
**NUTRITION CARE PRACTICES AND RISK FACTORS FOR
MALNUTRITION AMONG PATIENTS IN EMBU LEVEL FIVE
HOSPITAL IN KENYA**

BY

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the degree of Master of Science in Applied Human Nutrition in the
Department of Food Science Nutrition and Technology, Faculty of
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DEDICATION

To my wife Susan Mwikali for her love, patience and support

My lovely children Sharon, Winfred and Kemuel for the short time spent together, you

live in my heart

My mother and brothers for always being supportive.

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ACRONYMS AND ABBREVIATIONS

| | |
|---------------|--|
| AIDS | Acquired Immune Deficiency Syndrome |
| AS | Arm Span |
| BMI | Body Mass Index |
| CCF | Congestive Cardiac Failure |
| CI | Confidence Interval |
| ENT | Ear Nose and Throat |
| ESPEN | European Society of Parenteral and Enteral Nutrition |
| HIV | Human Immuno Virus |
| HTN | Hypertension |
| ICU | Intensive Care Unit |
| LOS | Length of Stay in Hospital |
| MCH/FP | Maternal and Child Health/Family Planning clinic |
| MNA-SF | Mini Nutrition Assessment – Short Form |
| MoH | Ministry of Health |
| MOP | Medical Out-patient Clinic |
| MUST | Malnutrition Universal Screening Tool |
| MST | Malnutrition Screening Tool |
| NPO | Nothing Per Os (Nil by mouth) |

| | |
|-------------|---|
| NRS | Nutrition Risk Assessment |
| PUD | Peptic Ulcer Disease |
| RBS | Random Blood Sugar |
| SGA | Subjective Global Assessment |
| SNAQ | Short Nutrition Assessment Questionnaire |
| SPSS | Statistical Package for Social Scientists |
| OPP | Organo Phosphate Poisoning |
| OR | Odds Ratio |
| UK | United Kingdom |
| USA | United States of America |

OPERATIONAL DEFINITION OF TERMS

Nutrition Care practices – activities that promote optimum nutrition support for patients at risk of malnutrition and include nutrition status assessment and prescription of appropriate diet.

Level five hospital – a Kenyan referral hospital with high volume of patients with specialized medical care.

24-hour dietary recall - A method of dietary assessment in which the individual is asked to remember everything eaten during the past 24 hours to determine nutrient adequacy.

Malnutrition – a condition that arises as a result of either inadequate intake of nutrients or excess intake and thus can either be under nutrition or over nutrition.

Nutritional assessment - The process by which the nutritional status of a hospitalized patient is determined; usually includes dietary history, and intake data, biochemical data, clinical examination and medical history; anthropometric data and psychosocial data.

Nutrition Care Process - The process of planning and meeting the nutritional needs of the hospitalized patient.

Nutrition Status - a measurement of the extent to which the individuals physiologic need for nutrients is being met.

Nutritional screening – A standard, easy, efficient procedure to identify patients at nutritional risk who require nutritional assessment.

Over nutrition – a form of malnutrition that arises when the body has excess of nutrients and the most common being overweight and obesity.

Risk Factors – these are factors or characteristics either intrinsic or extrinsic that influence the outcome of nutritional status of a patient.

Under nutrition – a form of malnutrition that arises due to deficiency of one or more nutrients in the body and the most common being energy malnutrition

Body Mass Index – an indices for determining the nutritional status of an individual by taking the weight in kilogram and dividing with square of the height in metres and compare on scale to provide a classification.

Subjective Global Assessment – is a nutrition assessment tool that assesses nutrition status through completion of a questionnaire which includes data on weight change, dietary intake change, gastrointestinal symptoms, changes in functional capacity in relation to malnutrition as well as assessment of fat and muscle stores and the presence of oedema and ascites.

ABSTRACT

Nutrition care is an important determinant in patients' nutrition, health outcome and adequate nutrition is required for patients to improve and maintain their health. Health care providers have a role in ensuring patient receive adequate nutrition care while in hospital. The objective of this study was to evaluate nutritional care practices, malnutrition levels and the risk factors for malnutrition among hospitalized medical patients.

The study was cross-sectional, descriptive and observational in nature and involved 98 patients admitted in medical wards in Embu Level Five hospital. A 4-item validated patient questionnaire consisting of socio demographic, nutrition assessment, morbidity and dietary intake was administered to each patient

A total of 98 patients of whom 48 (49%) and 50(51%) were male and females respectively participated in the study. The mean age of the respondents was 37 ± 10.7 while the mean length of stay at the time of the study was 6.0 ± 3.7 days. Nutrition status assessment at the point of admission (within 48 hours of admission) was hardly done at 1.6%. However, biochemical tests were done for 62.2% of patients and only on doctors' request. The prevalence of under nutrition among the study respondents was high at 53.1% based on Body Mass Index and 54.1% based Subjective Global assessment method. The mean calorie and protein provided by the hospital food was significantly lower at 1468.4 ± 253.9 kcal/day and 36.2 ± 17.6 g/day compared to both hospital recommendation of 2000 kcal/day and 65g/day of protein and mean patient needs of 1612 ± 209.7 kcal/day and 53.2 ± 11.0 g/day (P-value, <0.000). Less than half (42.9%) of the study respondents consumed more than three quarters (>75%) of the hospital food

provided. The following factors showed an association with nutrition status; energy intake ($p=0.015$), protein intake ($p=0.004$), length of stay ($p=0.07$), and the proportion of hospital food consumed ($p=0.007$). The following factors were found to be predictors for malnutrition among hospitalized patients; energy intake ($p=0.028$, OR=0.999, 95% CI: 0.999, 1.000) and protein intake ($p=0.003$, OR=1.041), 95% CI: 1.014, 1.069).

Conclusion: The nutrition care among hospitalized patients is inadequate as nutrition status assessment at the point of admission is hardly done. The hospital diet both in calorie and protein content is inadequate to cover for patients' needs. Malnutrition is highly prevalent (>50%) among hospitalized patients as determined by both BMI and SGA. Overall food intake among patients is inadequate to cover for their body needs. Energy intake, protein intake, length of stay and the amount of hospital food consumed were associated with malnutrition. Energy and protein intake were found to be the risk factors for hospital malnutrition.

Recommendation: nutrition status assessment should be done to all patients upon admission. Malnourished patient should receive individualized care with foods tailored to correct malnutrition. Hospital diet should be adequate so as to meet patients' needs. There is therefore a great need to review the whole aspect of nutrition care for all patients. To achieve this, the implementation of clinical nutrition guidelines should be prioritized. This will result into improvement of patient nutrition care and reduction in hospital malnutrition.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Florence Nightingale, 1860 (cited by Brown in nursing times, 1991) wrote: “Thousands of patients are annually starved in the midst of plenty, from want of attention to the ways which alone make it possible for them to take food”. He added that patients should not become undernourished during hospital stay as no illness or disease benefits from poor nutrition. Over a century later, it is still common to come across hospitalized patients displaying undiagnosed signs and symptoms of malnutrition (McWhirter et al., 1994). The problem could be attributed to the patient’s disease which may result in poor appetite, psychological factors, lack of nutrition training on the medical staff, economic status and longer hospitalization with lack of assistance with feeding (Baker et al, 2011)

The quality of nutrition care is an important determinant in patients’ nutrition and health outcome, Length of Stay in Hospital (LOS) and cost of medical care. Equally, adequate nutrition is required for patients to improve and maintain their health. Many patients admitted in hospitals with various medical conditions develop malnutrition while in hospital (Martinez et al, 2005). Globally, nutrition care has received much attention in developed countries as evident from the many publications while this is not the case for developing countries such as Kenya as there is scanty of information on the same.

Studies have documented that there is a strong association between nutrition care and hospital malnutrition. Poor skills in recognition of malnutrition in patients exist among health care providers. (McWhirter et al, 1994)

The provision of food to patients has largely been left to casual staff and relatives of patients. In recent times. On many occasions, the diet is not in line with the medical condition; sometimes leading to under feeding (Thibault et al, 2011).

1.2 Problem Statement

Though adequate nutrition care is an essential component of patient care, it still remains a challenge in Kenyan public hospitals (Ministry of medical services, 2010). The problem could be due to lack of training on Clinical nutrition issues on the part of health care providers, shortage of health personnel, skewed allocation of resources and the low priority to patient nutrition care. In addition, patients admitted with different types of illnesses are usually either malnourished or at high risk of being malnourished and the situation is usually worsened by poor dietary intake while in hospital. Inadequate and or lack of appropriate nutritional care during hospitalization may also worsen patients' nutritional status. The result is medical complications, prolonged length of stay, increased risk of mortality and subsequent increase in cost of medical care (Lim et al, 2012).

1.3 Rationale

Malnutrition is a common problem for hospitalized patients, with big impact on overall health and the economy as a whole. Optimal nutrition in the hospital can facilitate better patient outcomes; early screening for nutritional risk allows for appropriate intervention in hospital setting, as well as planning for appropriate nutrition therapy and follow-up for out-patient nutrition care. By improving quality of nutrition care, the length of stay and cost can be reduced besides reduction in disease related complications (Lim et al, 2012).

1.4 Aim of study

The aim of the study was to contribute towards creating a better understanding of the quality of nutrition care in public hospitals in Kenya.

1.5 Purpose of study

The purpose of the study was to generate data on the current nutrition care practices and prevalence of malnutrition among patients admitted into medical wards in level five hospitals in Kenya and in particular Embu Level five hospital and to identify possible barriers/challenges. The findings can be used to advocate for strengthening of clinical nutrition in hospitals.

1.6 Broad objective

To evaluate the nutritional assessments, hospital malnutrition levels and the risk factors for malnutrition among hospitalized medical patients in Embu Level Five Hospital.

1.7 Specific Objectives

1. To determine socio-demographic characteristics of patients admitted in the medical wards.
2. To assess the status of nutrition assessments at the time of admission for the patients
3. To determine the nutrition status of the hospitalized patients using Body Mass Index (BMI) and Subjective Global Assessment (SGA) methods
4. To assess the nutrient adequacy of hospital diets and nutrient intakes of the patients

5. To determine the risk factors associated with malnutrition among the hospitalized patients

1.8 Research Question

1. Do all patients upon admission into the medical ward undergo appropriate nutrition status assessment?
2. Is the diet provided at the hospital adequate to meet the nutritional needs of the patients?
3. What are the factors associated with the nutritional status of hospitalized patients?

1.9 Hypothesis

1. All patients undergo appropriate nutrition status assessment at the point of admission.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Malnutrition is a frequent cause of morbidity and mortality and is present in several risk populations. Among the more affected groups are inpatients hospitalized for a variety of causes. There is a high prevalence of under nutrition among hospitalized patients, as has been recognized in other countries (Martinez et al, 2005; Aznarte et al, 2001; González Sánchez et al, 2000; Thorsdottir et al, 1999; McWhirter et al, 1994).

