NUTRITION SUPPORT PRACTICES IN GHANAIAN HOSPITALS

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BY

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DECLARATION

I, Prince Kweku Yalley Abban, hereby declare that this dissertation is the result of my own diligent research work I undertook at the Department of Dietetics, School of Biomedical and Allied Health Sciences, University of Ghana, under the supervision of Dr. Laurene Boateng and Dr. Matilda Asante. Neither the whole nor any part of it has been, is being or is to be submitted for another degree at this or any other University. All references cited are fully acknowledged.

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DEDICATION

This work is dedicated to my parents, teachers, mentors and everyone who has played a parental role in my life and supported me in diverse ways to live my dreams.

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ABSTRACT

Background: Nutrition support remains a key component of medical care. It is beneficial for critically ill patients with eating difficulties and their inability to meet their nutritional requirements. Nutrition support has been shown to positively affect clinical outcomes. Notwithstanding, there is paucity of published data on nutrition support practices and delivery in Ghanaian hospitals.

Aim: To investigate nutrition support and its related practices in hospitals in Ghana.

Method: A cross-sectional study design was employed. Purposive sampling was used to recruit 137 healthcare professionals involved in nutrition support in 17 health facilities in Ghana. A structured questionnaire was used to obtain information on hospital demographics, profile of clinicians, nutrition support delivery and monitoring practices. Data were analysed using SPSS version 23.0. Descriptive statistics were summarized as frequencies and percentages. Data were presented in charts, tables and figures. Pearson's Chi-square was used to determine the association between categorical variables. Statistical significance was set at $p<0.05$.

Results: Less than a quarter (22.0%), and 54.9% of the respondents indicated that they had a formal nutrition support guideline and nutrition support team in their facility respectively. Majority of the respondents indicated that they routinely screened patients in their facility (84.7%), and the dietitian (85.7%) was the main professional involved in nutrition screening. Unsuccessful oral nutrition (64.0%), and the use of apparent/obvious clinical indications (46.3%) were the main determinants of initiating enteral and parenteral nutrition respectively. Participants mainly used clinical judgement (81.4%), and professional experience (58.5%) as the basis for enteral

nutrition support decision. However, the basis for parenteral nutrition decision was based solely on clinical judgement (73.2%). Less than half of the respondents (42.0%) reported that they had an above average competence in nutrition support, with a greater proportion being dietitians (69.2%).

Conclusion: Findings of this study showed that although health professionals were involved in nutrition support, most of their practices were not consistent with recommended or published guidelines. Most of them relied greatly on clinical judgement as the basis for enteral and parenteral nutrition decision making.

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LIST OF ABBREVIATIONS

AGS – American Geriatrics Society

AIO – All-in-One

AMUH – Alexandria Main University Hospital

APACHE –Acute Physiological Assessment and Chronic Health Education

ASPEN - American Society for Parenteral and Enteral Nutrition

BTF – Blenderized Tube Feeding

EN – Enteral Nutrition

ESPEN – European Society for Clinical Nutrition and Metabolism

FOLE – Fish Oil Lipid Emulsion

GIT – Gastrointestinal Tract

GRV – Gastric Residual Volume

HEN – Home Enteral Nutrition

IC – Indirect Calorimetry

ICU – Intensive Care

LOS – Length of stay

MCB – Multi-Chamber Bags

NGT – Nasogastric Tube

NST – Nutrition Support Team

ONS – Oral Nutrition Supplements

PN - Parenteral Nutrition

PICU – Paediatric Intensive Care Unit

SCCM – Society of Critical Care Medicine

SMOF – Soy Medium Chain, Olive and Fish Oil

SOLE – Soybean Oil Lipid Emulsion

SOP – Standard Operating Procedure

TPN –Total Parenteral Nutrition

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Malnutrition refers to nutrient deficiency due to diminished dietary intake, increased nutritional requirements, increased losses or a host of these factors (Álvarez-Hernández et al., 2012; Barker, Gout & Crowe, 2011; World Health Organisation (WHO), 2020). Hospital malnutrition is often not recognized among patients, and they may remain malnourished throughout their stay, affecting clinical outcomes (Avelino-Silva & Jaluul, 2017). Globally, the prevalence of malnutrition in hospitalized patients is estimated to be between 20% - 50 % (Barker et al., 2011). Malnutrition may arise due to inadequate dietary intake, underutilization of nutrients, increased metabolic requirements or complications of an underlying disease process (Barker et al., 2011). The use of the term malnutrition is limited to undernutrition in this context.

Barker et al. (2011) in an Australian study reported a 23% malnutrition rate at the point of admission using the Subjective Global Assessment (SGA) rank. In this same study, length of stay (LOS) for malnourished patients was 4.5 days more compared to well-nourished patients. In a multi-center prospective study conducted in Kenya, South Africa and Ghana, there was a significantly greater risk of hospital malnutrition in adult patients in Kenya and Ghana (66.2%) compared to that of South African hospitals (53.7%) (Blaauw et al., 2019). Similarly, studies conducted in Zambia and Uganda on malnutrition in hospitals revealed a prevalence of 59.7% and a 25–59% respectively (Asiimwe, Muzoora, Wilson & Moore, 2015; Miyoba et al., 2018). These growing evidence points to the widespread issue of malnutrition in hospitals in Africa.

The consequences of malnutrition are varied and severe, including increased morbidity and mortality, longer hospital stay, increased financial burden and increased risk of nosocomial infections. These consequences are prominent in the intensive care unit (Abi et al., 2018; Bhagavatula & Tuthill, 2011). Aside the impact of malnutrition on morbidity and mortality, there is a considerable economic burden within the range of 2.1% and 10% of national expenditures on healthcare (Khalatbari-Soltani & Marques-Vidal, 2015). The cost of adult under-nutrition was estimated at £7.3 billion annually in the United Kingdom, with close to thrice of such amount spent on malnourished patients in the United States compared to well-nourished patients (Bhagavatula & Tuthill, 2011; Corkins et al., 2014).

Nutrition support (NS) refers to the "provision of nutrients and any necessary adjunctive therapeutic agents to patients orally and or enterally by administration into the stomach or intestine and or by intravenous infusion (parenterally) for the purpose of improving or maintaining a patient's nutritional status" (National Collaborating Centre for Acute Care (UK), 2006). The two main types of NS are enteral and parenteral nutrition. Enteral nutrition is mostly preferred when possible, however parenteral nutrition may be indicated when the patient has non-functional gastrointestinal tract (GIT) or enteral nutrition is contraindicated (Elke et al., 2016). The significance of nutrition support in the hospital, particularly in intensive care units (ICUs) cannot be overlooked (Sobotka et al., 2009).

According to McDougall (2015), nutrition support must be handled by a multidisciplinary team, considering the complex nature of managing the critically ill (McDougall, 2015). According to Bhagavatula & Tuthill (2011), early involvement and intervention of Nutrition Support Team (NST) can prevent and/or treat malnutrition by the appropriate selection of nutritional intervention. In addition, this will aid in early identification and prevention of infections. Nutrition support team members have performed varied roles in the care of patients

and previously relied greatly on positive clinical outcomes as the gold standard of assessing the effectiveness of their work (ASPEN Practice Management Task Force et al., 2010).

Despite the acknowledged essence of nutrition support, achieving optimal nutrition remains a challenge in most intensive care units (ICUs). The key known contributing factors of malnutrition in critically ill patients are under prescription and under feeding (Marshall et al., 2012). Optimal nutrition is greatly dependent on a systematic approach made up of guidelines, procedures and policies for planning, initiation of nutritional therapy and assessment of tolerance (Berger et al., 2018). Guidelines for nutrition support used in other ICUs in Norway, Switzerland, United Kingdom and United States have been demonstrated to significantly improve practice (Dobson & Scott, 2007; Kiss, Byham-Gray, Denmark, Loetscher & Brody, 2012; Wikjord, Dahl & Søvik, 2017; Wøien & Bjørk, 2006; Wooley & Pomerantz, 2005).

Nutrition support has gained growing attention in healthcare and is now considered an essential intervention in the care of critically ill patients (Park et al., 2017). There is paucity of documented data on nutrition support practices and delivery in Ghanaian hospitals. The unavailability of evidence may affect the coordination of care among nutrition support team members and potentially impact nutrition support and its delivery in the hospital. Thus, this study seeks to investigate nutrition support and its related practices in selected hospitals in Ghana.

1.2 Problem Statement

Malnutrition in hospitalized patients is a major problem in most countries, with an estimated prevalence of 20% - 50% globally (Barker et al., 2011). A multi-center prospective study revealed that there was an increased risk of hospital malnutrition in adult patients in Kenya and Ghana (66.2%) compared to that of South African hospitals (53.7%) (Blaauw et al., 2019). Malnutrition in adults or children. Similarly, studies conducted in Zambia and Uganda revealed a prevalence of 59.7% and a 25.0–59.0% respectively (Asiimwe et al., 2015; Miyoba et al., 2018). These growing evidence points to the widespread problem of hospital malnutrition in Africa.

Considering the global problem of hospital malnutrition, nutrition support is required to provide patients with nutrients to maintain optimal nutrition. Studies have shown that there are inconsistencies in nutrition support practices (Hill, 2015; Kang et al., 2018; Roynette, Bongers & Fulbrook, 2008). A survey by Roynette et al. (2008) in 350 hospitals in 20 European countries reported that nutrition support practices and particularly routine compliance to published guidelines differed extensively all over the region. A cross-sectional study by Hill (2015) investigating nutrition support practices in South African ICUs revealed that there were inconsistencies in the administration, delivery and monitoring of nutrition support among clinicians. This suggests that compliance with recommendations varied and does not match the currently available guidelines. Moreover, nutrition support is not a mandatory skill to be acquired by health professionals in Ghana. There is also limited documented data on nutrition support practices in Ghana. Thus, this study sought to investigate nutrition support and its related practices in hospitals in Ghana.

1.3 Significance of Study

Nutrition support provides energy, protein and other nutrients for patients who have difficulty in feeding orally (Kim et al., 2012). Nutrition support for critically ill patients of any form improves the morbidity and mortality of such patients (Heyland, 2000). Therefore, it is important to identify strategies that will improve its delivery. Findings of this study will provide information on the current state of nutrition support practices and delivery in Ghana. Further, these findings will help to identify gaps and barriers in nutrition support practice and delivery in selected hospitals and form a basis for guiding development of nutrition support guidelines in Ghana.

Research findings would further provide clinicians with research evidence to exploit the effectiveness of feed delivery and coordinating nutrition care. Finally, training needs of health professionals will be identified resulting in the design of training programmes and workshops for health professionals who work in nutrition support.

1.4 Aim and Specific Objectives

1.4.1 Aim

To investigate nutrition support and its related practices in hospitals in Ghana.

1.4.2 Objectives

1. To describe existing nutrition support guidelines, delivery and monitoring practices in hospitals.
2. To identify factors that influence nutrition support delivery and related practices.
3. To determine the level of skills and competence of the nutrition support team.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Nutrition Support

Nutrition support (NS) refers to the "provision of nutrients and any necessary adjunctive therapeutic agents to patients orally and or enterally by administration into the stomach or intestine and or by intravenous infusion (parenterally) for the purpose of improving or maintaining a patient's nutritional status" (National Collaborating Centre for Acute Care (UK), 2006). Hitherto, nutrition support in critically ill patients was considered a supporting or adjunctive source of energy for the patient during illness (Sharada & Vadivelan, 2014). However, it is important in the management of the critically ill patient when oral food intake is inadequate or not possible. Nutrition support for hospitalized patients remains a key component of medical care. It has been proven to affect clinical outcomes positively (Hill, 2015; Lee et al., 2018; Reber, Gomes, Bally, Schuetz & Stanga, 2019).

Appropriate nutritional support in critically ill patients is associated with a reduced length of stay, shorter duration of mechanical ventilation, fewer infectious complications, and reduced mortality (Orinovsky & Raizman, 2018). Although the length of stay (LOS) in hospitals are getting shorter, the nutritional status of patients appears to deteriorate further during hospitalization. This turns out to be quite challenging in improving nutritional status of hospitalized patients, therefore provision of nutrition support for patients on admission should be considered essential (Rasmussen et al., 2018).

