission (Yes=1, No=0)
2. Immediate initiation of feeding within 30 minutes (Yes=1, No=0)

Prevention/treatment of hypothermia
3. Measuring of temperature on admission (Yes=1, No=0)
4. Advice given to caretaker to keep child warm (Yes=1, No=0)
5. Keeping baby warm by caretaker (Yes=1, No=0)
6. Protecting child from draught (Yes=1, No=0)
7. Advice given to keep baby and bed dry (Yes=1, No=0)
8. Whether child is bathed while in the ward (Yes=1, No=0)
9. Drying the child after bathing (Yes=1, No=0)

Prevention or treatment of dehydration
10. Assessment for dehydration/shock (Yes=1, No=0)

Checking for infection
11. Treatment for presumed bacterial infection (Yes=1, No=0)
12. Monitoring of appetite (Yes=1, No=0)

Monitoring of micronutrients
13. Clinical assessment for micronutrient deficiency (Yes=1, No=0)
14. Whether child was given F75/F100 (Yes=1, No=0)

Initial re-feeding
15. Whether child was started on re-feeding (Yes=1, No=0)
16. Monitoring of vomiting during initial re-feeding (Yes=1, No=0)
17. Monitoring of frequency and consistency of stool during initial re-feeding (Yes=1, No=0)
18. Monitoring of daily body weight during initial re-feeding (Yes=1, No=0)

Monitor Catch-up growth
19. Daily weighing in the morning before feeding (Yes=1, No=0)
20. Calculating and recording of weight gain (Yes=1, No=0)

The overall score was generated by aggregating the scores. The maximum attainable score was 20. A percentage score was generated and classified as Low (<50%), moderately high (50 – 69%), High (70 – 85%), and very high (>85%).

Appendix VIII: Reference plan of management of acute malnutrition

	Phases		
	Stabilization		*Rehabilitation*
Checklist	Day 1-2	Day 3-7	Week 2-6
1. Prevent or treat hypoglycaemia	▓▓▓		
2. Prevent or treat hypothermia	▓▓▓		
3. Prevent or treat dehydration	▓▓▓		
4. Correct electrolyte balance	▓▓▓	▓▓▓	▓▓▓
5. check for infection	▓▓▓	▓▓▓	
	No iron Supplementation		*Iron Supplementation*
6. Monitor micronutrients	▓▓▓	▓▓▓	▓▓▓
7. Assure cautious feeding	▓▓▓	▓▓▓	
8. Monitor catch up feeding			▓▓▓
9. Assure sensory stimulation	▓▓▓	▓▓▓	▓▓▓
10. Prepare for follow up			▓▓▓

Adapted from the Kenya National Guidelines for Integrated Management of Acute Malnutrition Version 1: 2009.