The studies show malnutrition prevalence ranging from 20 – 50 percent at the point of admission. Poor nutrition status among patients has been adversely associated with a range of clinical, functional and economic outcomes. Malnourished patients have been shown to have a length of hospital stay of 1.5 - 1.7 times longer than well-nourished patients. They have also been shown to have a three-fold increase in mortality over a 12-month period post discharge. Malnutrition can also lead to poor wound healing and impaired immune function resulting in infectious complications. The prevalence of inpatient malnutrition and its related outcomes are likely to vary with different populations and health care settings (Lim et al, 2012).

Causes of malnutrition among hospitalized patients include:

- Previous malnutrition because of subjacent illness: anorexia, feeding difficulties and increased nutritional requirements.

- ‘Ex novo’ malnutrition during hospital stay: deficiencies in hospital diets, fasting periods because of diagnostic or therapeutic procedures and metabolic stress associated with illness. (Martinez et al, 2005)

It is possible that the existence of other problems in a hospital setting favours the appearance or non-detection of the problem: lack of knowledge among health workers, lack of screening protocols, non-compliance with protocols including nutritional parameters, lack of Nutritional Units or those that are frequently understaffed and lack of registered dietitians in public hospitals. (Martinez et al, 2005 ; Roldán et al, 1985; de Ulíbarri Pérez et al, 2002).

The consequences of malnutrition on morbid-mortality of in-patients are important, because several systems are affected: immunity, respiratory, cardio-circulatory, metabolism, tissue and wound healing. Studies undertaken indicate the presence of malnutrition as a marker of a worse prognosis, increased post surgery complications, mortality rates, hospital stay and even influencing readmission rates. This implies an increase in cost of hospitalization of up to 60 percent (Martinez et al, 2005; Roldán et al, 1985).

2.2 Overview of Patient Nutrition Care Process

Nutrition care involves applying the art and science of nutrition to promote the health and well being of patients. The process consists of four distinct, but interrelated and connected steps. The first step involves screening of all new admissions for nutritional risks and assessment of at-risk patients to determine their nutrition status. The second step involves nutrition diagnosis which involves defining the problem, etiology and

signs/symptoms. The third step involves nutritional support, evaluation and assessment of patient's nutritional needs, development of nutrition plans and goals, and provision of quality meals and other forms of support to the individual patient. The fourth step is monitoring nutrition support and care plan for appropriateness, accuracy and effectiveness. (Ministry of Medical Services, 2010)

It is recommended that, to assist in control of hospital costs, adoption of a simple nutrition screening procedure in identifying patients at risk of malnutrition should be adopted. The screening tool should be quick and simple to administer and done to every patient within 24 – 48 hours of patient entering the hospital.

NUTRITION CARE STEPS FOR HOSPITALIZED PATIENTS

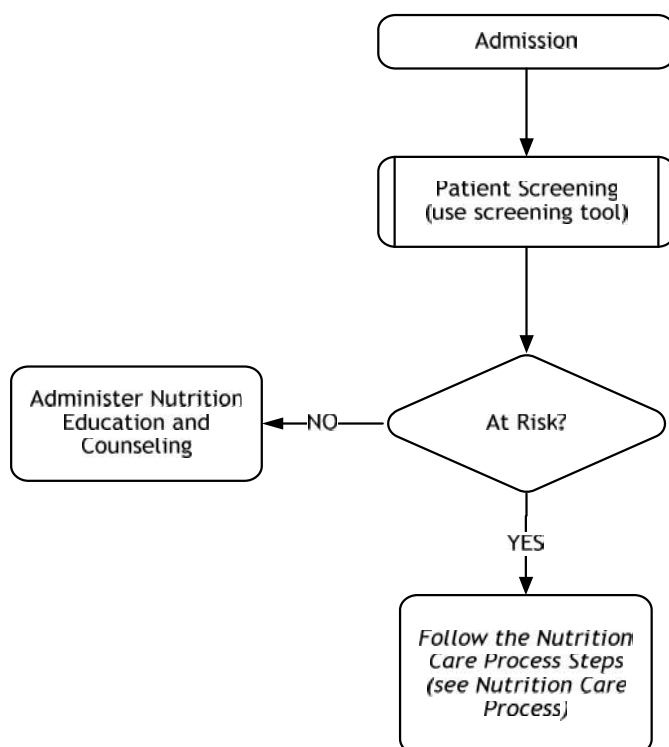


Figure 1: Nutrition care steps for hospitalized patients

(Source: Ministry of medical services, 2010)

2.3 Nutrition Screening and Assessment

Identifying malnutrition is fundamental to its treatment. Many validated tools for nutrition risk screening and nutrition assessment exist for the clinician to use in assisting with the accurate identification, referral and treatment of patients who are malnourished or at-risk of malnutrition. (Velasco et al, 2011)

Nutrition risk screening involves the use of a rapid and simple set of usually two or three questions that have been validated to predict malnutrition risk. Patients identified through screening as at-risk are subsequently referred for further nutritional assessment, usually performed by a nutritionist/dietician. Nutrition screening can be performed by any trained health professional, but is usually completed by nursing or nutrition assistant staff.

Nutrition assessment on the other hand is a diagnostic tool to determine if a patient is currently malnourished and it requires greater skill and time to perform than nutrition risk screening. The Patient is referred to a dietician by a medical or a nursing staff to provide nutritional care but little time often exists for these staff to screen additional patients implying that many at risk patients go without being assessed. (Velasco et al, 2011)

Several nutrition screening and assessment tools exist to identify risk of, and diagnose, malnutrition. The Malnutrition Screening tool (MST) is a simple, three-question tool assessing recent weight by asking the patient if there is change in clothe fittings and appetite loss validated for use in general medical, surgical and oncology patients. It was designed for use by non-nutrition-trained staff and utilizes a scoring system to identify patients at high nutrition risk which can then provide a basis for dietetic referrals and intervention. (Antony, 2008)

The Malnutrition Universal Screening Tool (MUST) was developed to detect both under-nutrition and obesity in adults, and was designed for use in multiple settings including hospitals and nursing homes. Body Mass Index (BMI), unplanned weight loss and the presence or absence of serious disease allow a score to be derived to indicate whether nutrition intervention is necessary. (Antony, 2008)

The Mini Nutrition Assessment (MNA) was developed specifically for use among elderly patients (> 65 years) in hospitals, nursing homes and the community and is thus limited to this demographic group. The original form considers anthropometrical, medical, lifestyle, dietary and psychosocial factors in an 18 item assessment, using a points-based scoring system to determine if a patient is at risk of, or suffering from, malnutrition. The short-form MNA (MNA-SF), which is an abridged version of the MNA, provides a simple two-step nutrition screen with the full MNA completed only for those patients deemed at nutritional risk. (Antony, 2008)

Nutritional Risk Screening (NRS-2002) uses recent weight loss, decreased BMI and reduced dietary intake, combined with a subjective assessment of disease severity (based on increased nutrition requirements and/or metabolic stress), to generate a nutrition risk score. Such subjective grading of illness severity may not accurately reflect current nutritional status and the tool does not allow for definitive diagnosis of malnutrition. The NRS tool has, however, been recommended for use in hospitalized patients by ESPEN and may be useful for prompting the initiation of nutrition support.

The four item Short Nutrition Assessment Questionnaire (SNAQ) was developed to diagnose malnutrition in hospitalized patients and provides an indication for dietetic

referrals as well as outlining a nutrition treatment plan. It has been validated for hospital inpatient and out-patient use, as well as residential patients and does not require calculation of BMI. (Antony, 2008)

Subjective Global Assessment (SGA) is one of the most commonly used nutrition assessment tools, and assesses nutrition status through completion of a questionnaire which includes data on weight change, dietary intake change, gastrointestinal symptoms, changes in functional capacity in relation to malnutrition as well as assessment of fat and muscle stores and the presence of oedema and ascites. This tool allows for malnutrition diagnosis, and classifies patients as either: A—well-nourished; B—mildly/moderately malnourished; or C—severely malnourished. SGA has been found to be an appealing method of assessing nutritional status, as its subjective nature allows clinicians to capture subtle patterns of change in clinical variables (e.g., weight loss patterns rather than absolute weight loss). A high degree of inter-rater reproducibility has been shown for SGA, with 91-percent of surgical patients classified by SGA having two clinicians agreeing on SGA classification. It is, however, important to note that the previously mentioned screening tools do not allow a specific diagnosis of malnutrition versus cachexia, and that in fact, many patients diagnosed as at risk of, or actually malnourished, may be better classified by the definition of malnutrition used in SGA. (Bauer et al, 2005)

2.4 Dietary intake for hospitalized patients

As stated by Hippocrates in the 5th century BC, food is entirely part of the therapy during sickness. Hospital food must contribute to prevent under nutrition or limit its development during hospital stay. At the hospital, feeding is also a significant element of

comfort and quality of welcome offered by the institution. Meals and snacks should cover the patients' nutritional needs and meet their food expectations. (Thibault et al, 2011)

Financial constraints force hospitals to reach a compromise between reasonable costs of production and distribution of food, patient's satisfaction, and coverage of energy and protein needs. (Agarwal et al, 2012)

Reduction of dietary intake during hospital stay, together with the increase of energy requirements, is the main cause of hospital under nutrition, and can contribute to its worsening. Several studies have shown that decreased food intake is associated with increased complications and mortality during hospital stay (Thibault et al, 2011).

Although optimal nutritional intake forms an essential part of therapeutic treatment of malnutrition, only two studies conducted in Australia were identified describing the food intake trends of patients. One study audited the nutritional intake at main meals of acute care patients and reported that on average, the energy consumption of over one-third of their participants was less than 50 percent of that provided in a standard hospital diet. (Agarwal et al, 2012). However, this study did not capture information on the nutritional status of the participants. In a recent study, Bauer et al (2011) found on average nearly 50 percent of patients reported eating half or less of their meal and these patients were found to be up to four times more likely to be malnourished compared to those who ate more than half of their meal.

The European Nutrition Day Study captured information on the body mass index of acute care patients and audited their one-day food intake. The study found that fewer than half the participants' finished the meals offered during the one-day audit. The strength of the

European Nutrition Day Study was its large sample size of 16,000 participants (from 256 hospitals across Europe) and the involvement of a variety of people (such as doctors, nurses, catering and food service staff, administrative staff, patients themselves and/or their family members and friends) to assist with data collection. (Agarwal et al, 2012)

According to Dupertius et al 2003, hospital malnutrition can result from disease and/or treatment. He cites that disease can also induce metabolic and/or psychological disorders, which increase the nutritional needs and/or decrease the food intake (e.g. anorexia, gastrointestinal symptoms) of patients. Similarly, the prescription of modified (e.g. salt-free diet) or 'nothing by mouth' (NPO) diets before clinical examinations (e.g. gastrointestinal investigations) may lead to insufficient food intake.