2.1.1 Nutrition Support Teams

Dating back to the late 1960s, nutrition support teams (NSTs) were created to develop an interdisciplinary and collaborative approach to nutrition support (Ceniccola, Araújo, de Bristo-Ashurst, Abreu & Akustsu, 2016). Nutrition Support Teams are composed of multiple healthcare professionals such as physicians, dietitians, nurses and pharmacists who are responsible for supervising all nutritional aspects of patient treatment such as quality indicators, enteral nutrition (EN), malnutrition screening as well as parenteral nutrition (PN) care. These four (4) key health professionals play pivotal roles in nutrition support teams (National Collaborating Centre for Acute Care (UK), 2006). According to Ceniccolla et al. (2016), a collaborative approach from a multidisciplinary team provides nutrition care more effectively than individuals playing independent roles.

Nutrition support teams have been regarded as means to optimize the safety and effectiveness of specialized nutritional support. They have been demonstrated to be an excellent means for assessing nutritional status and improving the efficacy of nutrition support in a variety of hospital settings (Shang et al., 2005). The activities of the NST differ according to each health facility's characteristics and available resources. Their work involve establishing guidelines and plan for nutrition support as well as directly assisting patients (Lopes, Ceniccolla, Araújo & Akutsu, 2019). Nutrition Support Teams help to facilitate the initiation of parenteral nutrition at the appropriate time and avoid episodes of parenteral nutrition (Bhagavatula & Tuthill, 2011). Furthermore, they may assess inappropriate parenteral nutrition (PN) referrals and recommend enteral feeding when necessary, as demonstrated in 41% of cases of a British study. The compositions of NSTs and their implementations are diverse, both locally and among countries (Hvas et al., 2014). Nutrition support team members play a key role in making decisions on the route of feed delivery and management of nutrition support. Prior to selecting

the appropriate route for administration, a careful consideration is been made on the functionality, accessibility and digestive and/or absorptive capacity of the GIT (Bischoff et al., 2020). Nutrition support teams (NSTs) are therefore very essential and useful in acute care hospitals.

Ceniccola et al. (2016) emphasized that despite the usefulness of nutrition support teams, they are non-existent in majority of hospitals globally and where present, most team members spend only a fraction of their time working within that role. In some countries, the responsibility of the NST in ensuring high standard enteral feeding and it's associated practices is regulated by law. This regulation can inure to the benefit of the healthcare system and the regulatory bodies as well (Lopes et al., 2019). Brazil is among the few countries to have developed laws specific to EN and NST activities. The establishment of NST and EN delivery in hospitals is regulated by Brazil's National Health Surveillance Agency (Lopes et al., 2019).

2.2 Types of Nutrition Support

Enteral nutrition and parenteral nutrition are the two main types of nutrition support. Enteral nutrition is mostly preferred if feasible, however parenteral nutrition may be indicated when the patient has a non-functional GI tract or enteral nutrition is contraindicated (Elke et al., 2016). According to Chowdary & Reddy, (2010), parenteral nutrition involves feeding someone via their blood stream. Research has shown that there is high preference for enteral feeding in critically ill patients due to it benefits; maintenance of gut, gut mass, gut associated lymphoid tissue, prevent gut stasis and stress ulceration (Irish Society for Clinical Nutrition and Metabolism, 2012).

2.2.1 Enteral Nutrition

Enteral nutrition involves nutrition support directly into the gut via a feeding tube (National Collaborating Centre for Acute Care (UK), 2006). Enteral nutrition is the preferred route of feeding for the critically ill patient who requires nutrition support. The enteral route is considered to be more physiologic, with its associated nutritional and non-nutritional benefits such maintaining structural and functional gut integrity, and intestinal microbial diversity (Elke et al., 2016). More so, EN maintains of the intestinal mucosal integrity, reduction of infection rates and decreased morbidity (Shankar, Daphnee, Ramakrishnan & Venkataraman, 2015). Enteral feed can be administered to patients with gastroparesis and a functional bowel at the post-pyloric route via a naso-jejunal or jejunostomy tube (McDougall, 2015). The benefits of enteral nutrition in intensive care has been highlighted at the neglect of it related risks (Selcuk et al., 2006). Poorly managed gastrotomy tube may lead to complications, therefore it management outside the hospital requires a well-equipped individual (Dinenage et al., 2015).

It is noteworthy that the content of nutrition is as important as the route. In time past, patients were placed on parenteral nutrition despite having a fully functional gastrointestinal tract. However, there has been a gradual switch from PN to EN (Selcuk et al., 2006). According to Abi et al. (2018), early EN is clearly used in preference over PN in ICUs , as 72% of hospitals in Lebanon start early EN (within 48 hours) in more than 10% of cases while only 30% of hospitals start early PN (within the first week) in more than 10% of cases . Moreover, it is recommended that within 24 hours of admission, critically ill patients should be fed preferably by the enteral route (McDougall, 2015). Initiation of EN within 24 to 48 hours of intensive care unit (ICU) admission is recommended by Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) guidelines, although there is no contraindication if EN is initiated soon after active resuscitation (McClave et al., 2016).

Despite this recommendation, there still remains a general uncertainty or lack of clarity regarding early initiation of EN and time point at which early EN can be safely initiated in the ICU (Shankar et al., 2015). Compared to parenteral nutrition, there is decreased infection-related morbidity, short hospital stay and reduced cost of hospitalization with enteral nutrition (Sharada & Vadivelan, 2014). Conversely, Selcuk et al. (2006) indicated that preferring the enteral route to avoid infection risk is not true. In a retrospective study in Turkey, Selcuk et al. (2006) reported that infection risk was similar between enteral and parenteral nutrition groups. This finding was in agreement with the Acute Physiological Assessment and Chronic Health Education (APACHE) score (Selcuk et al., 2006).

Home enteral nutrition (HEN) refers to enteral feeding that occurs in the home setting and long-term facilities. Home enteral nutrition is a life-sustaining therapy recommended for patients with inadequate dietary intake (Wong, Goh, Banks & Bauer, 2018). An estimated 2-34% of residents in nursing homes in the United States are on HEN (Wong et al., 2018). Since the earlier introduction of HEN, it has been established as a reliable and effective nutritional intervention. It is usually initiated during hospital stay and continued as a long-term home therapy (Bischoff et al., 2020). Swallowing disorders and gastrointestinal problems such as obstruction and malabsorption are the main indications for HEN (Wong et al., 2018).

In recent years, there has been increase in survival rates of 82%, compared to earlier studies that reported survival rates of 40-55% in the HEN (Wong et al., 2018). Enteral and parenteral nutrition for the critically ill adult patient varies in terms of the route of nutrient delivery, the amount and composition of macro and micronutrients, and the choice of specific, immune-modulating formulas (Elke et al., 2019). There have been some controversies with the use of HEN in patients with dementia, with a study reporting 70% mortality in these patients. The American Geriatrics Society (AGS) and European Society for Clinical Nutrition and

Metabolism (ESPEN) do not recommend feeding tubes for older adults with advanced dementia (American Geriatrics Society Ethics Committee and Clinical Practice and Models of Care Committee., 2014; Volkert et al., 2019).

2.2.2 Parenteral Nutrition

Parenteral nutrition (PN) represents an alternative approach when enteral feeding routes are unsuccessful, impossible or unsafe to use (Singer et al., 2018). Parenteral nutrition refers to a form of specialized nutrition therapy involving the intravenous administration of nutrition which may include protein, carbohydrate, fat, minerals and electrolytes, vitamins and other trace elements (Torrinhas & Waitzberg, 2016). Parenteral nutrition (PN) is beneficial and vital in a variety of health conditions. Total parenteral nutrition (TPN) is indicated for patients with a non-functional GIT who cannot eat or meet caloric goals (McDougall, 2015). Although PN may improve clinical outcomes in both surgical and medical patient, its related complications are associated with significant morbidity and mortality (Hvas et al., 2014). Long-term PN compared with short term PN is associated with frequently occurring complications such as demineralization of bones and catheter infections (Hartl, Jauch, Parhofer & Rittler, 2009).

Comparatively, feeding enterally is more physiologic than parenteral. Loss of intestinal integrity, mucosal atrophy, reduced gut immunity and increased permeability are effects of parenteral feeding (McDougall, 2015). Refeeding syndrome is also a remarkable side effects of PN, which can occur in severely malnourished patients who are receiving aggressive PN (Hartl et al., 2009). The risk of such complications can be managed by the use of nutrition support teams and carefully monitoring patients (Hartl et al., 2009).

2.3 Nutritional Requirements and Nutrition Support

In a study conducted by Kim et al. (2012) on the adequacy of macronutrient intake of patients in ICU in Korea, it was observed that more than half of the respondents were underfed as a result of low energy and protein intake. This was attributed to under-prescription and continued interruptions during feeding. Haverkort (2014) reported that 24% and 7% of post-operative patients on enteral nutrition were not meeting the recommended daily energy and protein intake. Contrary to this, Baker, Halliday, Pauline, Karen and Bowrey (2017) noted in their study on post-operative patients that more than half of participants' energy and protein intakes were adequate with values of 94% and 77% respectively after 6 months. Baker et al. (2017) also observed that more than half of the participants met the micronutrient requirements. There is a growing evidence that adequate nutrition may contribute to reducing cost and sustaining health care systems (Ceniccola et al., 2016).

2.4 Formulas and Oral Supplements

Blaauw & Du Toit, (2017) explained that the various enteral formulas prepared by the dietitian to be administered to the patient is dependent on the patient's requirements and thus it is very essential to assess patient's needs before any formula is administered. There are different formulas that have been made for different types of patients' conditions. Brown, Roehl and Betz (2015) indicated that it is essential for clinicians to use their clinical judgement in selection of the appropriate formula for patients.

Despite the availability of commercial, ready-to use formulas for over 20 years, many institutions prefer the use of "homemade", blenderised tube feedings (BTF) (Sullivan et al., 2004). This preference for "homemade" blenderised tube feedings may result from the belief that they are more "natural" or less costly. A typical blenderised tube feed contains common

foodstuffs such as eggs, meat, milk, soft fruits, and vegetables pureed in a food blender (Oparaji, Sferra & Sankararaman, 2019). There is a likelihood of contamination associated with the preparation of blenderized tube-feeding diets and in the handling of commercial diets (Vieira, Santos, Bottoni & Morais, 2018). Interestingly, a study by Abi et al. (2018) suggested that about 50% of hospitals in Lebanon still resort to "homemade" EN formulas despite the proven inferiority to the ready-made formulas. Homemade enteral feeding is still common in Lebanon due to reimbursement issues (Abi et al., 2018).

Patients' response to ingredients in enteral formulas may influence clinical outcomes. Therefore, these ingredients must be carefully evaluated in their quality and quantity prior to administration (Savino, 2018). Despite the use of standardized recipes, blenderized tube-feeding diets prepared with common foodstuffs have inconsistent micronutrient and macronutrients. They are often described as nutritionally unbalanced, with an increased risk of food contamination (Vieira et al., 2018). Although, homemade tube feeding is gaining popularity among patients and clinicians, many are reluctant to recommend it considering the potential risk of microbial contamination, variability of nutritional composition, and increased clinician time (Walia, Van Hoorn, Edlbeck & Feuling, 2017).

Oral nutritional supplements (ONS) are used to meet nutritional requirements when the patient has a functional gastrointestinal tract and swallowing mechanism (Kulick & Deen, 2011). They are commercially prepared products, commonly presented as drinks that contain a mixture of nutrients and are used to supplement any food intake the patient is able to take orally (Fletcher, 2015). The micronutrient in enteral feeding formulas may be insufficient to compensate for patient losses or are poorly absorbed during the early phase of injury (Savino, 2018).

Standard Polymeric Formulas

According to Brown et al. (2015) standard polymeric formulas are the most commonly used formulas for patients requiring EN support. They are designed to mimic a regular diet by providing carbohydrate, protein, and fat in non-hydrolysed forms. They differ based on energy concentration (1–2 kcal/ml) and protein concentration. Common sources of carbohydrate in enteral formulas include corn malto-dextrin and corn syrup solids while common sources of protein include sodium and calcium caseinates and soy protein isolates. Lipid sources are usually canola, soybean, and/or safflower oil. Polymeric formulas are either disease specific and/ or may contain prebiotics and probiotics. They are mostly indicated for patients without severe malabsorptive disorders (Brown et al., 2015).

Fiber-Containing Formulas

There are fiber-containing enteral formulas available on the market. Fiber-containing formulae help in improving digestive health and normal bowel function. Soy fiber and guar gum are among the common sources of fiber used for enteral formulas (Brown et al., 2015). Fiber-containing formulae are recommended for patients with diarrhoea to maintain gut microbiota (Garleb et al., 1996; Whelan et al., 2005).

Semi-Elemental Formulas

These formulae contain partially or fully hydrolysed macronutrients. They are typically used for patients with an impaired GIT. Examples include hydrolysed corn starch, maltodextrin or fructose from carbohydrate source; free amino acids and dipeptides or tripeptides from protein source and fatty acid esters or medium-chain triglycerides from lipid (Brown et al., 2015). Although seldomly used, these products are used in severely malnourished patients and hypoalbuminemia resulting in oedema and malabsorption.

Disease-specific formulas

Specialized enteral formulae are made up of a plethora of formulae tailored for a variety of medical conditions. This formula is recommended for use among patients with peculiar disease condition or related specific organ nutritional requirements (Zadák & Kent-Smith, 2009). Currently, specific formulas are available for diseases such as liver disease, renal disease, diabetes, pulmonary insufficiency, heart failure, GI dysfunction as well as situations of metabolic stress such as trauma or sepsis.

Diabetes Mellitus (DM) formulae

Products specifically marketed for glucose control are based on a macronutrient composition of 40% carbohydrate, 40% fat and 20% protein. Emphasis is also placed on the type of fat, the addition of fiber and the addition of selected micronutrients (Brown et al., 2015).

Renal formulae

Consideration is given to the protein, sodium, potassium, phosphorus and fluid restriction in the management of renal patients. Enteral formulae marketed specifically for patients with renal impairment address these aspects by either decreasing or increasing the respective nutrients within a given volume (Brown et al., 2015). Renal formulae are caloric dense to facilitate fluid management, since water and electrolyte balance is paramount in this condition (Zadák & Kent-Smith, 2009).

Immuno-nutrition Formulae

Immune modulating or immune-nutrition formulae are products enriched with pharmacologically active substances such as glutamine, arginine, omega-3 fatty acids and

antioxidants. It acts on the immune system to modulate immune system thereby improving clinical outcome (Naranjo, Isenring & Teleni, 2017).

Blenderised Formulae

According Brown et al. (2015), Blenderised tube feeding (BTF) formula is mostly prepared at home by blending food or meals into a liquid thin enough to be administered via a feeding tube. Blenderized tube feeding may be completely made of food or a combination of food and standard formula. In addition, use of BTF may allow for more variety in nutrients and may be more likely to include a greater variety of phytochemicals not present in standard polymeric formulas. Epp (2018) reported that patients preferred blenderised feeds because they had better tolerance.

According Berger et al. (2018), critically ill patients can benefit from micronutrients supplemented by parenteral infusions. Parenteral nutrition solutions or infusions are available as All-in-One (AIO) or multi-chamber bags (MCB) with all the essential nutritional components. Standardized fixed feeding regimens or individually compounded mixtures contain vitamins, trace elements, minerals and water (British Association of Parenteral and Enteral Nutrition, 2015).

Lipid Emulsions

The forms of approved lipid emulsions widely available are, SMOF (soy, medium chain, olive, and fish oil), soybean oil lipid emulsion (SOLE), fish oil lipid emulsion (FOLE) and other lipid emulsion containing multiple fat sources. All the above mentioned lipid emulsions may come with it peculiar challenges (King, 2019). There is not much knowledge about the recommended composition of standard lipid emulsions, but with available choices, clinicians would get the benefit of improved clinical outcomes.

Premixed Parenteral Nutrition Formulations

Parenteral Nutrition (PN) formulations are available as either premixed, in standardized bags, or nutrients compounded by pharmacist. There are available an array of standard premixed PN solutions used by adult patients, however it is uncommon in paediatrics (Singh & Rauch, 2016). Premade solutions contain different components of PN formulations in multiple chambers mixed together prior to administration. These solutions can be shelf stable for up to a year or more, compared with individually mixed solutions with approximately seven to nine days shelf life (Pradelli, Graf, Pichard & Berger, 2018).

Supplemental Parenteral Nutrition Solution

Supplemental Parenteral Nutrition solution are nutrients that are administered intravenously to supplement oral and/or enteral nutritional intake. Supplemental Parenteral Nutrition may help compensate for energy deficits in cases where solely EN is insufficient for meeting one's energy and protein needs (Pradelli et al., 2018).

2.5 Nutrition Support Guidelines

Optimal nutrition is greatly dependent on a systematic approach involving guidelines and standard operating procedures (SOPs) used for planning, initiation and assessing complications related with nutrition support (Berger et al., 2018). According to Marshall et al. (2012), evidence-based guidelines for critical care are useful in supporting clinical decisions. It further reiterates the relevance of evidence-based guidelines specific to nutrition support in critical care and many other areas of clinical practice. The development of nutrition-specific guidelines for critical care is an important step to providing evidence-based recommendations aimed at improving nutritional intake (Marshall et al., 2012).

According to O'Leary-Kelley and Bawel-Brinkley (2017), nutrition support guidelines are effective towards meeting the nutritional goals of critically ill patients. O'Leary-Kelley and Bawel-Brinkley (2017) reported that there is feeding optimization through use of protocols but no clear association with improved clinical outcomes. Implementation of nutrition support protocols potentially deliver volumes of enteral feed that is equivalent to energy and protein requirements, despite the difficulty in meeting the caloric goals via the enteral route (O'Leary-Kelley & Bawel-Brinkley, 2017). A study by (Wikjord, Dahl and Søvik, (2017) reported that although their ICU used a nutrition support guideline since 2007, it became obvious that the guideline needed modification. This was due to the growing knowledge in favour of the benefits of early EN initiation against delaying early PN in critically ill patients.

According to Boulatta et al. (2017), enteral nutrition (EN) is a relevant clinical intervention for patients of all ages in a variety of care settings. Along with its many beneficial health outcomes lies the potential for adverse effects. Practice guidelines present clinicians the best research evidence for maximizing the effectiveness of nutrition interventions (O'Leary-Kelley & Bawel-Brinkley, 2017). Additionally, to maximize the benefits of EN while minimizing adverse events requires that a systematic approach of care is set in place. This includes open communication, standardization, and incorporation of best practices into the EN process (Boullata et al., 2017). Although, guidelines establish expert consensus supported current literature, clinical decisions should always be patient-centered and guided on a case-by-case basis (O'Leary-Kelley & Bawel-Brinkley, 2017).

2.6 Factors Influencing Nutrition Support

Kim et al. (2012) identified feeding method, prescription by physician, timing of initiation of enteral nutrition and prolonged interruptions as the factors that influenced nutritional adequacy.

A study conducted by El-Regal, Abdelgawad, Ahmed, Asfour and Abdelrehim (2016) in ICUs of Alexandria Main University Hospital (AMUH) in Egypt over a seven (7) day consecutive research observed that unscheduled basic nursing procedures, GIT complications, diagnostic procedures or airway management influenced the nutritional adequacy of enteral feeds. Although current evidence acknowledges the essence of nutrition support, the delivery of adequate nutrition remains difficult to achieve in most intensive care units (ICUs). Both under prescription and under delivery of feedings are known to be controlling factors to malnutrition in critically ill patients (Marshall et al., 2012).

2.7 Skills and Competence of Nutrition Support Team Members

Nutrition support for the critically ill patient requires careful interpretation of biochemical data, teamwork, and strict monitoring to avoid unintended complications. The practices and process are critical to maintaining patient safety and improving clinical outcomes (Guenter et al., 2015). It is therefore important that nutrition support team members build skills and competence in this regard.

Skills and competence are pivotal in the education and training model for health professionals across disciplines. Health professionals are not adequately trained to address nutrition-related issues with their patients, thus missing important opportunity to contribute to improving clinical outcomes of their patients (Kris-Etherton et al., 2015). Assessing a professional's competence is easy in theory but very difficult in practice. However, with the absence of documented competence, regular assessment cannot be carried out. This compromises the ability to effectively perform a role (Guenter et al., 2015; Kris-Etherton et al., 2015).

CHAPTER THREE

3.0 METHODS

3.1 Study Design

A descriptive cross-sectional study design was employed for this study.

3.2 Study Site

The study was carried out in eight (8) regions of Ghana.

WESTERN REGION

Effia-Nkwanta Regional Hospital

Effia-Nkwanta Regional Hospital is the third largest hospital in Ghana after Korle Bu and Komfo Anokye Teaching Hospital. It is situated at Sekondi in the Sekondi-Takoradi Metropolis of the Western Region of Ghana. It was established in 1938, serving as the main referral centre in the Western region. It has a bed capacity of 359 and workforce of about 1,000 (Achampong, 2012).

Tarkwa Municipal Hospital

Tarkwa Municipal Hospital is a government primary hospital situated in Tarkwa in the Nsuaem Municipal of the Western Region. It has state-of-the art facilities serving the health needs of the inhabitants of the Municipality and beyond. It has a capacity of 120 beds with out-patient department, accident and emergency block, X-ray unit, pharmacy and three operating theatres (Ghana News Agency, 2013).

CENTRAL REGION

Cape Coast Teaching Hospital

Cape Coast Teaching Hospital is 400-bed capacity referral hospital located in Cape Coast. It was formerly the Central Regional Hospital. It is among the five teaching hospitals in Ghana. The hospital provides health services to people in the central and western region and serves as a training facility for medical students from the University of Cape Coast and several nurses from the training colleges (Abu et al., 2016).

GREATER ACCRA REGION

FOCOS Hospital

Foundation of Orthopaedic and Complex Spine (FOCOS) Hospital is a state-of-the art hospital in Ghana providing full-service specialty and comprehensive orthopaedic and complex spine care. The hospital was developed by the Foundation of Orthopaedic and Complex Spine (FOCOS), a non-profit organization. It was officially opened in 2012 with a capacity of 50 beds. The hospital specializes in complex spine deformity surgery and joint replacement surgeries. It is equipped with two operating theatres, an outpatient clinic, laboratory, physiotherapy centre, radiology centre and patient wards (Owusu, 2019).

University Hospital, Legon

The University of Ghana Hospital, popularly known as the Legon Hospital is officially owned by the University of Ghana. It is situated behind the Legon Police Station. Legon hospital has 130-bed capacity made up of general wards, maternity, casualty and emergency ward, paediatric unit, dental unit and operating theatre (University of Ghana Health Services, 2020).

37 Military Hospital

The 37 Military Hospital is a 400-bed capacity hospital located in Accra, Ghana. It is one of the largest hospitals in Ghana. The hospital was established on 4th July 1941 to provide health services for military personnel who were injured in the Second World War. It is a teaching hospital comprising of several departments; medical, surgical, dental, pathology, physiotherapy, paediatrics, obstetrics, gynaecology, pharmacy and radiology (Osei-Bonsu, 2016)

Greater Accra Regional Hospital

The Greater Accra Regional Hospital, formerly Ridge Hospital was commissioned in 1928 by the British and upgraded to the status of a regional hospital in 1997. As a regional referral centre in the national capital, the Greater Accra Regional Hospital has an ultra-modern 620-bed capacity with all the essential services. Broadly it provides the following services: surgery, medicine, obstetrics and gynaecology, neonatal and paediatrics, accident & emergency, radiology and pharmacy. The hospital also provides teaching and training services for undergraduate and postgraduate students (Sifa et al., 2019).

Trust Hospital, Osu

The Trust Hospital was established in 1992 primarily to provide medical care to SSNIT staff and their dependents. The facility was upgraded to extend its services to the general public. The main departments include ophthalmology, ear, nose and throat (ENT), dental and physiotherapy with two theatres (The Trust Hospital, 2020).