Several steps are involved in the process of improving the hospital meal service. In addition to screening patients in order to identify those at nutritional risk, monitoring their food intake ensures that the patients actually receive appropriate quantity and type (e.g. modified texture) of food. Furthermore, adapting hospital menus and mealtime atmosphere to meet patients' expectations may improve food intake and coverage of their needs. Although large-scale food production and continued efforts to reduce meal costs prevent hospital cooks from expressing their skills and recipes, the hospital meal should be a reasonable compromise between production/distribution costs and patients' satisfaction. Thus, from an economic point of view, food wastage, which can reach up to 67 percent of the food provided, could be reduced (Thibault et al, 2011).

It is therefore important to evaluate food intake in hospitalized patients on a regular basis with the aims of lowering the risk of under-nutrition, and thus improve clinical outcome and reduce health costs involved. (Thibault et al, 2011)

2.5 Malnutrition and Clinical outcome

Specific diseases can prompt inherent nutritional problems, most commonly malnutrition. For example, chronic obstructive airway's disease is associated with a high incidence of protein calorie malnutrition. Infection may increase patients' nutritional needs because of an increase in metabolic rate (Coates 1985).

After a cerebral-vascular accident, patients with weakness or paralysis can be susceptible to nutritional problems because of difficulties with handling cutlery, or chewing food. Other variables, in addition to or in spite of their primary disease, may also affect nutrition. Loss of body fluid (such as through diarrhoea, vomiting, wounds, blood loss) can deplete nutrients such as electrolytes or nitrogen. Surgery or trauma such as accidental injury can significantly affect body metabolism; the metabolic response to trauma has been shown to correlate with the magnitude of injury and result in both a proportionately increased metabolic rate and increased energy requirements (Elwyn et al 1981).

A range of studies in the past have indicated that up to 50 percent of patients hospitalized for more than two weeks were affected by malnutrition, and were at risk of higher rates of morbidity and mortality and longer hospital stays (Hill *et al* 1977). More recent work confirms that medical and surgical patients with malnutrition experience higher rates of

complications than patients who are adequately nourished (Mc Camish 1993; Potter et al 1995).

The potentially-reversible effects of malnutrition include reduced muscle power and mobility with increased likelihood of deep vein thrombosis and pressure sores. Wound healing can be delayed, tolerance to therapies such as chemotherapy or radiotherapy may be reduced (Holmes 1996), while increased complication rates and longer length of stay lead to increased costs of hospital care (Lennard-Jones 1995) and increased admission rates (Tierney et al 1994). A report from the King's Fund suggests that potential improvements in nutritional care could lead to savings of £226 million a year (Lennard-Jones 1995).

Butterworth (1974) highlighted the role of U.S. hospitals in the development of patient malnutrition, prompting a flurry of research in this area in both the USA and UK. Weisnier et al (1979) found that 75 percent of medical patients admitted with normal nutritional status had depleted nutritional reserves after a time in hospital. Similarly, a study of underweight hospital patients suggested that although their food intake had been adequate prior to admission, in hospital their intake fell to only 70-80 percent of their needs (Johnston 1980). A study by Coates's (1985) showed all patients taking an ordinary hospital diet were consuming less energy and some, less protein, than the recommendations. McWhirter and Pennington (1994) drew attention to the continuing presence of hospital-related malnutrition, and the Association of Community Health Councils (1997) showed that many hospital patients were receiving too little food to stave off hunger.

Hospital diets have been found to be, at best, adequate for maintenance of nutritional status, but not repletion. (Holmes 1996). In a study published in 1985, a number of circumstances that contribute to hospital malnutrition were identified as follows:

- Lack of nutritional awareness, with research suggesting that nutritional problems in hospital are often unrecognized.
- The low status of nutritional care, where short-term interventions such as surgery are given more credence than long-term and more subtle forms of therapy such as nutrition, which tends to get categorized as “just a ‘hotel service’ and hence not worthy of the attention of health professionals”
- Priority of treatment, where restricting food or fluid intake for diagnostic procedures, or medical rounds may contribute to a patient's compromised nutritional status.
- Lack of communication between the nurse and patient, or between members of the health care team, can contribute to nutritional neglect.
- Confusion over responsibility for nutritional care, as it potentially falls within the remit of doctors, nurses, dieticians and pharmacists (Coates 1985).

2.6 Review of Methodologies

A number of studies on nutrition care among hospitalized patients have been done. However, only two studies (Paula et al, 2004 and Porben 2006) were found to be close to the current study.

One of the studies was on the current practice of nutritional therapy in Portugal published in 2004. The study employed self administered semi structured questionnaires focusing on various variables relating to use of oral, enteral and Parenteral Nutrition. The study

included current practice and health professionals' involvement in prescription and monitoring as well as activities and composition of Nutrition support Team. The study revealed important issues showing that although importance of nutrition care is acknowledged, health care providers did not practise and document clinical nutrition procedures that could be linked to attitude. The strength of the methodology is that it covered a large sample of health care providers spread all over the country and it was relatively cheaper as self administered questionnaires were sent to hospitals and returned to the team for analysis (Paula et al, 2004).

Another study conducted in Cuban hospitals in 2000 to 2003 and published in 2006 employed a similar approach to the Portugal study but combined with nutrition status assessment using Subjective Global Assessment. The study covered 1,906 patients and found out that although malnutrition among hospitalized patients was high (>40%), there was poor nutrition care with only less than 16 percent of patient having their clinical charts documented on nutritional routine. The strength of the study is that it reviewed all clinical nutrition care routines and documentation for hospitalized patients across the country (Porben, 2006).

In another study conducted by Rasmussen et al, (1999), 1000 self administered questionnaires on randomly selected doctors and nurses in 82 hospitals were sent to investigate the use of clinical nutrition routines in hospitals. The strength of the study was on its large sample size.

2.7 Knowledge Gap

Despite extensive research on nutrition care routines, hospital malnutrition and the causative factors in developed world, there is little data for the same in developing countries such as Kenya. In 2010, Kenya developed a clinical nutrition manual for use in nutrition management of various ailments including hospital malnutrition. The study therefore aimed at filling the knowledge gap as far as nutrition care practices and hospital malnutrition among adult patients is concerned.

CHAPTER THREE: METHODOLOGY

3.1 Study Area and Study Site

The study was conducted in Embu Level Five hospital in Eastern Province, Embu County. The hospital is a referral facility for the region and has specialized services including both in-patient and out-patient medical services.

3.1.1 Hospital Background

The hospital is situated in Embu town, Embu west District of Embu County along the Nairobi – Meru road. It has a catchment population of 375,410. The facility acts as a referral for Meru, Embu, Mbeere and Mwingi districts.

The hospital has an authorized bed capacity of 618 and an actual bed capacity of 565. The average out-patient attendance is 11,000 patients per month while the average inpatient admission per month is 1,200 and an average daily admission of 40 patients. The mean Length of Stay (LOS) is 7 days.

The hospital offers an array of services from out-patient to in-patient services which clients pay for based on Ministry of health set rates depending on the nature of service. The out-patient department consists of the following services; MCH/FP, comprehensive Care Clinic, Chest clinic, ENT clinic, Dental clinic, Out-patient clinic, eye clinic, pharmacy, laboratory, records office, and nutrition clinic, Orthopaedic and special clinics. The medical ward consists of 6 wards (3 for males, and 3 for females) and has an average of 88 Patients. Nutrition services attract a fee of Ksh. 50 for every appointment/review.

The hospital human resource base at the time of survey was as follows; 11 medical consultants, 12 medical officers, 3 dentists, 26 clinical officers, 270 nurses, 6 pharmacists, 6 nutritionists and 19 laboratory technologists.

3.2 Study population

The study involved adult patients (18 years and 65) both male and female admitted in the medical wards for at-least 48 hours prior to selection and who gave consent to participate in the study.

3.3 Study Design

The study was cross-sectional, descriptive, observational and analytical in nature to determine the nutrition care and hospital malnutrition among hospitalized patients admitted in medical wards.

3.4 Sample size determination

The sample size calculation was based on Fischer formula (1991) shown below.

$$n = \frac{Z^2 pd}{d^2}$$

Where;

n = the desired sample size (infinite population).

Z = the standard normal deviate, set at 1.96 which corresponds to the 95 percent confidence level.

p = the proportion in the target population estimated to have malnutrition. This was estimated at 0.5 given that there was no existing prevalence data on malnutrition among adult patients in Kenya.

$$q = 1.0 - p.$$

d = degree of desired accuracy (set at .05)

This gave an estimated sample size of 384 subjects/patients

However, given that the patient population in the hospital is less than 10,000, the final sample size was calculated using an adjusted Fischer formula below;

$$nf = n / 1 + (n / N)$$

Where:

n_f = the adjusted sample size (when population is less than 10,000).

n = the desired sample size (when the population is more than 10,000).

N = the estimate of the population size (in this case 100 patients admitted per month the hospital).

Therefore;
$$nf = \frac{384}{1 + (384/100)} = 79 + 10\% \text{ attrition} = 86.9 \approx 87$$

The sample size was rounded to the nearest 1 giving 87 as the final sample size for the study. The 10 percent attrition was introduced to factor in non response of the recruited patients.

3.5 Sampling

The selection of Embu Level Five hospital was conditional and based on availability of a nutritionist attached to the medical ward. The selection of medical wards was purposive as they have patients admitted with varying medical conditions and form a large proportion of the in-patients. Given the variation in medical condition, it was assumed this would give a better picture of nutrition care. The sampling frame consisted of patients admitted in medical ward. The selection of patients in these wards applied simple random sampling method. Figure 2 shows the sampling frame used during the study.

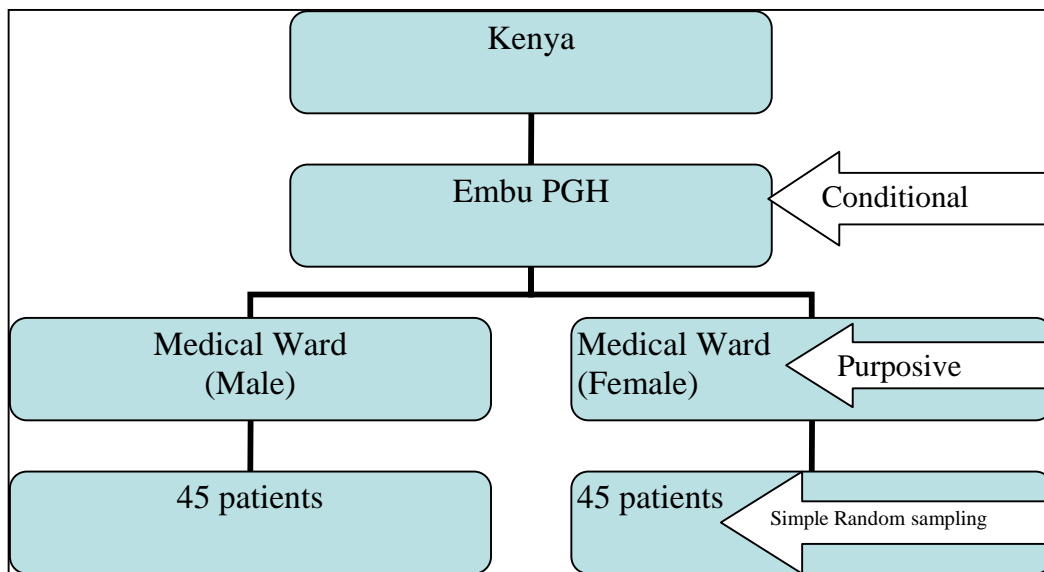


Figure 2: The Sampling Procedure Schema

3.1.2 Inclusion criteria for Patients

Patients who were admitted in the medical wards and met the criteria below were included in the study.

- Patients aged between 18 and 64 years
- Patients who had stayed in the ward for at-least 48 hours since admission
- Patients who gave consent to participate in the study
- Patients who were able to walk (patients unable to walk would were a challenge and measurements hence measurement error)

3.6 Sampling Procedure at the ward

Simple random sampling method was used to recruit patients admitted into the medical wards provided they had met the eligibility criteria outlined in section 3.1.2. All patients were first allocated numbers from one (1) to n^{th} number for both male and female wards

in this case the nth number was 200 in both male and female wards. To select patients to participate in the study 200 pieces of papers were prepared and coded from 1 to 200 and folded. The next step involved placing them in a container and mixing before random selection.

The research assistants with guidance from the principal researcher picked a folded coded piece of paper from the container and checked the patient number. The number picked was checked against the patient name and noted down. The process was then repeated without replacement until a minimum of 87 patients had been selected randomly. If the patient met the criteria, he or she was asked for consent to participate in the study.

For the study consent, the purpose of the study was well explained to the patient and a copy of ethical clearance from UoN-KNH ethical board provided to the patient. This included; what the study involved and the measurements to be taken. The patient was then allowed to either accept or decline. Patient who accepted and were able to write were given the consent form (Appendix 3) where signature was appended. Those unable to write were requested to allow their carer/relative to sign on their behalf.

Upon consent, the questionnaire was administered by the researcher or his assistants until all the required information was obtained. If a patient did not give consent or did not meet the eligibility criteria, this was considered as non response.

3.7 Recruitment and Training of Research Assistants

Two research assistants were recruited to assist the researcher in data collection. The two were nutrition volunteers based at the Embu Level Five Hospital and who had at least

Bsc degree in nutrition and dietetics. The role of the research assistants was to assist in the administration of the questionnaire and measurements.

The Principal Investigator trained the research assistants for two days. The curriculum covered; interview techniques, how to obtain informed consent, extraction of information from patients records, estimation of food intake, administration of 24-hr meal record, administration and translation of questionnaire to the patient, measurement taking (weight, Height/length) and assessment of nutrition status using Subjective Global Assessment tool.

3.8 Study assessment tools

The main tools for data collection were; semi structured questionnaire, key informant question guide, weighing scale for weight taking and a stadio-meter or tape measure for height/length taking.

The patient questionnaire (Appendix 1) consisted of three sections; **Section A** contained patient information which was retrieved from the patient file. The patient data obtained and recorded on the study questionnaire included; date of admission, age, gender, marital status, patient occupation, primary diagnosis, type of prescribed diet and type of nutrition status assessment conducted to the patient at the point of admission. **Section B:** involved weight measurement, weight on admission and height measurement. It also included medical history determination through parameters such as dietary history, weight changes, gastro intestinal changes and functional impairment. Also performed to the patient in Section B was physical examination where the patient was examined for signs of malnutrition such as wasting as indicated by visible ribs, loose skin of the muscles.

Section C contained patient's food consumption record for the past 24 hours from hospital and home.

The weight of the patient was determined using electronic weighing scale which could measure to the nearest 0.1kg and manufactured by SECA Company in Germany. The patient height was taken using stadiometer manufactured by SECA Company and recorded to the nearest 0.1cm. Patients who could not stand straight had their arm span taken using tailor's tape measure.

3.9 Pre-testing of the Data Collection Tools

As part of hands-on training of the research assistants, a one-day pre-testing was done at Embu Level five hospital ophthalmology ward (eye ward) using 10 patients selected using simple random sampling method as described in 3.6 sampling procedure at the ward. The pre-testing was also meant to check whether the study questionnaire was aligned to the study objectives and clarity of the questions to the patients. During the pretesting, the researcher used the opportunity to supervise the research assistants as part of quality checks.

The pre-testing procedure involved selection of 10 patients using systematic sampling method at an interval of two. Pre-testing affirmed that the questionnaire was in conformity with the study objectives.

3.10 Data Collection Procedures

For each patient sampled and consent given by signing (appendix 3), his or her file was retrieved from the nursing corner for extraction of relevant information for the study.

Ethical approval from UoN-KNH ethical board was also provided to the patient before giving consent.

3.10.1 Patient profile data

For each patient file retrieved, the following information was checked and recorded on the study questionnaire; date of admission, gender, age, marital status, primary diagnosis, any reference to nutrition status assessment such as weight, height and biochemical tests done to the patient. In addition, diet prescribed if available was recorded into the patient questionnaire. The information obtained from the patient file was used to assess level of nutrition care practices of which nutrition status assessment and dietary practices were indicators as well as socio-demographic characteristics of the patients sampled. If any of the target information was missing, the patient was interviewed and the questionnaire filled accordingly.

3.10.2 Nutrition Status Assessment using BMI

To determine the nutrition status of the patient, BMI and SGA were used as indices of nutritional status. Weight and height measurements were taken following the procedures outlined in clinical nutrition manual (ministry of medical services, 2010). Weight was taken by requesting the patient to stand still on a SECA electronic weighing scale. To ensure that the weight taken was close to true weight, the patient was first weighed with clothes on. After the measurement was recorded, the patient clothes were then weighed upon changing the clothes. The actual weight was obtained by subtracting weight of clothes from initial weight taken with clothes on. The weight was then recorded to the nearest 0.1kg in the study questionnaire. After taking weight, the patient was asked to stand on a stadiometer and his or her height taken to the nearest 1cm. Patients who could

not stand straight had their arm span (AS) taken. This involved taking measurement from the fingertip of one hand to the fingertip of the other hand held parallel to ground and at 90 degrees to the chest using a tape measure. The measurements obtained were converted to height by using the following formula; males ($h = 0.77AS + 37.7$) and females ($h = 0.67AS + 53.97$, (Singh et al, 2012). To calculate body mass index and consequently determine the nutrition status of each patient, the formula was as follows; $BMI = \frac{weight(kg)}{(height[meters])^2}$. The value obtained was used to classify the patients' nutrition status under any of the three categories; Overweight (>25), Normal (18.5 – 24.5) and Underweight (<18.5) (ministry of medical services, 2010)

3.10.3 Nutrition Status assessment using SGA

Nutrition status using subjective global assessment examined patient in two components as contained in the SGA tool (Jeejeebhoy et al, 1990). The advantage of using SGA tool is on its predictive nature before malnutrition can actually occur as it looks at patient's history before hospitalization.

3.10.3.1. Medical history

Each patient was evaluated for changes in weight in the past 6 months by calculating the percentage weight loss. The patient was asked questions that would indicate weight change as indicated by changes in clothing size such as loose fitting clothes over the six months period. In addition, a change in weight over the past two weeks was evaluated. The information obtained was used to determine and classify as follows; No change (A), 5 – 10% weight loss (B) or 10% or more sustained weight loss. Dietary intake changes relatively to normal were determined through interviewing the patient by asking the

question presented in appendix 1 part B; have eating patterns changed over the past weeks? Has the amount of food eaten changed? Are the foods used to eat no longer eaten? What happens if one tries to eat more? The information obtained was used to classify the patient as either having no significant change in diet (A), poor but improving or borderline but declining (B) or starvation/unable to eat (C). Gastrointestinal symptoms; nausea, vomiting, anorexia and persisted diarrhoea for more than two weeks were evaluated through interview and was classified as; None (A), some symptoms (B) and many symptoms (C). The patient functional capacity was assessed using parameters such as either walking, bedridden or on wheelchair through interview and observation. The patient was then classified as; No dysfunction (A), mild dysfunction and severe dysfunction (C). (Covinsky et al, 1999)

3.10.3.2. Physical examination

Each patient was examined physically for signs of malnutrition; loss of subcutaneous fat in triceps and chest through touch and observation, muscle wasting in quadriceps and deltoids. In addition, the patient was examined for ankle and sacral edema by pressing gently but firm for three seconds and releasing. If a pit was left, that indicated edema. For each trait examined, it was classified as either normal (A), mild-moderate (B) and severe (C) as described by Covinsky et al, (1999)

To determine the overall nutritional status, an overall impression was determined after examining all the results based on the two broad categories of medical history and physical examination. A patient was classified as severely malnourished (C) if the patient had physical signs of malnutrition such as severe loss of subcutaneous fat, severe sign of

muscle wasting, or edema in presence of a medical history suggestive of risk such as continuing weight loss of 10% or more or a decline in dietary intake and functional impairment and gastro intestinal symptoms (society for hospital medicine, 2004).

A patient was assigned mild-moderate malnutrition (B) if there was a weight loss of 5 – 10% with no subsequent gain and mild subcutaneous fat or muscle loss and a reduction in dietary intake with or without exhibiting functional impairments of gastro intestinal symptoms (society for hospital medicine, 2004).

A patient was classified as well-nourished (A) if the patient had no physical signs of malnutrition, no significant weight loss, no dietary intake difficulties, no functional impairment related to nutrition or no gastro intestinal symptoms (society for hospital medicine, 2004). The overall score was then indicated at the bottom of the questionnaire (appendix 1).