Korle Bu Teaching Hospital (KBTH)

The Korle Bu Teaching Hospital is the third largest hospital in Africa and the leading national referral centre in Ghana. It was established on October 9, 1923 and currently has a bed capacity of 2,000 with 17 clinical and diagnostic departments/units. The hospital records an average daily attendance of 1,500 patients and about 250 patient admissions (Korle Bu Teaching Hospital, 2016).

Princess Marie Louise Children's Hospital

The Princess Marie Louise Children's Hospital (PML) is a public hospital located in the commercial part of Accra. It has a bed capacity of 74 serving as the second largest provider of specialist paediatric services in Accra. It serves an inner-city population along the coast of the southern border of the country and the rest of Accra, providing both primary care and specialised services in paediatrics (Tette et al., 2016).

VOLTA REGION

Ho Teaching Hospital

The Ho Teaching Hospital, formerly Volta Regional Hospital was built and handed over to the government of Ghana in November 1998. It is popularly known as "Trafalgar". It serves as the major referral hospital for other health facilities within the region and the eastern corridor of southern Ghana. It currently has a 360-bed capacity. Healthcare delivery service extends beyond the borders of Ghana to neighbouring countries like Togo, Benin and Federal Republic of Nigeria. The hospital provides outpatient, maternal and childcare, inpatient, surgical services, herbal medicine services and mental health (Konlan et al., 2020).

Central Tongu District Hospital

The Central Tongu District hospital formerly Adidome District hospital, is a government primary hospital located in Adidome, in the Volta Region of Ghana. The hospital provides generally services to inhabitants of Mafi-Adidome and its environs (ArcGIS, 2020).

NORTHERN REGION

Tamale Teaching Hospital

The Tamale Teaching Hospital is a Teaching hospital in Tamale in the Northern region of Ghana. It serves as a referral hospital and has a bed capacity of 800 beds. The hospital was established in 1974 and was formerly known as the Tamale Regional Hospital. It serves undergraduate and postgraduate students of the University of Development Studies offering medicine, nursing and nutrition (Ministry of Health, 2020).

UPPER EAST REGION

Upper East Regional Hospital

The Upper East Regional Hospital in Bolgatanga serves as a referral centre for all the health facilities in the region. It has a 220-bed capacity. The hospital is boarded by Yikene, Nyaria, Bukere, and Tindanmolgo. It has the following departments: outpatient department, medical, surgical, maternity, paediatric, maternal and child health/family planning, ear, nose and throat, physiotherapy, psychiatric, chest, theatre, and emergency departments (Banoya, 2018).

Bawku Presbyterian Hospital

Bawku Presbyterian Hospital is in the Bawku Municipal in the Upper East region. It was established in 1953 by the government of Ghana and was handed over to the Presbyterian Church in 1956. The hospital is made of 331 bed capacity of 12 wards. The hospitals has major

departments such as obstetrics/gynaecology, orthopaedic/physiotherapy, eye, general surgery, ear/nose and throat, dental, family planning units as well as general outpatients' departments and medical/surgical and paediatric wards (Alhassan et al., 2019).

EASTERN REGION

Eastern Regional Hospital

The Eastern Regional Hospital, Koforidua (ERHK) was established in 1926 and it is a secondary level referral facility for the entire Eastern Region and doubles as Municipal Hospital for the New Juaben Municipality. There have been two major structural additions to it since its establishment. The hospital has a bed capacity of 356 beds. The hospital has the following departments/units: obstetrics and gynaecology, internal medicine, paediatrics, surgery, dental, ophthalmology, physiotherapy, ear, nose and throat (Eastern Regional Hospital, 2017).

BRONG AHAFO REGION

Brong Ahafo Regional Hospital

The Brong Ahafo regional hospital located in Sunyani was established in 1927. The hospital currently has a bed capacity of 300. The hospital offers the following services: 24-hour accident and emergency centre, psychiatry, general surgery, obstetrics and gynaecology, internal medicine and nutrition (Ghana Health Service, 2014).

3.3 Study Population

The study population were dietitians, doctors, nurses and pharmacists at respective study sites.

3.3.1 Inclusion Criteria

Dietitians, doctors, nurses and pharmacists who gave their consent to participate in the study. Hospitals where nutrition support is practised.

3.3.2 Exclusion Criteria

Dietitians, doctors, nurses and pharmacists who refused to participate in the study and hospitals that did not give permission to conduct the study.

3.4 Sampling Technique

A purposive sampling method was used to recruit at least four key eligible health professionals (one dietitian, one doctor, one pharmacist and one nurse) from each eligible facility to participate in the study.

3.4.1 Questionnaire

This study adapted and modified questionnaire developed in a similar study in South Africa by Hill (2015). It was composed of questions on hospital demographics, profile of health professionals, assessment of nutrition support delivery and monitoring practices.

3.4.2 Pre-Testing of Questionnaires

The questionnaire was pre-tested with nine (9) respondents from three (3) health facilities before it was administered. There was a 66% response rate for the pre-test. The response and feedback from the pre-test contributed to the modification of some of the questions.

3.5 Procedure Data Collection

The list of all dietitians in Ghana was obtained from the Ghana Dietetic Association register. Dietitians were contacted to identify those working in hospitals where nutrition support was

practised. Upon identifying dietitians involved in nutrition support, the hospitals were then selected. With the assistance of the dietitians, the other health professionals involved in nutrition support in the facility were also identified. A structured questionnaire was hand delivered to respondents and collected after completion. Respondents were also asked to share with the research team, any documented nutrition support guideline or policy documents used at their various facilities, if available and feasible.

3.6 Data Management Plan

Data from the questionnaire was entered and stored on a password protected personal computer. Completed questionnaires were kept in a locked cabinet.

3.7 Data Analysis

Data were analysed using SPSS version 23.0. Descriptive statistics were summarized as frequencies and percentages. Data were presented in charts, tables and figures. Pearson's Chi-square was used to determine the association between categorical variables. Statistical significance was set at $p<0.05$.

3.8 Ethical Consideration

Approval for the study was obtained from the Ethics and Protocol Review Committee of the College of Health Sciences, University of Ghana. Written permission and ethical clearance were also obtained from hospitals with Institutional Review Boards (Appendix F). Written informed consent was obtained from participants before they were recruited into the study. Confidentiality of all information received from the study was ensured by keeping data on a password protected computer and completed questionnaire in a locked cabinet.

CHAPTER FOUR

4.0 RESULTS

4.1 Respondent Characteristics and Hospital Demographics

Table 4.1 presents the background characteristics of health professionals and hospital demographics. A total of 118 out of 137 participants from 17 hospitals completed the questionnaires, giving a response rate of 86.1%. Majority of the respondents (93.2%) indicated working in the public hospital. More than half (59.3%) of them were working in hospitals with a bed capacity between 100 - 500. Most of respondents (66.0%) were working mainly in the medical unit of their facility. Majority of the respondents (51.7%) indicated working in the Greater Accra region, followed by Upper East region (10.2%) and Eastern region (8.5%) (Figure 4.1).

Table 4.1: Respondent Characteristics and Hospital Demographics (N = 118)

Characteristics	Frequency (Percentage) n (%)
Hospital Type	
Public	110 (93.2)
Private	8 (6.8)
Bed Capacity	
Less than 100	14 (12.0)
100-500	70 (59.3)
More than 500 but less than 1000	12 (10.2)
Above 1000	22 (18.6)
Specialty Area	*
General OPD	56 (47.5)
Surgical	43 (36.2)
Medical	78 (66.1)
Cardiothoracic	1 (9.3)
Neuro	14 (11.9)
Burns	19 (16.1)
Trauma	14 (11.9)
ICU / Emergency	38 (32.2)
Obstetrics and Gynaecology	1 (0.8)
Paediatrics	8 (6.8)
Oncology	1 (0.8)
Renal	1 (0.8)
Neonatal ICU	1 (0.8)
Other (Not specified)	4 (3.4)
Profession	
Nurse	49 (41.5)
Dietitian	41 (34.7)
Doctor	28 (23.7)

*Responses exceed 100% as multiple choice were possible

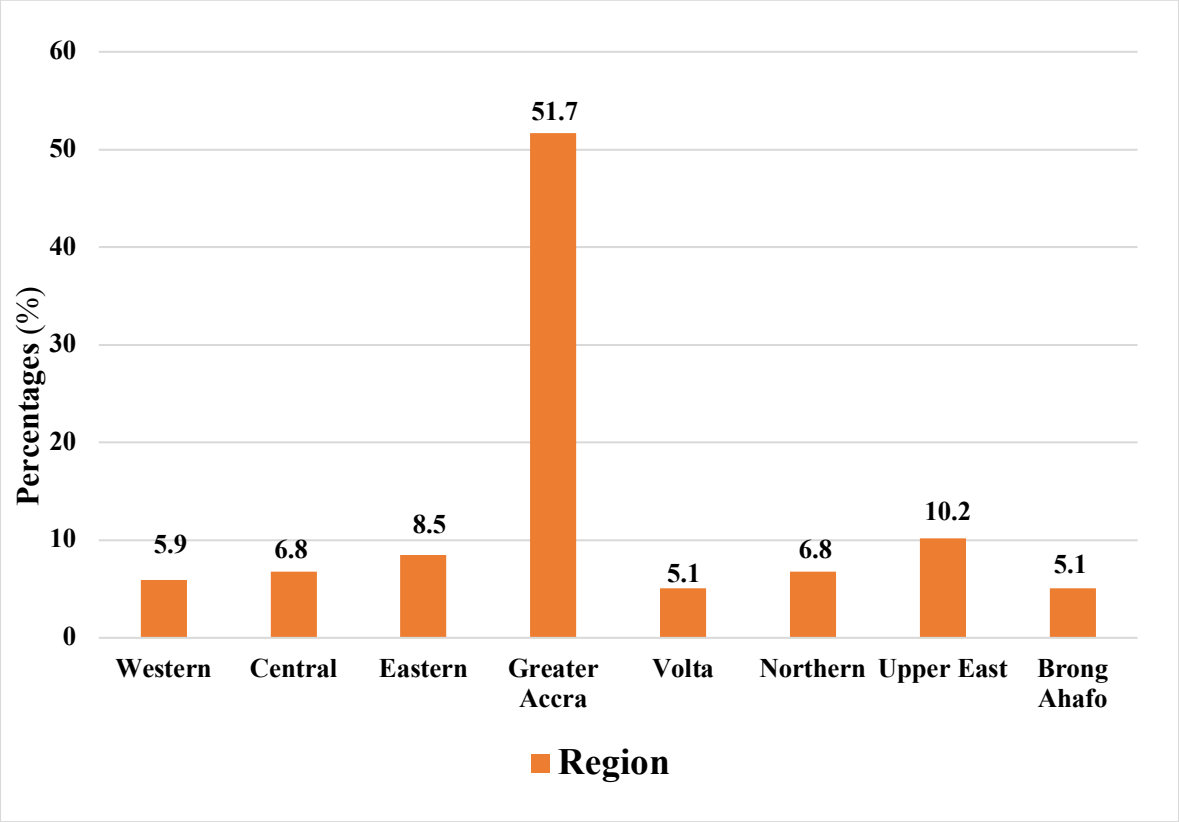

Figure 4.1: Regional distribution of respondents

4.2 Structure of Nutrition Support

The structure of nutrition support is summarised in Table 4.2 and Figure 4.2. Less than a quarter (22.0%) of the respondents indicated that they had a formal nutrition support guideline in their facility (Table. 4.2). More than half of them (54.9%) mentioned that they had a formal nutrition support team (Figure 4.2). There was an association between the presence of a formal nutrition support guideline (p= 0.024) (Table 4.2) and presence of a nutrition support team (p=0.001) (Figure 4.2) and the professions of the respondents. There was an association between the representation of dietitians on the NST and their professions (p= 0.002) (Table 4.2).