3.10.4 Assessment of hospital Diet Adequacy and Food Intake

Each patient was assessed for the amount of food provided by the hospital as well as amount of food consumed by the patient. The standard hospital diet provides 2000kcal and 65gms of protein (ministry of medical services, 2010). The first step involved obtaining hospital menu which contained information on type of food, quantity and frequency of meals prepared each day. Each patient was assessed for type and amount of food served and consumed using a 24-hour food record questionnaire as described by ministry of health, 2010. The questionnaire comprised of the three sections; the first column involved recording of the time a food item was served to the patient; the second column involved description of the type of food offered to the patient; the third column

recorded the quantities of food offered to the patient; and the fourth column included recording of the amount of food consumed by the patient in weight (gms) or in volume (mls). The 24-hour food record was filled for each patient interviewed starting with the first meal in the morning until the last meal in the evening.

The amount of food served from the hospital kitchen and consumed at each time during the day by each patient was estimated in terms of proportion consumed through interview and demonstration (All, >half, <half and nothing)

The energy (calorie) and protein values of the food served to the hospitalized patients as per the Menu were calculated using Food Exchange list (ministry of health, 2010) and Nutrient Analysis software (Thibault et al, 2011). Individual food intake for nutrient adequacy was compared to nutritional needs calculated in two different ways:

- The minimum needs, necessary to maintain basal metabolism rate (BMR), calculated using the Harris–Benedict formula (Roza et al, 1984) for energy and 1.0 g of protein/kg of body weight/day as follows;

$$Female = 447.593 + \{9.23 * weight(kg) \} + \{3.098 * height(meters) \} - \{4.33 * age(yrs) \}$$

$$Male = 88.362 + \{13.397 * weight(kg) \} + \{4.799 * height(meters) \} - \{5.677 * age(yrs) \}$$

- The recommended needs, intended to cover increased needs due to disease (e.g. stress, fever, digestive or renal losses), calculated using the Harris–Benedict formula increased by 10 percent for energy and 1.2g of protein/kg of body weight/day for patients <65years old, (ASPEN, 1998).

The energy and protein levels provided by the hospital diet for each patient was calculated and compared with the recommended energy and protein levels for hospital diet of 2000kcal and 65gms respectively (ministry of medical services, 2010). In addition, the energy and protein consumed by each patient was compared with energy and protein requirements calculated using modified Harris-Benedict equation. Other parameter determined was the proportion of hospital diet consumed against what had been offered.

3.11 Data Quality Control

The Research Assistants were trained on how to correctly fill out questionnaires to enhance data validity. Equipment for weight and height measurements were calibrated with standard measurements of a 5 kilogram bar and 110cm standard stick every day before start of interview. Filled questionnaires were checked for completeness and accuracy in recording as well as legibility to ensure that all questions were filled correctly. Those found to have errors were discussed and revisited in the ward. In addition, the information from questionnaires were entered into Microsoft excel where initial cleaning took place before being exported to appropriate software for statistical analysis.

3.12 Data Management and Analysis

Data management and Analysis was carried out using the statistical package for social sciences (SPSS) software version 16.

3.12.1 Descriptive statistics

Categorical variables (Gender, Marital status, Nutritional status, Education, Occupation, Dietary intake and Type of diet) were described by frequency and percentages. Normally distributed continuous variables (Age, Length of Stay, nutrient requirement and intake) were presented as mean, standard deviation and range.

3.12.2 Inferential statistics

In determining associations, correlation and risk factors for under nutrition (age, gender, length of stay, education level, nutrient intake and marital status), chi square test, one sample t-test, Independent t-test and Fishers Exact was used at 95 percent confidence level. Statistical significance was tested at p-value <0.05(two tailed). The Odds Ratios (OR) was calculated and reported with 95 percent confidence interval (CI).

To determine risk factors associated with malnutrition, a bivariate correlation analysis was done. The variables that showed significant association with nutritional status were entered in a logistic regression (stepwise forward) to determine the risk factors for malnutrition among hospitalized patients.

3.13 Ethical considerations

A research permit was obtained from Ministry of Science and Technology. Upon receiving of the permit, Ethical clearance was sought from Ethics and Research Committee of Kenyatta National Hospital and University of Nairobi. An authority to conduct the study was sought from the Medical Superintendent.

The patient consent letter included the following sections;

- (a) Objectives of the study being conducted in the hospital which was to establish nutrition care practices and risk factors for malnutrition among hospitalized patients with a view of identifying gaps and challenges.
- (b) Study procedures which involved asking questions relating to socio-demographics, dietary intake, measurements taking of weight, height/arm span and physical examination.
- (c) Risks and benefits of the study to the patient were detailed to show that there were no risks on any procedures performed during the study while there were no direct benefits to the patient.
- (d) Confidentiality was outlined clearly to the patient that all the information provided were confidential and could not be shared with any other person other than for the purposes of the study as well as the study participation being voluntarily.
- (e) Contacts of the ethics and research committee in case a patient would like to have a clarification or a concern.
- (f) Declaration by the patient that all the information relating to the study was provided and participation was voluntary.
- (g) Signature of the patient or care taker upon consent.

In addition, for the purposes of confidentiality, the questionnaires were coded and did not include names of participating patients.

CHAPTER FOUR: RESULTS

4.1 Socio demographic characteristics of sampled population

The study was conducted between April and the end of May 2013. A total of 101 patients admitted in the medical wards were sampled and questionnaires administered. Three questionnaires were excluded from the analysis due to incompleteness. The final sample size used for the analysis was 98 questionnaires which represented 96 percent response rate.

4.1.1 Gender

Out of the 98 patients who participated in the study, 48 (49%) and 50 (51%) were males and females respectively.

4.1.2 Age

The mean age of the respondents was 37.0 (SD 10.7) years with the youngest patient aged 18 and oldest 64 years. The mean age of the female respondents was generally higher, 38.3 (SD 11.3) compared to that of the males 35.8 (SD 10.3) years, but the difference was not statistically significant (Independent t-test, $p=0.25$). The independent t-test was used since the residuals of age variable were checked for normality and were normally distributed.

4.1.3 Marital status, Education and Occupation

Table 1 shows the socio – demographic characteristics of the respondents by gender. Majority of the respondents were married (62.2%) while only 2 percent were widowed (n=98). Out of the 98 respondents, 53.1 percent were farmers and while 16.3 percent

were unemployed. Casual labour was higher among male respondents (16.3%) compared to female respondents (1.0%). The level of education among the respondents was low with 67.3 percent having primary education while only 6 percent had post secondary education. Male respondents (5.0%) had higher post secondary education compared to female (1%) respondent.

Table 1. Socio - demographic characteristics of the respondents

| Attributes | All (N=98) | Male (n=48) | Female (n=50) |
|---------------------------|-------------------|--------------------|----------------------|
| <i>Marital Status</i> | <i>n(Percent)</i> | <i>n(Percent)</i> | <i>n(Percent)</i> |
| Single (never married) | 30(30.6) | 15(15.3) | 15 (15.3) |
| Married | 61(62.2) | 30(30.6) | 31(31.6) |
| Divorced | 5(5.2) | 3(3.1) | 2(2.0) |
| Widowed | 2(2) | 0(0) | 2(2.0) |
| <i>Level of education</i> | | | |
| Primary | 67.3 | 33(33.7) | 33(33.7) |
| Secondary | 26.5 | 10(10.2) | 16(16.3) |
| Post secondary | 6.1 | 5(5.1) | 1(1.0) |
| <i>Occupation</i> | | | |
| Farming | 53.1 | 25(25.5) | 27(27.5) |
| Casual labor | 17.3 | 16(16.3) | 1(1.0) |
| Unemployed | 16.3 | 2(2.0) | 14(14.2) |
| Formal employment | 5.1 | 3(3.1) | 2(2.0) |
| Others | 8.2 | 2(2.0) | 6(6.1) |

4.1.4 Length of stay in hospital

The mean length of stay at the ward (LOS) at the time of the study was 6.0 (SD3.7) days (n=98) with a range of 2 and 21 days. The mean length of stay for female respondents (n=50) was generally higher, 6.5 (SD 4.2) compared to that of males (n=48) at 5.2 days

(SD2.9), although there was no statistical difference (Independent t-test, $p=0.083$). Majority of the respondents (80.4%) had stayed in the hospital ward for 7 days or less while 100 percent ($n=98$) had stayed in the ward for 48 hours and more. Only 3.1% ($n=5$) of the respondents had stayed in the hospital for more than 14 days.

4.1.5 Reason for admission (Primary diagnosis)

The respondents were admitted for a range of medical conditions as shown in figure 3. Broncho-pneumonia was the leading cause for hospitalization (14%) while anemia was diagnosed among 8.2 percent of the sampled respondent.

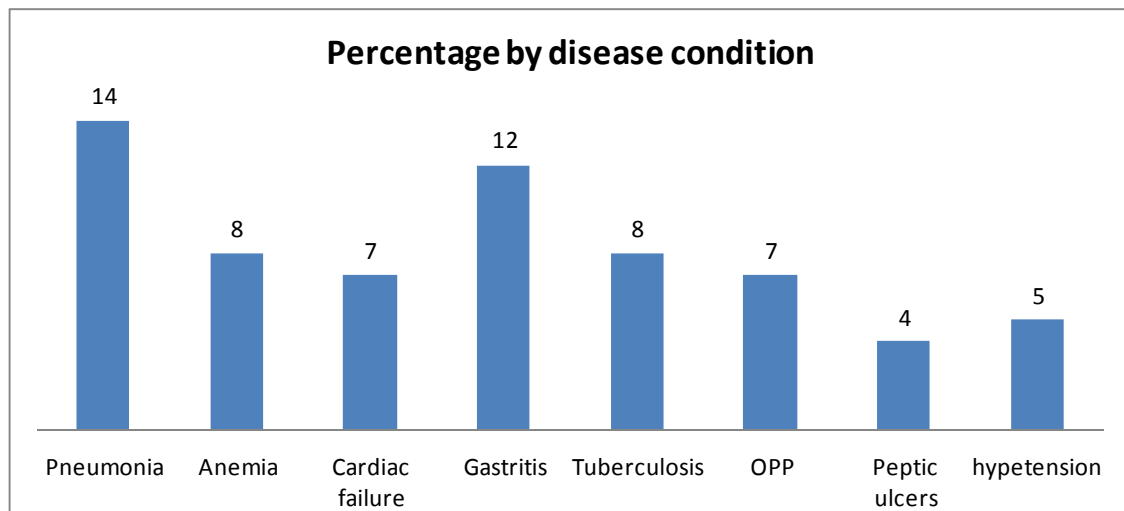


Figure 3. Distribution of the respondents by medical condition at admission

4.2 Nutrition status assessments at the point of admission

As part of assessing the nutrition care practices among hospitalized patients, the study sought to find out if nutrition status assessment at the point of admission was being done to patients' at-least 48 hours upon admission. The nutrition status assessments and documentation through patients' medical files were; Anthropometric assessment,

Biochemical tests, Clinical assessment and Diet history. Out of 98 respondents, only one patient (1.6%) had anthropometric assessment done and documented. However, the study findings indicates biochemical tests were the most commonly done and documented (62.2%) and mainly for non nutrition purposes.

All the biochemical assessments (n=62) were carried out at the request of the doctor for medical diagnosis and management of the patients as opposed to nutritional purposes. The common biochemical test done was hemoglobin (Hb) which accounted for 64.5 percent of all test done. Figure 4 shows distribution of the type of biochemical assessments performed on the respondents.

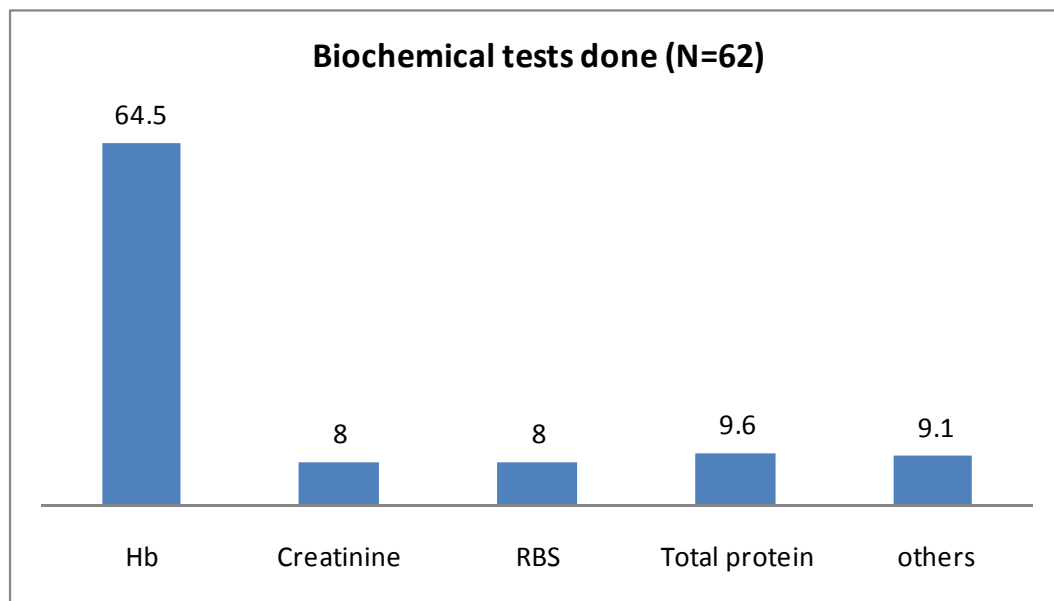


Figure 4. Proportion of sampled patients by type of biochemical tests done

4.3 Nutrition Status of the Study Respondents as measured using SGA

All the sampled respondents interviewed (N=98) were subjected to nutrition status assessment using Subjective Global Assessment (SGA) method. Based on SGA

assessment, 45 of the respondents (45.9%) were well nourished, 37(37.8%) mild/moderate undernourished while 16 (16.3%) were severely undernourished (Table 2). Overall, the prevalence of under nutrition (at risk and/or undernourished) was 54.1 percent. The proportion of under nourished female patients were higher (52%) compared to male patients (44.3%), but the difference was not significant (chi – square test, $p=0.260$). Moreover, there was no significant difference comparing age, level of education, marital status and occupation to nutritional status of the respondents as shown in table 2.

Table 2. Distribution of respondents by SGA based nutrition status

| Characteristic | Subjective Global Assessment (N=98) | | | P-value (Chi – square) |
|-----------------------------|-------------------------------------|------------------|----------|---------------------------|
| | Well nourished | Moderate/At risk | Severe | |
| Sex n (%) | | | | |
| Female | 19(38.0) | 22(44.0) | 9(18.0) | 0.269 |
| Male | 26(54.1) | 15(31.3) | 7(14.6) | |
| Age n (%) | | | | |
| 18- 40 years | 27(50.0) | 16(29.6) | 11(20.4) | 0.198 |
| 40-64years | 18(40.9) | 21(47.7) | 5(11.4) | |
| Education n (%) | | | | |
| Primary | 29(43.9) | 27(40.9) | 10(15.1) | 0.645 |
| Secondary | 16(50.0) | 10(31.3) | 6(18.7) | |
| Marital status n (%) | | | | |
| Single/widowed/divorced | 19(51.3) | 10(27.1) | 8(21.6) | 0.192 |
| Married | 26(42.6) | 27(44.3) | 8(13.1) | |
| Occupation n (%) | | | | |
| Farming | 21(40.3) | 20(38.5) | 11(21.2) | 0.129 |
| Unemployed | 7(43.7) | 9(56.3) | 0(0.0) | |
| Employed | 17(56.7) | 8(26.6) | 5(16.7) | |

The prevalence of under nutrition using SGA method showed the nutrition status at the point of contact with the researcher. Therefore, it was difficult to determine whether under nutrition occurred while in hospital or the patients were already malnourished at the point of admission. The phenomenon was attributed by lack of respondents' nutrition status data at the time of admission.

4.4 Nutrition Status of study Respondents using Body Mass Index (BMI)

The respondents were assessed for nutritional status by the use of Body Mass Index which is a ratio of weight and height. Of the 98 respondents, 52 (53.1%) were under nourished (BMI<18.5kg/M²), while 40 (40.8%) had normal nutrition (BMI of 18.5 – 24.5) and 6 (6.1%) were found to be over nourished (BMI>24.5) as shown in table 3. Among those found to be overweight, majority were female patients 6(12%) and only one (1) male patient was overweight.

Table 3: Nutritional status of the respondents using BMI method

| Characteristic | Body Mass index (N=98) | | | P-value |
|-----------------------------|------------------------|----------|------------|---------|
| | Underweight | Normal | Overweight | |
| Sex n (%) | | | | |
| Female | 29(58.0) | 15(30) | 6(12.0) | 0.300 |
| Male | 23(47.9) | 24(50.0) | 1(2.1) | |
| Age n (%) | | | | |
| <40 years | 37(68.0) | 15(27.7) | 2(4.3) | 0.110 |
| >40 years | 29(65.9) | 11(25.0) | 4(9.1) | |
| Education n (%) | | | | |
| Primary | 44(66.7) | 18(27.3) | 4(6.0) | 0.971 |
| Secondary | 22(68.7) | 8(25.0) | 2(6.3) | |
| Marital Status n (%) | | | | |
| Single/widowed/divorced | 28(75.7) | 7(18.9) | 2(5.4) | 0.409 |
| Married | 38(62.3) | 19(31.1) | 4(6.6) | |
| Occupation n (%) | | | | |
| Farming | 38(73.0) | 13(25.0) | 1(2.0) | 0.274 |
| Unemployed | 11(68.7) | 4(25.0) | 1(6.3) | |
| Employed | 17(56.7) | 9(30.0) | 4(13.3) | |

Based on the findings depicted in Table 3, there was no significant difference found between gender, age, education level, marital status and occupation and the nutrition status of the respondents.

Overall, upon aggregation of nutrition status classification into two categories (well nourished and malnourished {over and under}), the prevalence of malnutrition among the respondents was 60.2 percent (n=59) using BMI classification while the prevalence of malnutrition using SGA method was 54.1 percent (n=53). 37 (37.8%) of the study respondents were identified as malnourished by both methods. Figure 5 shows a graphical representation of the results using the two assessment methods.

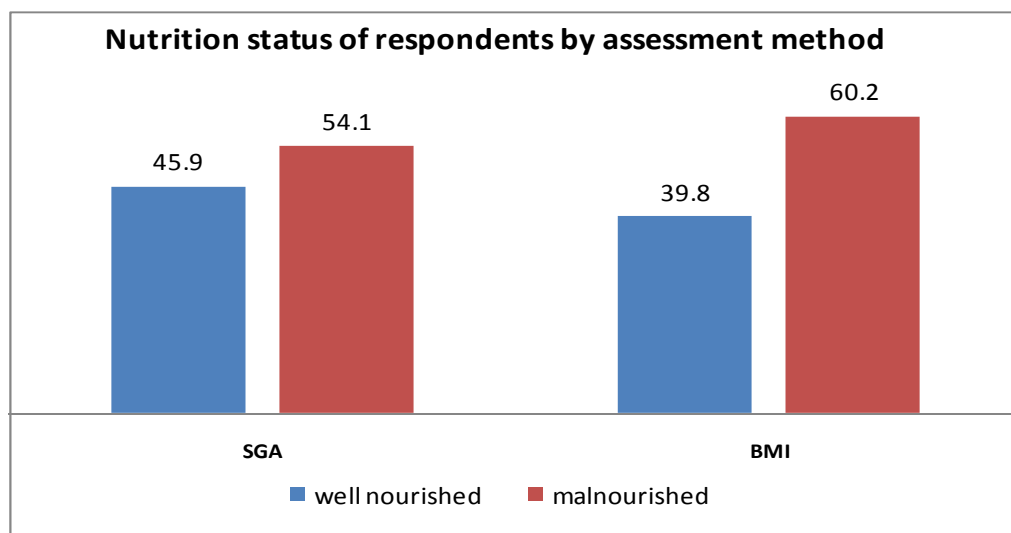


Figure 5: Nutrition status among study respondents by assessment method

The use of BMI to determine nutritional status of the study respondent gave higher prevalence of malnutrition when compared to the use of SGA method. Moreover, there was a statistical difference on the two methods (chi square test, $p=0.000$)

4.5 Hospital Food and Dietary Adequacy

Assessment of dietary adequacy of the hospital diet as part of nutrition care process was evaluated and compared with the recommendations as determined by the Modified Harris Benedict Equation (Roza et al, 1984) for both males and females and hospital menu recommendations (MoH, 2009). An upward adjustment of 10 percent was used for all the patients to cater for stress factors while for protein, a standard of 1.2 grams/kg body weight was used for Modified Harris Benedict Equation.

The study established that the mean caloric and protein requirement of the patients based on the recommendations of Harris Benedict Equation was 1612 (sd 209.7) kcal/day and 53.2 (sd 11.02) g/day respectively. On the other hand, the mean caloric and protein contents of the diet provided by the hospital were 1468.4 (sd 253.9) kcal/day and 36.2 (sd 17.6) g/day respectively. At 95% confidence level, both the calories ($t_{97} = -6.155$, CI: -413.41, -211.81, $p=0.000$) and protein ($t_{97} = -9.555$, CI: -20.53, -13.47, $p = 0.000$) provided at the hospital were significantly lower than the requirements (independent t-test). In addition, at 95% confidence level, both the calories ($t_{47} = -4.919$, CI: -461.7, -193.6, $p=0.000$) and protein ($t_{47} = -6.074$, CI: -19.97, -10.03, $p=0.0000$) provided at the hospital were significantly lower than requirements for male respondents. Similar results were obtained for females.