Table 4.2: Structure for Nutrition Support

Variables	Total, n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P – value
Presence of a formal NS guideline, N	118	41	28	49	
No	41 (34.7)	19 (46.3)	6 (21.4)	16 (32.7)	0.024*
Yes	26 (22.0)	6 (14.6)	4 (14.3)	16 (32.7)	
Don't Know	51 (43.2)	16 (39.0)	18 (64.3)	17 (34.7)	
Profession represented on the team, N	118	41	28	49	
Dietitian	60 (50.8)	13 (31.7)	21 (75.0)	26 (53.1)	0.002*
Nurse (General)	36 (30.5)	8 (19.5)	10 (35.7)	18 (36.7)	0.166
Nurse (ICU-trained)	21 (17.8)	5 (12.2)	6 (21.4)	10 (20.4)	0.507
Doctor (General Physician)	30 (25.4)	7 (17.1)	9 (32.1)	14 (28.6)	0.297
Doctor (Specialist)	27 (22.9)	7 (17.1)	5 (17.9)	15 (30.6)	0.306
Pharmacist	14 (11.9)	5 (12.2)	3 (10.7)	6 (12.2)	0.977
Diet Cook	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	0.455
Nutritionist	8 (6.8)	3 (7.3)	4 (14.3)	1 (2.0)	0.119
Occupational Therapist	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	0.492

Pearson's chi-square test, p-value < 0.05 was considered significant

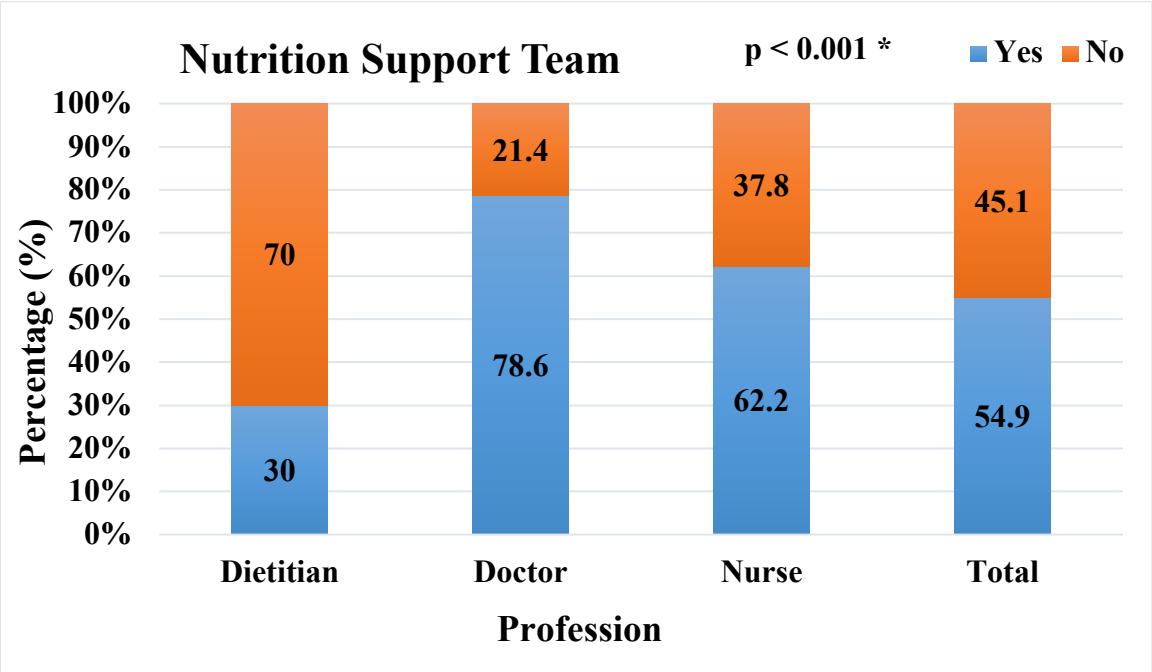

Figure 4.2: Presence of a Formal Nutrition Support Team

4.3 Nutrition Support Practices

Majority of the respondents (84.7%) indicated that they routinely screened patients in their facility (Figure 4.3). Among the professionals, a greater proportion of nurses (91.8%) reported screening patients routinely. There was no association between routine nutrition screening practice and the professions of the respondents ($p=0.191$). Regarding the use of nutrition screening tools, most of the respondents reported using body mass index only (80.5%) and the combined nutrition assessment methods (ABCD approach) (78.8%) in screening patients. Among the professionals, a greater proportion of dietitians (78.0%) used the combined nutrition assessment methods (ABCD approach) in screening patients ($p< 0.001$) (Table. 4.3). Majority of the respondents (85.7%) indicated that the dietitian is the professional mainly involved in nutrition screening.

Table 4.3: Nutrition Support Practices

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Profession mainly involved in nutrition screening, N	100	31	24	45	
Dietitian	84 (85.7)	29 (93.5)	19 (86.4)	36 (80.0)	0.539
Nurse	7 (7.1)	1 (3.2)	2 (9.1)	4 (11.1)	
Doctor	6 (6.1)	1 (3.2)	1 (4.5)	4 (11.1)	
Nutritionist	1 (1.0)	0 (0.0)	0 (0.0)	1 (2.2)	
Nutrition screening/assessment tools used, N	118	41	28	49	
BMI / Body weight assessment only	95 (80.5)	35 (85.4)	19 (67.9)	41 (83.7)	0.151
Subjective Global Assessment	13 (11.0)	7 (17.1)	2 (7.1)	4 (8.2)	0.306
Nutrition Risk Index	17 (14.4)	5 (12.2)	2 (7.1)	10 (20.4)	0.248
Prognostic Nutrition Index	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	0.388
Hospital Prognostic Index	7 (5.9)	2 (4.9)	0 (0.0)	5 (10.2)	0.178
ABCD Approach	93 (78.8)	32 (78.0)	14 (50.0)	15 (30.6)	<0.001*
Don’t know	10 (8.5)	0 (0.0)	4 (14.3)	6 (12.2)	0.052
Other (Nutrition Risk Screening)	1 (0.85)	1 (2.4)	0 (0.0)	0 (0.0)	0.388

Pearson’s chi-square test, p-value < 0.05 was considered significant

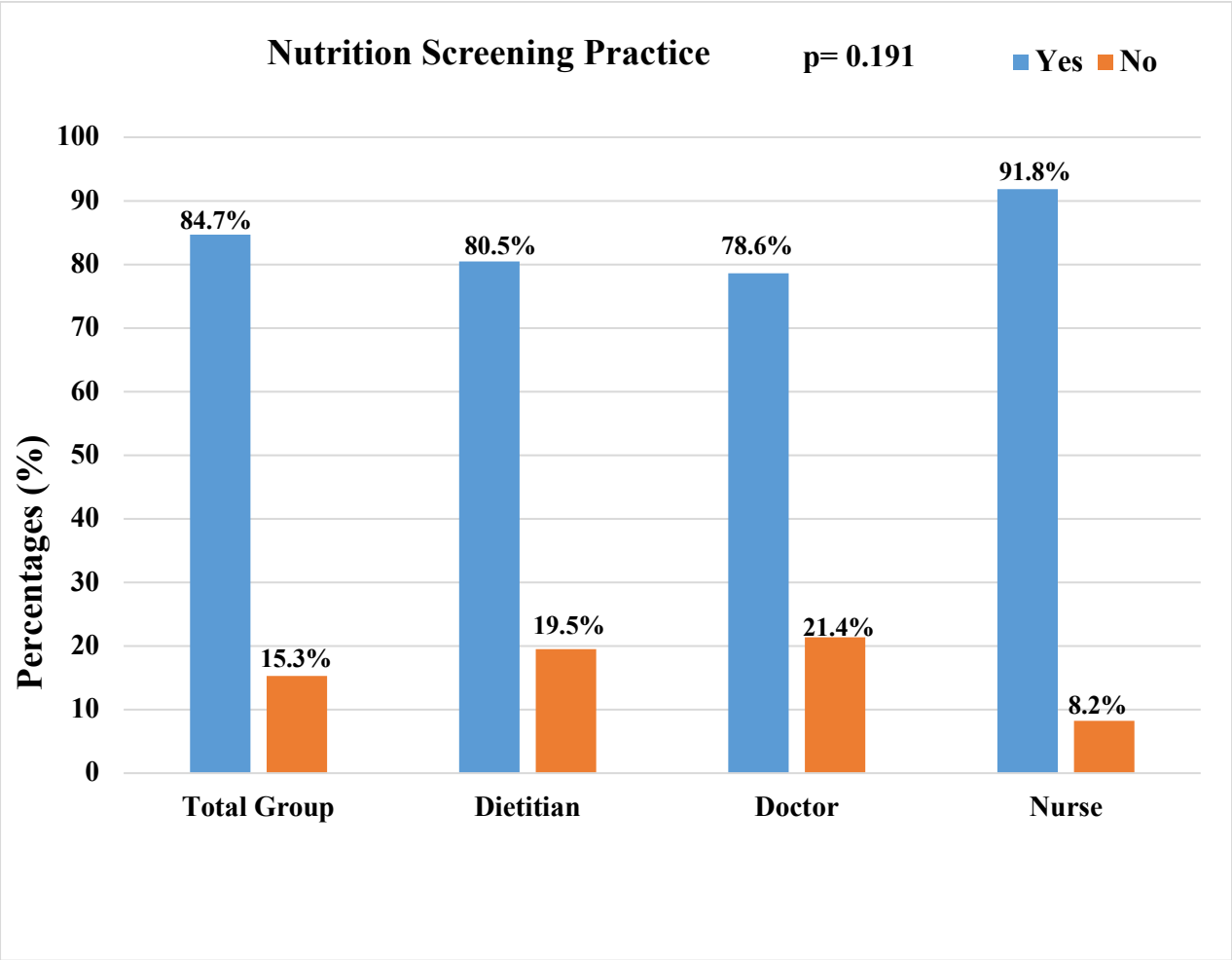

Figure 4.3: Routine Nutrition Screening Practice

4.4 Factors Influencing Nutrition Support Decision-Making

Table 4.4 shows the factors influencing nutrition support decision-making. The main methods used by the participants in estimating nutritional requirements of patients were body weight-based methods (59.3%), clinical judgement (44.9%) and formulas (33.1%). There was an association between the use of formulas ($p= 0.003$) and the use of published guidelines ($p< 0.001$) in estimating nutritional requirements of patients and the professions of the respondents.

Further, more than half of the respondents indicated using unsuccessful oral nutrition (64.0%) and poor nutritional status (54.2%) as a determinant of initiating enteral feeding. Among the professionals, a significantly higher proportion of doctors (60.7%) reported using presence of bowel sounds in initiating enteral feeding ($p= 0.001$).

For parenteral nutrition decision-making, less than half of the respondents indicated using apparent/obvious clinical indications (46.3%), and when enteral feeding is unsuccessful within 3 days (36.6%) to initiate parenteral feeding (Table. 4.4).