Table 4: Energy and Protein requirements compared to Hospital diets

| Characteristic | Calorie Requirement | Calorie Provided | Protein Requirement | Protein provided |
|-----------------------|----------------------|----------------------|---------------------|-------------------|
| Sex | | | | |
| Female (n=50) | 1513(121.1) | 1214.8(530) | 52.3(11.2) | 33.3(17.7) |
| Male (n=48) | 1715.2(232.9) | 1387.5(461.5) | 54.2(10.8) | 39.2(17.1) |
| Overall (n=98) | 1612.0(209.7) | 1468.4(253.9) | 53.2(11.0) | 36.2(17.6) |

The hospital diet was adequate for slightly over half (55.1%) of the respondent energy requirements. For protein, the hospital diet was only able to adequately cater for only over one-third (35.7%) of the respondents requirements. Figure 6 describes the caloric and protein adequacy levels of the diets provided by the hospital.

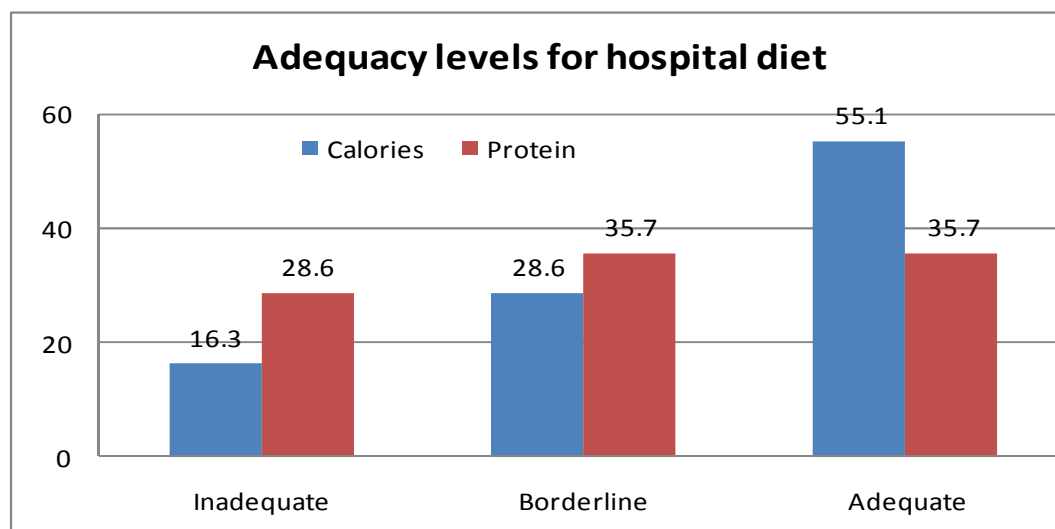


Figure 6: Caloric and protein adequacy diets provided in the hospital

Only 42.9 percent of respondents consumed all the food served in the hospital. At 95% confidence level, there was no significant association between the gender of the respondent and proportion of the hospital diet consumed (Fisher's exact = 3.389, p =

0.419). Table 4 shows the distribution of the respondent by the proportions of food consumed.

Table 5: Distribution of the respondents by proportions of hospital diet consumed

| Proportion of food consumed (%) | Male, n=48 (%) | Female, n=50 (%) | Total N= 98 (%) |
|--|-----------------------|-------------------------|------------------------|
| 0 – 25 | 14.6 | 12.0 | 13.2 |
| 25 – 50 | 22.9 | 38.0 | 30.6 |
| 50 – 75 | 14.6 | 12.0 | 13.3 |
| 75 – 100 | 47.9 | 38.0 | 42.9 |

Inadequate intake of calories put the respondents at 1.3 times risk of being malnourished than those who consumed adequate calories (OR = 1.319, 95% CI: 0.570, 3.055). Protein inadequacy on the other hand was associated with 1.2 times likelihood of developing malnutrition among the patients (OR = 1.189, 95% CI: 0.492, 2.877).

4.6 Risk factors associated with malnutrition

A bivariate correlation analysis to determine the factors associated with malnutrition showed that the amount of energy and protein consumed, the proportion of hospital diet consumed and the length of hospital stay were significantly associated with malnutrition (Table 6).

Table 6: Factors associated with malnutrition among the study subjects

| Variable | Pearson's Correlation | Significance |
|-----------------------------|------------------------------|---------------------|
| Energy intake | 0.244 | 0.015 |
| Protein intake | 0.286 | 0.004 |
| Length of hospital stay | 0.170 | 0.037 |
| Proportion of food consumed | 0.270 | 0.007 |
| Age | 0.006 | 0.953 |
| Sex | -0.101 | 0.322 |
| Diagnosis | -0.011 | 0.917 |
| Marital status | -0.007 | 0.494 |
| Educational level | -0.063 | 0.540 |

The variables that showed significant association with nutritional status were entered in a logistic regression (stepwise forward) to determine the risk factors associated with malnutrition among the studied respondents. A significant model emerged (Nagelkerke R Square =0.739, $p=0.003$, 95% CI) with only two variables being retained as significant predictors of malnutrition among the hospitalized patients: energy intake ($p=0.028$, OR=0.999, 95% CI: 0.999, 1.000); and protein intake ($p=0.003$, OR=1.041, 95% CI: 1.014, 1.069) as shown in Table 6.

Table 7: Risk factors associated with malnutrition among hospitalized patients in Embu Level Five Hospital

| Variables | B | S.E. | Wald | df (n-1) | Sig. | Exp(B) | 95% CI for EXP(B) | |
|----------------|-------|------|-------|-------------|------|--------|-------------------|-------|
| | | | | | | | Lower | Upper |
| Energy intake | -.001 | .000 | 4.814 | 1 | .028 | .999 | .999 | 1.000 |
| Protein intake | .040 | .013 | 8.830 | 1 | .003 | 1.041 | 1.014 | 1.069 |

Summary of Key Findings

The average length of stay for patients in medical ward is six (6) days. Nutrition status assessment to patients at the point of admission (<2%) is hardly done to patients. The prevalence of malnutrition among hospitalized patients is high (over 50%) as determined by both SGA and BMI method. In addition, there was no statistical difference in malnutrition levels between male and females. The hospital diet is inadequate to cover patients' needs both for calorie and protein. There were association between energy intake, protein intake, length of hospital stay and proportion of hospital food consumed with malnutrition. The risk factors for malnutrition identified were inadequate energy and protein intake among patients.

CHAPTER FIVE: DISCUSSION

This cross sectional study reveals numerous issues related to patient nutrition care among the sampled patient group. It is apparent that nutrition assessment of patients at the point of admission is hardly done as the findings show only one percent of the patients had their anthropometric assessment done and documented. This is despite recommendation by Ministry of Health that all patients be screened for risk of malnutrition upon first contact with health worker (ministry of health, 2010). The findings of the study confirm that nutrition status assessment is obviously lacking in our public hospitals. The findings are in sharp contrast with 54 percent of hospital malnutrition reported. Judging from the results, malnutrition does not receive the much needed attention in public hospitals.

The findings in the study show that the burden of malnutrition is high in the hospital (54.1% using SGA and 53.1% using BMI). The high prevalence of malnutrition among the patients reported in this study is consistent with other studies which have shown a range of 20 – 50 percent (Lim et al, 2011) and 35 – 68 percent (Porben, 2006) although different methods of assessments have been applied. Biochemical tests done to 63 percent of patients were not done for nutritional management purposes further affirming that little attention has been given to nutrition care among hospitalized patients. Moreover, biochemical tests are not independent markers of nutritional status per se as they can be subjected to non-nutritional causes (Porben, 2006). The prevalence of malnutrition reported in this study was at the point of contact with the researcher and therefore difficult to determine whether malnourished patient had the condition before admission or during hospitalization.

Both anthropometric assessment (BMI) and SGA methods produced similar verdict. These results are similar to other studies conducted in other countries (Gonzalez et al, 2003, Waitzberg et al, 2001). The fact that the rates reported are not varied affirms that there is interplay between malnutrition and disease.

The two assessment methods gave rather similar but different rates of malnutrition with the BMI method giving a higher prevalence compared to the SGA method. These results however contrasts the argument by Planas et al (2004) that malnutrition is often underestimated when based on anthropometry compared to SGA. However, this depends on the definition used to identify malnutrition. Use of SGA has been argued to be superior to anthropometry as it is a better indicator of disease related malnutrition (Planas et al., 2004)

The adequacy and type of hospital diet provided to patients is a predictor to the quality of nutrition care in hospitals. The evaluation of food intake was aimed at identifying early underfed patients as decreased food intake is associated with increased complications and mortality during hospital stay (Hiesmayr et al 2009). Despite the hospital having a menu stipulating the average amount of calories and protein to be provided to each patient, the actual amount offered was inadequate a factor that was linked to limited resources as confirmed through key informant interviews. The study revealed that most of the patients were underfed (45%). Similarly, more than half (57%) of the patients did not consume all the amount offered a factor that could be linked to its quality although not determined during the study as it did not form part of the objectives. The findings also point to food wastage which requires action to save on food losses. These findings are worrisome given the high prevalence of hospital malnutrition and this can act as a pointer that there is

likelihood of patients deteriorating in nutrition status while in the hospital. It therefore calls for the institutions to ensure compliance to the recommendations on calorie adequacy.

The study also revealed that malnutrition was associated with certain factors among them length of hospital stay. Patients staying for longer periods have been shown to have a higher risk of developing under nutrition and subsequent morbidity and mortality (Hill *et al* 1977, McCamish 1993; Potter *et al* 1995, Planas *et al*, 2004). Inadequate protein, caloric intake was a significant risk factor associated with malnutrition among the patients. Therefore, the higher risk of developing under nutrition with increasing length of stay can be attributed to the inadequate diet provided in the hospital as well as to poor consumption of hospital diet by the patients. The findings are in line with those of Coates's (1985) and those of Association of Community Health Councils (1997) that found that many hospital patients were receiving too little food and risked starving off hunger. During illness the nutrient needs increases due to increased utilization reflected in higher BMR. This is explained by its role in energy utilization and increased needs during disease.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

4.7 Conclusion

It is evident that the prevalence of malnutrition among hospitalized patients is high while nutrition care is inexistent as supported by the findings of both nutrition status assessment and hospital diet. The assessment of nutrition status for patients at the point of admission is hardly done and biochemical tests performed to a significant proportion of the patients are for non nutritional uses a missed opportunity to optimise patient care procedure. The hospital diet is inadequate for both calorie and protein to meet patients' needs hence a risk factor to hospital malnutrition. The findings can be extrapolated to mean that the diet is inadequate for all nutrients. The Length of stay in the hospital ward was associated with the risk of hospital malnutrition an indication that the longer the stay, the higher the risk. Other factors found to be associated with hospital malnutrition were proportion of hospital food consumed calorie and protein. Overall, the risk factors for hospital malnutrition were inadequate calorie and protein intake among patients.