Table 4.4: Factors Influencing Nutrition Support Decision-Making (N=118)

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Methods of calculating nutritional requirements, N	118	41	28	49	
ESPEN/ASPEN or other published guidelines	18 (15.3)	12 (29.3)	0 (0.0)	6 (12.2)	0.003*
Clinical judgement	53 (44.9)	23 (56.0)	9 (32.1)	21 (42.9)	0.135
Indirect calorimetry	6 (5.1)	3 (7.3)	1 (3.6)	2 (4.1)	0.720
Illness severity	30 (25.4)	10 (24.4)	5 (17.9)	15 (30.6)	0.457
Body weight-based methods	70 (59.3)	30 (73.2)	13 (46.4)	27 (55.1)	0.062
Formulas	39 (33.1)	28 (68.3)	3 (10.7)	8 (16.3)	<0.001*
Don't know	23 (19.5)	0 (0.0)	12 (42.9)	11 (22.4)	<0.001*
Determinants of enteral feed initiation, N	118	41	28	49	
First day in ICU	15 (12.7)	2 (4.9)	4 (14.3)	9 (18.4)	0.154
Low gastric residual volume / aspirate volume	25 (21.2)	9 (22.0)	5 (17.9)	11 (22.4)	0.884
Haemodynamic stability	16 (13.6)	3 (7.3)	7 (25.0)	6 (12.2)	0.102
Reasonable gastrointestinal function	42 (35.6)	12 (29.3)	14 (50.0)	16 (32.7)	0.179
Presence of bowel sounds	40 (33.9)	8 (19.5)	17 (60.7)	15 (30.6)	0.001*
Low intra-abdominal pressure	3 (2.5)	0 (0.0)	1 (3.6)	2 (4.1)	0.173
Reasonable nutritional status	18 (15.3)	8 (19.5)	2 (7.1)	8 (16.3)	0.360
Presence of any gastrointestinal symptoms	17 (14.4)	8 (19.5)	3 (10.7)	6 (12.2)	0.506
Poor nutritional status of patient	64 (54.2)	24 (58.5)	15 (53.6)	25 (51.0)	0.773
Unsuccessful oral nutrition	76 (64.0)	29 (70.7)	15 (53.6)	32 (65.3)	0.338

Pearson's chi-square test, p-value < 0.05 was considered significant

Table 4.4 (continued): Factors Influencing Nutrition Support Decision-Making (N=118)

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Parenteral nutrition support initiation, N	41	9	11	21	
Mainly within 24 hours of ICU admission	12 (29.3)	1 (11.1)	3 (27.3)	8 (38.1)	0.325
As soon as a clinical indication becomes apparent	19 (46.3)	4 (36.4)	6 (54.5)	9 (42.9)	0.813
Within 3 days if enteral feeding unsuccessful	15 (36.6)	5 (55.6)	4 (36.4)	6 (28.6)	0.372
After 7 days if enteral feeding unsuccessful	4 (9.8)	1 (11.1)	0 (0.0)	3 (14.3)	0.428
Immediately in malnourished patients	7 (17.1)	0 (0.0)	3 (27.3)	4 (19.0)	0.257

Pearson's chi-square test, p-value < 0.05 was considered significant

4.4.1 Basis for Nutrition Support Decision

Figures 4.4A and 4.4B details the basis for enteral and parenteral nutrition support decision-making. Participants mainly used clinical judgement (81.4%), and professional experience (58.5%) as the basis for enteral nutrition support decision. There was an association between the use of either clinical judgement, professional experience, and published guidelines as the basis for enteral nutrition support decision-making and the professions of the respondents (all p values < 0.05).

Pertaining to the basis for parenteral nutrition support decisions, most of the respondents (73.2%) indicated using clinical judgement, comprising of a higher proportion of doctors (81.8%) (Figure 4.4B). However, this was not statistically significant ($p= 0.655$).

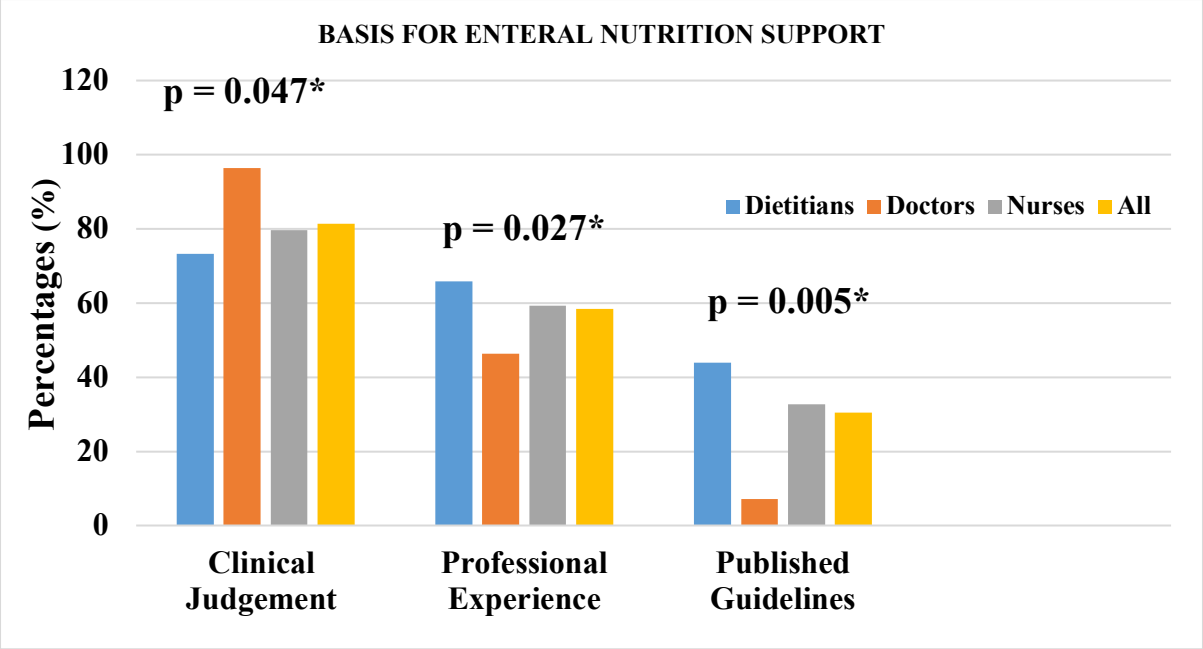

Figure 4.4A: Basis for enteral nutrition support.
*Total percentage was more than 100 because the responses were multiple choices.

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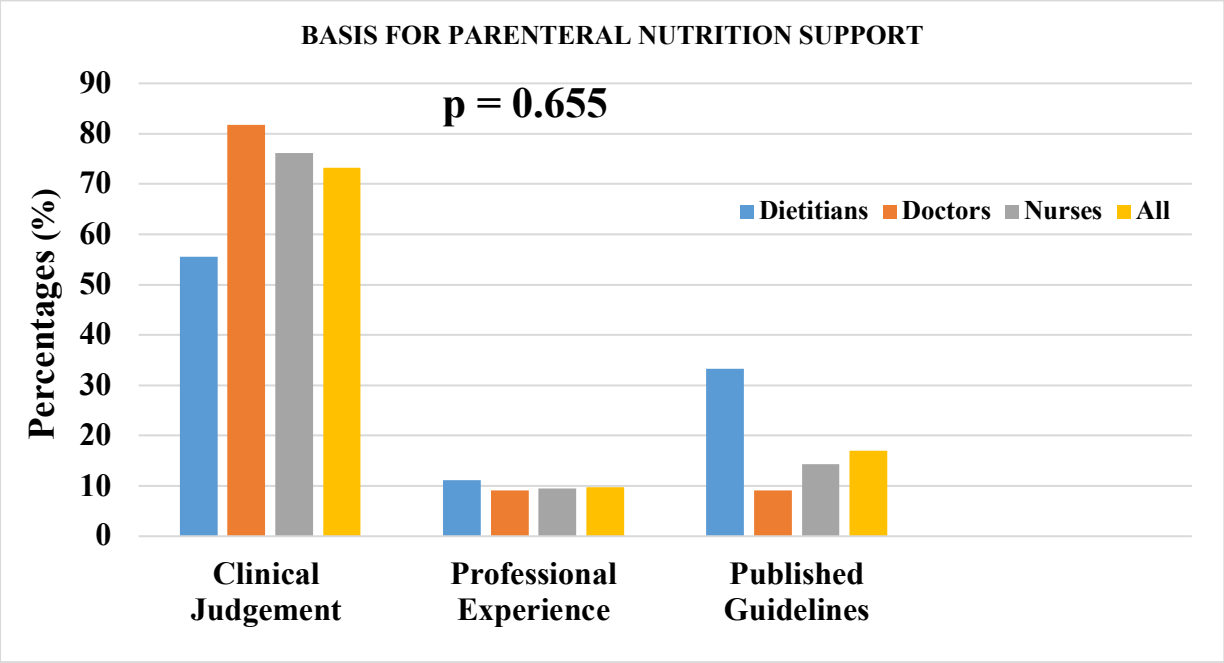

Figure 4.4B: Basis for parenteral nutrition support.

4.5 Enteral Nutrition Administration, Delivery and Monitoring

Table 4.5 shows enteral nutrition administration, delivery and monitoring practices of respondents. Regarding the optimal time to initiate enteral feeding, less than half of the health professionals (39%) reported initiating enteral feeding once gastric residual volume were below predefined threshold (Table 4.5). Most of the respondents reported that they used the nasogastric route for enteral feed delivery (93.8%) and the blind, bedside placement method in placing enteral feeding tubes (83.6%) (Table. 4.5). Pertaining to the usual procedure for checking feeding tube positions, most of the participants (62.6%) reported using auscultation of injected air. However, there was no association between the optimal timing to initiate enteral feeding, route of enteral feed delivery, procedure for placing enteral feeding tubes and the professions of the respondents (all p values > 0.005).

There was an association between pattern of enteral feed delivery, method of optimising enteral feeding and frequency of monitoring enteral nutrition support and the professions of the respondents (all p values < 0.05). More than half of the respondents indicated delivering enteral feed to patients with intermittent boluses (56.8%), and changing enteral feeding sets randomly/no pattern followed (65.7%) (Table 4.5). All the respondents indicated that they changed enteral feeding tubes daily. A similar proportion of the respondents indicated that they assessed feed tolerance every 4-6 hours until feeds were established (34.6%), and never assessed feed tolerance (32.7%).

More than two-thirds of the respondents reported using gastric residual volume to assess feed tolerance (69.5%), and either gastric suppression agents, prokinetic agents or post-pyloric feeding in optimizing enteral nutrition (67.7%). Similarly, 68.6% and 66.7% of respondents monitored enteral nutrition daily and used clinical signs/symptoms of intolerance to monitor enteral nutrition respectively.

Table 4.5: Enteral Nutrition Support Practices (N=118)

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Optimal timing for enteral nutrition initiation, N	87	27	22	38	
Mainly within 24 hours of ICU admission	18 (20.7)	6 (22.2)	2 (9.1)	10 (26.3)	0.348
As soon as the patient is haemodynamically stable, but within 5 days	30 (34.5)	9 (33.3)	11 (50.0)	10 (26.3)	
Once GRV are below predefined threshold	39 (44.8)	12 (44.4)	9 (41.0)	18 (47.4)	
Most common route, N	118	41	28	49	
Nasogastric	113 (95.8)	38 (92.7)	27 (96.4)	48 (98.0)	0.678
Orogastric	3 (2.5)	1 (2.4)	1 (3.6)	1 (2.0)	
Naso-jejeunal	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Surgical jejunostomy	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	
Percutaneous Endoscopic Gastrostomy	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	
Procedure for placing enteral feeding tubes, N	110	37	26	47	
Endoscopy-assisted	12 (10.9)	7 (18.9)	0 (0.0)	5 (10.6)	0.209
Blind, bedside placement	92 (83.6)	28 (75.7)	25 (96.2)	39 (83.0)	
Fluoroscopy-assisted	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
In the operating theatre	5 (4.5)	1 (2.7)	1 (3.8)	3 (6.4)	
Not Sure	1 (0.9)	1 (2.7)	0 (0.0)	0 (0.0)	
Procedure for checking feeding tube position, N	99	25	27	47	
Chest X-ray	7 (7.1)	1 (4.0)	1(3.7)	5 (10.6)	0.001*
Auscultation of injected air	62 (62.6)	7 (28.0)	23 (85.2)	32 (68.1)	
pH measurement / litmus paper	3 (3.0)	1 (4.0)	0 (0.0)	2 (4.3)	
Aspiration of bile stained fluid	25 (25.3)	14 (56.0)	3 (11.1)	8 (17.0)	
Not Sure	1 (1.0)	1 (4.0)	0 (0.0)	0 (0.0)	
Lowering end of tube in water to check for bubbles	1 (1.0)	1 (4.0)	0 (0.0)	0 (0.0)	

Table 4.5 (continued). Enteral Nutrition Support Practices.