The findings reveal the need to address all aspects of nutrition care among patients as a priority in our public hospitals and to address the high prevalence of malnutrition. This will go a long way in reducing morbidity and mortality associated with malnutrition. Consequently, improvement in nutrition care will contribute to reduction in cost of medical care for both hospital and the patient with a positive impact to a county's economy.

4.8 Recommendations

Following the findings elicited by this study, the following recommendations are proposed;

1. Anthropometric nutrition assessment to be incorporated into the list of essential procedures to be undertaken for every patient at the point of admission. This will be achieved by operationalization of clinical nutrition manual published by ministry of medical services in 2010.
2. There is need for increased use of biochemical tests and particularly Hb and Serum protein as markers of nutrition status since are commonly performed. The nutritionist in-charge of the ward can use the results in diet planning.
3. Explore ways of incorporating SGA method as part of screening for malnutrition as it identifies malnutrition early. The ministry of health need to engage dieticians and clinical nutritionist on ways of actualizing the tool in all public hospitals.
4. To improve on nutrition care, more staff and particular clinical nutritionists/dieticians should be hired to increase nutrition services among patients. This aspect though not covered in the study is important given that the numbers of nutritionists currently available are inadequate to provide quality nutrition care for each patient.
5. There is need for a multidisciplinary approach towards the nutritional management of patients especially incorporating dieticians and will look at patient management holistically. This will ensure that nutrition profile among health workers is elevated and dealt with importance given to other medical aspects.
6. More studies should be undertaken to determine development of malnutrition while in the hospital and hospital dietary intake. The findings can be used for

policy making in patient nutrition care. In addition, it will be easier to determine at what point treatment and rehabilitation for malnutrition can start.

7. Advocacy among hospital administrators on the importance of nutrition care of patients and impact of hospital malnutrition on cost, length of stay and disease outcome in order to give nutrition its rightful role. Knowing the relationship between malnutrition and the cost of care will enable decision makers and leaders in public hospitals allocate adequate resources to nutrition.

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APPENDIX 1. PATIENT STUDY QUESTIONNARE

QUESTIONNARE NO.....

NUTRITION CARE OF HOSPITALIZED PATIENTS AND ASSOCIATED FACTORS IN SELECTED LEVEL 5 HOSPITALS IN KENYA

Name of Interviewer..... Date.....

Hospital code..... Ward No.....

| PART A: PATIENT DATA | | | | |
|--|-----------------------------------|------------------------------|------|--------|
| Date of Admission | | | | |
| Age (Yrs) | | Sex/Gender | Male | Female |
| Level of education | | | | |
| Occupation | | | | |
| Primary Diagnosis..... | | | | |
| Is there any reference to Nutrition status in the patient record? Yes.....No..... | | | | |
| If yes, which one? (indicate what you found e.g. weight, height, serum albumin, Hb etc) | | | | |
| Type of Prescribed Diet (Normal, enteral, Parenteral) | | | | |
| PART B: Nutrition Status Assessment (BMI) | | | | |
| Usual Weight (Kg) | Weight on Admission (Kg) | Current weight (cm) | | |
| Height (cm) | MUAC (cm) | | | |
| NUTRITION STATUS ASSESSMENT (Subjective Global Assessment) | | | | |
| MEDICAL HISTORY | | SGA Rating | | |
| | | (A) | (B) | (C) |
| 1. Weight change clothing size..No Change.....change Overall loss in past month.....6 month.....1 year | | | | |
| % loss of usual weight<5%5-10%>10% | | | | |
| Change in past 2 weeksincrease (gain) | | | | |

| | | | |
|--|--|--|--|
|no change (stabilization)decrease (continued loss) | | | |
| 2. Dietary intake. reductionunintentionalintentional overall changeno changechange (increase or decrease) | | | |
| Durationweeksmonths | | | |
| Diet changeSub optimal solids(i.e., 75%, 50%, 25% intakefull liquid diethypo caloric fluidsNPO (starvation) | | | |
| 3. gastro intestinal symptoms (persisting daily for >2weeks)nonediarrhoeadysphagia/odynaphagianauseavomitinganorexia | | | |
| 4. Functional impairment overall impairmentnonemildsevere Durationdaysweeksmonths | | | |
| Typeambulatory (walking or wheelchair) Bedridden | | | |
| Physical examination | | | |
| 5. muscle wastingbicepstricepsquadricep....deltoid.....temple (Perform physical examination for presence of loose skin on the various muscles. Loose skin though pinch indicate muscle wasting) | | | |
| 6. Subcutaneous fat losstricep..... chesteyesperoralinterosseouspalmar (examine for signs of fat loss in the above areas, signs of wrinkled skin that developed recently is indication of fat loss) | | | |
| 7. Edemahands sacrallower extremity For edema press gently but firmly for 3 seconds and release if there is a pit, edema is present. | | | |
| (A) well nourished_____ (B) Mild/Moderate Malnutrition_____ (c) Severe undernutrition | | | |

| PART C: Food consumption Record (24 hrs) both from hospital and home | | | |
|---|----------------------------|-----------------------------|---------------------------|
| Time | Description of food | Amount offered (gms) | Amount taken (gms) |
| | | | |
| | | | |
| | | | |
| | | | |

APPENDIX 2. QUESTION GUIDE FOR KEY INFORMANT INTERVIEW

Name of Interviewer.....Name of interviewee.....

Date of interview.....

Introduction

I am conducting a study on Nutrition care practices and associated factors among hospitalized medical patients in your hospital. I would like to talk to you regarding general aspects affecting nutrition care for the patients. The information you will provide will be confidential and involve your role in patient care and your perception on challenges and what can be done to address them. The interview is completely voluntary.

Questions

1. How are patients assessed for their nutrition needs?
2. Who is involved in patient nutrition care?
3. Is there a team in place that discusses nutrition issues related to patients and who are the members?
4. What is the role of hospital administration in patient nutrition care?
5. Who is involved in budgeting for patient meals?
6. What are the perceived challenges in patient nutrition care?
7. Are there mechanisms in place to address such challenges?

APPENDIX 3. PATIENT CONSENT FORM

TITLE OF THE RESEARCH PROJECT

Nutrition care practices and associated factors among hospitalized patient in selected level five hospitals in Kenya (Embu and Coast provincial hospitals)

Principal investigator: Mr. Francis Wambua Robert

ADDRESS: P. O BOX 43319 – 00100
Nairobi, Kenya

Contact cell phone number: 0724 514 016

What is the objective of the research study?

The study is being conducted in two hospitals amongst patients admitted into the medical ward with various disease conditions and aims at establishing the extent of nutrition care practices among the patients from the time of admission. The purpose is to identify gaps relating to patient nutrition care and thereafter advocacy in order to improve overall patient nutrition care. This may eventually reduce prevalence of hospital malnutrition and length of stay in hospital.

Study Procedures

In this study, I and my research assistants will ask you questions relating to demographic and socio-economic questions, dietary intake and measurements to determine your nutritional status. The process will take between 45-60 minutes to complete.

Risks

There are no risks involved. I will only ask you questions and then perform physical examination and take measurements such as weight, height and will also measure your left Mid Upper Arm Circumference using a MUAC tape and this will not cause any discomfort.

Benefits

During this study there are no direct benefits to you for participating. However, the findings from the study may contribute to knowledge nutrition care and may be used in formulating policies that will help improve overall patient nutrition care in public hospitals.

Ethical issues and Confidentiality

Whatever information you shall provide will be kept strictly confidential and will not be shown to any other persons. Participation in the study is voluntary and you can choose not to answer any individual question or all of the questions.

Is there anything else that you should know or do?

You can contact the Health Research Ethics committee at the addresses provided below if you have any concerns or complaints that have not been adequately addressed by the researcher.

Kenyatta National Hospital/University of Nairobi - Ethics & Research Committee

Telephone number :- +2542726300-19 Ext.44102

E-mail: knhuonerc@gmail.com

Post address: P O BOX 20723-00202, Nairobi, Kenya

By signing below, I _____ agree to take part in the above research entitled; Nutrition care practices and associated factors among hospitalized patients in selected level five hospitals in Kenya.

I hereby declare that:

- I have been informed about the research and I have understood the benefits and the risks involved.
- I have had the chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is voluntary and I have not been pressured to take part in it.
- I may choose to leave the study at any time and that I will not be penalized or prejudiced in any way.
- I have been assured of confidentiality on any information that will be given.

.....
Signature of participant:

Date:

.....
Signature of witness:

Date:

KISWAHILI TRANSLATION

Kwa majina ni Francis Wambua Kutoka chuo kikuu cha Nairobi. Nafanya shaada ya pili katika Mambo ya lische. Nafanya Utafiti kuhusu Malezi ya wangonjwa hospitalini na changa moto zinakumba lische.

Naomba ushirikiane nami katika utafiti huu na habari utakayotoa itawekwa siri.

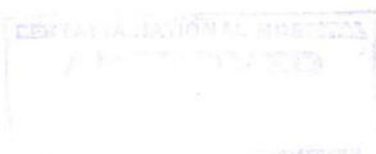
Nje, unakubali kushiriki katika utafiti huu?

1. Ndio
2. La

APPENDIX 4: ETHICAL CLEARANCE FROM UON-KNH ERC



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KNH/UON-ERC
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13 December 2012

Francis Wambua Robert
A56/69821/2011
Dept. of Food Science Nutrition and Technology
University of Nairobi

Dear Mr. Wambua

RESEARCH PROPOSAL: NUTRITIONAL CARE PRACTICES AND ASSOCIATED FACTORS AMONG HOSPITALISED PATIENTS IN TWO SELECTED LEVEL FIVE HOSPITALS IN KENYA (P318/06/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above revised proposal. The approval periods are 13th December 2012 to 12th December 2013.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN



Yours sincerely



PROF. A.N. GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
 The Principal, College of Health Sciences, UoN
 The HOD, Records, KNH
Supervisors: Prof. Wambui Kogi-Makau, Dept.of Food Science, Nutrition and Technology, UoN
 Dr. Gerald Muchemi, Dept.of Veterinary Services, UoN