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Pattern of feed delivery, N	111	37	26	48	
Continuous over 24 hours without any breaks	7 (6.3)	1 (2.7)	1 (3.8)	5 (10.4)	0.016*
Continuous, but with short holds for tolerance testing	32 (28.8)	(18.9)	5 (19.2)	20 (41.7)	
Continuous during the day, stopped during the night for several hours	9 (8.1)	4 (10.8)	0 (0.0)	5 (10.4)	
Intermittent boluses	63 (56.8)	25 (67.6)	20 (76.9)	18 (37.5)	
Frequency of changing feeding tubes, N	113	36	28	49	---
Only if clinically indicated	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Routine daily	113 (100)	36 (100)	28 (100)	49 (100)	
Never	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Frequency of changing feed giving set, N	105	33	25	47	
Never	3 (2.9)	1 (3.0)	1 (4.0)	1 (2.1)	0.675
Once a day	10 (9.5)	2 (6.0)	2 (8.0)	6 (12.8)	
Every time a new feed package is hung up	23 (21.9)	7 (21.2)	3 (12.0)	13 (27.7)	
Randomly	69 (65.7)	23 (69.7)	19 (76.0)	27 (55.1)	
Frequency of assessing feed tolerance, N	107	35	25	47	
Every 4-6 hours throughout ICU stay	26 (24.3)	7 (20.0)	3 (12.0)	16 (34.0)	0.071
Every 4-6 hours only until feeds established	37 (34.6)	8 (22.9)	10 (40.0)	19 (40.4)	
Once daily	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Never	35 (32.7)	18 (51.4)	9 (36.0)	8 (17.0)	
Prior to next feed	4 (3.7)	0 (0.0)	1 (4.0)	3 (6.4)	
Per feed	3 (2.8)	1 (2.9)	1 (4.0)	1 (2.1)	
Every few days	2 (1.9)	1 (2.9)	1 (4.0)	0 (0.0)	

Pearson's chi-square test, p-value < 0.05 was considered significant

Table 4.5 (continued). Enteral Nutrition Support Practices.

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Methods of assessing feed tolerance, N	118	41	28	49	
Gastric residual volume/aspirate volume	82 (69.5)	25 (61.0)	20 (71.4)	37 (75.5)	0.318
Number and nature of gastrointestinal Symptoms	53 (45.0)	25 (61.0)	11 (39.3)	17 (34.7)	0.035*
Intra-abdominal pressure monitoring	23 (19.5)	11 (26.5)	2 (7.1)	10 (20.4)	0.125
Methods of optimising EN, N	105	34	26	45	
Routine use of gastric suppression agents	17 (16.2)	2 (5.9)	2 (7.7)	13 (28.9)	0.009*
Routine use of prokinetic agents	14 (13.3)	2 (5.9)	4 (15.4)	8 (17.8)	
Routine use of post-pyloric feeding	3 (2.9)	0 (0.0)	2 (7.7)	1 (2.2)	
Above methods used when indicated	71 (67.6)	30 (55.6)	18 (69.2)	23 (51.1)	
Frequency of monitoring EN support, N	118	41	28	49	
Daily	81 (68.6)	31 (75.6)	12 (42.9)	38 (77.6)	0.017*
Only as clinically indicated	28 (23.7)	7 (17.1)	13 (46.4)	8 (16.3)	
Randomly	9 (7.6)	3 (7.3)	3 (10.7)	3 (6.1)	
Method of EN monitoring, N	117	40	28	49	
Compliance with enteral feeding protocols	67 (57.3)	26 (65.0)	11 (39.3)	30 (61.2)	0.082
Compliance with prescribed products	59 (50.4)	23 (57.5)	12 (42.9)	24 (49.0)	0.476
Compliance with prescribed rate	45 (38.5)	19 (47.5)	9 (32.1)	17 (34.7)	0.342
Compliance with nutritional goals	70 (59.8)	33 (82.5)	16 (57.1)	21 (42.9)	0.001*
Clinical signs/symptoms of intolerance	78 (66.7)	33 (82.5)	21 (75.0)	24 (49.0)	0.002*

Pearson's chi-square test, p-value < 0.05 was considered significant

4.6 Parenteral Nutrition Administration, Delivery and Monitoring

Table 4.6 shows parenteral nutrition administration, delivering and monitoring practices of respondents. Regarding initiation of parenteral nutrition, 46.3% and 36.6% of respondents indicated initiating parenteral nutrition as soon as clinical indication became apparent/obvious and within 3 days if enteral feeding is unsuccessful respectively.

Most of the respondents indicated providing requirements when enteral nutrition is not feasible as the usual rationale for parenteral nutrition (75.6%), and using a dedicated, single lumen in parenteral feed delivery (60.5%). However, less than half of them (40%) indicated changing parenteral nutrition giving sets randomly/with no pattern (40.0%) and monitoring parenteral nutrition daily (46.3%).

Generally, most of the respondents (73.2%) indicated using compliance with parenteral nutrition feeding guidelines to monitor parenteral nutrition. However, among the professions, a greater proportion of dietitians and nurses reported using compliance with nutritional goals (100%) and compliance with parenteral feeding guidelines (90.3%) respectively to monitor parenteral nutrition (Table. 4.6).

Table 4.6: Parenteral Nutrition Support Practices

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n(%)	P-value
Usual timing for parenteral nutrition initiation, N	41	9	11	21	
Mainly within 24 hours of ICU admission	12 (29.3)	1 (11.1)	3 (27.3)	8 (38.1)	0.325
As soon as clinical indication becomes apparent	19 (46.3)	4 (44.4)	6 (54.5)	9 (42.9)	0.813
Within 3 days if enteral feeding unsuccessful	15 (36.6)	5 (55.6)	4 (36.4)	6 (28.6)	0.372
After 7 days if enteral feeding unsuccessful	4 (9.8)	1 (11.1)	0 (0.0)	3 (14.3)	0.428
Immediately in malnourished patients	7 (17.1)	0 (0.0)	3(27.3)	4 (19.0)	0.257
Usual rationale for parenteral nutrition, N	41	9	11	21	
To provide requirements only when EN not possible	31 (75.6)	9 (100)	8 (72.7)	14 (66.7)	0.223
To provide requirements in all ICU patients	3 (7.3)	0 (0.0)	1 (9.1)	2 (9.5)	
To supplement EN in all malnourished patients	4 (9.8)	0 (0.0)	0 (0.0)	4 (19.0)	
To supplement EN in all patients who don't meet their requirements	3 (7.3)	0 (0.0)	2 (18.1)	1 (4.8)	
Commonly used vascular access, N	15 (37.5)	5 (55.6)	2 (18.2)	8 (40.0)	0.049*
Central Venous Catheter	16 (40.0)	2 (22.2)	3 (27.3)	11 (40.0)	
Peripherally inserted central catheter	1 (2.5)	0 (0.0)	1 (9.1)	0 (0.0)	
Haemodialysis Catheter	8 (20.0)	2 (22.2)	5 (45.5)	1 (5.0)	
Peripheral venous line					
Usual method of parenteral feed delivery, N	38	17	11	20	
Via dedicated, single lumen	23 (60.5)	5 (71.4)	6 (54.5)	12 (60.0)	0.831
Via dedicated port on multi-lumen line	14 (36.8)	2 (28.6)	5 (45.5)	7 (35.0)	
Via side-port of another line	1 (2.6)	0 (0.0)	0 (0.0)	1 (5.0)	
Via dedicated port of multichannel manifold	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	

Pearson's chi-square test, p-value < 0.05 was considered significant

Table 4.6 (continued). Parenteral Nutrition Support Practices

Variables	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Frequency of changing PN giving set, N	40	9	10	21	
Daily	13 (32.5)	3 (33.3)	1(10.0)	9 (42.9)	0.230
Every time a new bag is hung	11 (27.5)	3 (33.3)	2 (20.0)	6 (28.6)	
Randomly	16 (40.0)	3 (33.3)	7 (70.0)	6 (28.6)	
Never	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Other	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Frequency of monitoring of parenteral nutrition, N					
Daily	41	9	10	21	
1-3 times weekly	19 (46.3)	4 (44.4)	3 (27.3)	12 (57.1)	0.399
Randomly, as clinically indicated	5 (12.2)	1 (11.1)	3 (27.3)	4 (4.8)	
	17 (41.5)	4 (44.4)	5 (45.5)	8 (38.1)	
Methods of parenteral nutrition monitoring, N	41	9	11	21	
Compliance with parenteral feeding guidelines	30 (73.2)	7 (77.8)	4 (36.4)	19 (90.5)	0.004*
Compliance with prescribed product	15 (36.6)	6 (66.7)	3 (27.3)	6 (28.6)	0.105
Compliance with prescribed rate	15 (36.6)	7 (77.8)	1 (9.1)	7 (33.3)	0.006*
Compliance with nutritional goals	22 (53.7)	9 (100)	6 (54.5)	7 (33.3)	0.004*
Clinical signs/symptoms of intolerance	22 (53.7)	8 (88.9)	7 (63.6)	7 (33.3)	0.015*

Pearson's chi-square test, p-value < 0.05 was considered significant

4.7 Types of Enteral Formulas Administered

Figure 4.5 shows the types of enteral formulas administered. Majority of the respondents (31.0%) indicated that there was no usual starter feed administered. However, the commonly administered enteral formulas were standard feed without fiber (17.0%) and disease specific feeds (15.0%).

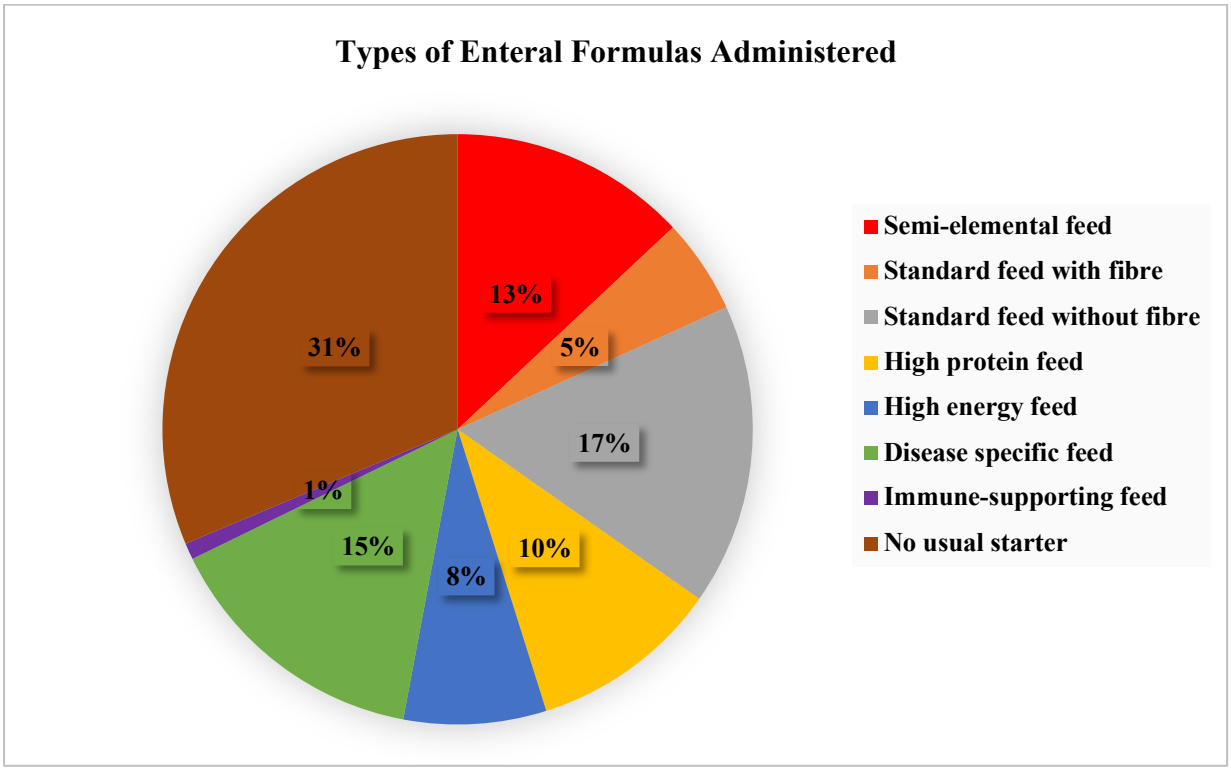

Figure 4.5: Types of enteral formulas administered

4.7.1 Frequency of Use of Enteral Formulas

Figure 4.6 details the frequency of using enteral formulas. Most of the respondents indicated that the often-used formulas were high energy feed (47.1%), high protein feed (37.3%) and disease specific feeds (33.7%). There was an occasional use of semi-elemental feed (36.1%), standard feed without fiber (34.3%) and standard feed with fiber (34.0%).

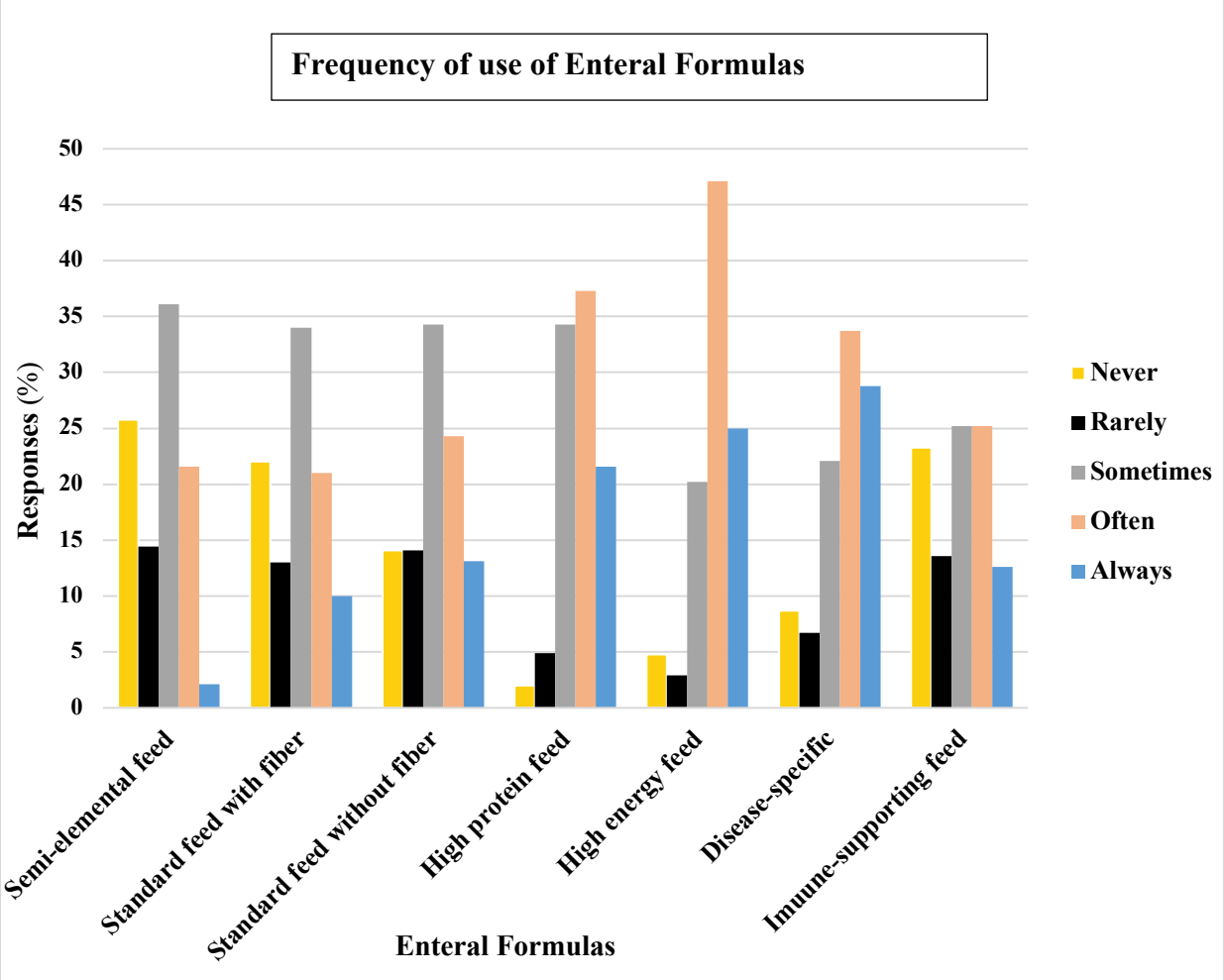

Figure 4.6: Frequency of use of enteral formulas

4.7.2 Types of Parenteral Products Administered

Figure 4.7 shows the types of parenteral products administered. The commonly administered parenteral products reported were All-in-one compounded bags (52.5%), and 3-chamber bags (22.5%).

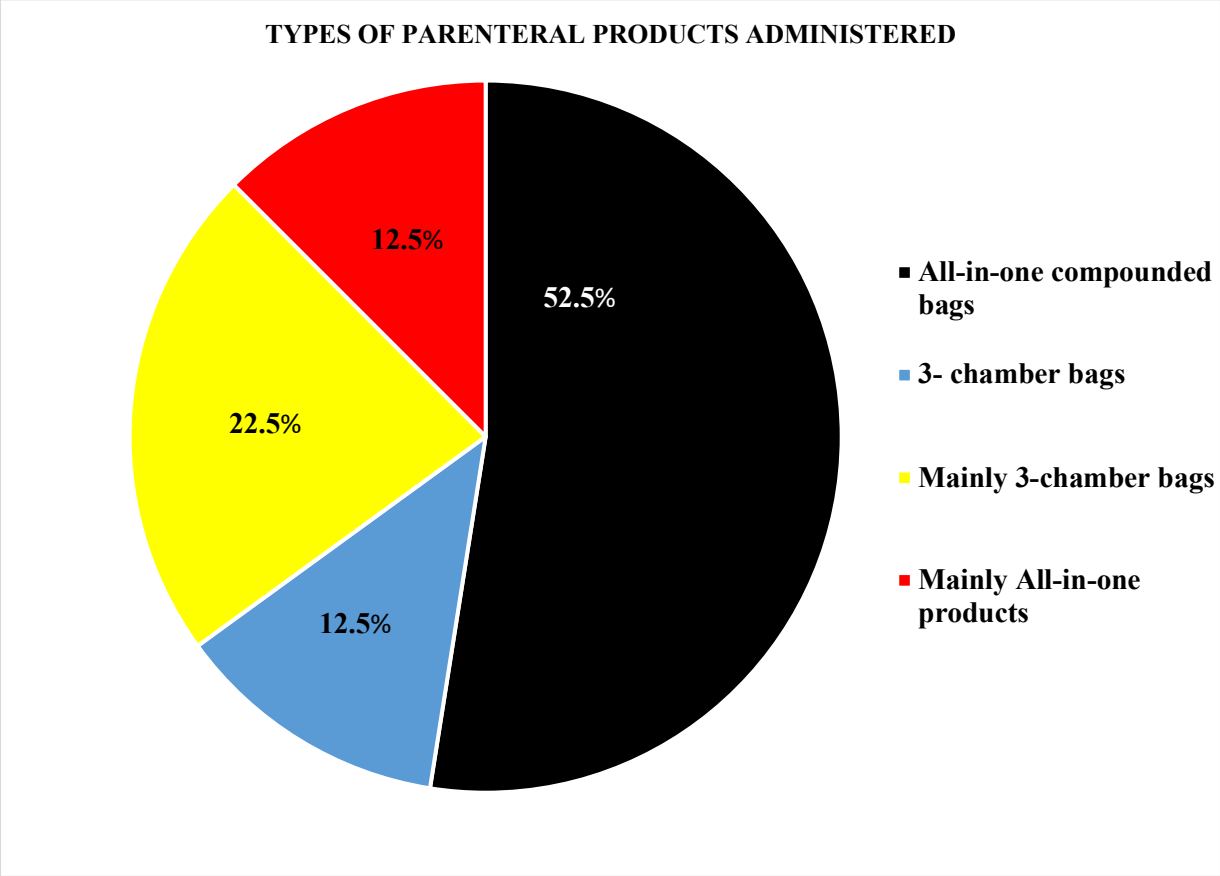

Figure 4.7: Types of parenteral products administered

4.7.3 Criteria for Selecting Enteral and Parenteral Nutrition Product

Table 4.7 shows the criteria for selecting enteral and parenteral products. The very important criteria for selecting enteral feeding products were patient tolerance (94.7%), and product features (75.5%). However, the criteria considered very important in selecting parenteral products were that, product met protein requirements (92.5%), and energy requirements (92.3%).

Table 4.7: Criteria for choice of enteral and parenteral nutrition product

Variables	Not Important at all n (%)	Somewhat Important n (%)	Very Important n (%)
Criteria for choice of enteral feeding product			
Cost	5 (4.3)	31 (27.0)	79 (68.9)
Product feature	0 (0.0)	27 (24.5)	83 (75.5)
Patient tolerance	0 (0.0)	6 (5.3)	108 (94.7)
Availability of hospital formulary	3 (2.7)	47 (41.6)	63 (55.8)
Service support from feed manufacturer	23 (20.9)	54 (49.1)	33 (30.0)
Criteria for choice of parenteral product			
Meet energy requirements	0 (0.0)	3 (7.7)	36 (92.3)
Meet protein requirements	0 (0.0)	3 (7.5)	37 (92.5)
Meets both energy and protein requirements	0 (0.0)	3 (10.7)	25 (89.3)
Appropriate electrolyte profile	0 (0.0)	6 (15.8)	32 (84.2)
Product detailer indication matches patient diagnosis	1 (2.6)	16 (42.1)	21 (55.3)
Glutamine-free	2 (5.6)	24 (66.7)	10 (27.8)
Glutamine-containing	2 (5.7)	19 (54.3)	14 (40.0)
Type of lipid	3 (8.6)	9 (25.7)	23 (65.7)
Cost	0 (0.0)	16 (44.4)	20 (55.6)
Shelf-life	1 (2.7)	8 (21.6)	28 (75.7)
Availability of hospital formulary	7 (18.9)	12 (32.4)	18 (48.6)
Service support from manufacturer	8 (22.2)	13 (36.1)	15 (41.7)
Methods and frequency of monitoring of parenteral nutrition support	2 (5.7)	9 (25.7)	24 (68.6)

4.8 Self Report of Skills and Competence in Nutrition Support

Tables 4.8 shows the skills and competence of health professionals in nutrition support. Less than half of the respondents (42.0%) reported that they had an above average competence in nutrition support. There was an association between the level of competence in nutrition support and the professions of the respondents (p= 0.001). Among the professionals, greater proportion of dietitians (69.2%) reported they had an above average competence in nutrition support.

Table 4.8: Skills and Competence in Nutrition Support (N =114)

Level of competence / skills	Total n (%)	Dietitians n(%)	Doctors n(%)	Nurses n (%)	P-value
Expert / Highly skilled	6 (5.3)	2 (5.1)	1 (3.7)	3 (6.1)	0.001*
Above average	48 (42.0)	27 (69.2)	6 (22.2)	15 (30.6)	
Satisfactory / average	44 (38.6)	8 (20.5)	16 (59.3)	20 (40.8)	
Below average	15 (13.2)	2 (5.1)	3 (11.1)	10 (20.4)	
Totally unskilled	3 (2.6)	0 (0.0)	2 (7.4)	1 (2.0)	

Pearson's chi-square test, p-value < 0.05 was considered significant

CHAPTER FIVE

5.0 DISCUSSION

5.1 Respondents Characteristics and Hospital Demographics

The participants were mainly nurses (41.5%). The high turnout of nurses in this study could be associated with them being majority in health care in Ghana. From this present study, majority of the respondents (51.7%) were in the Greater Accra region. This could be attributed to the uneven distribution of dietitians in the various regions of Ghana, with majority of them working in the Greater Accra region (Aryeetey, Boateng & Sackey, 2014; Boateng, Abban & Asante, 2016). Furthermore, given that dietitians were the pivotal group in identifying hospitals involved in nutrition support, it was evident that majority of the respondents would be from the Greater Accra region.

5.2 Structure of Nutrition Support

Less than a quarter of the respondents (22.0%) indicated that they had a formal nutrition support guideline in their facility. Health professionals using published guidelines may have done so personally. However, as a group there might not be any available documented nutrition support guideline in their facilities. On the contrary, a survey in 350 hospitals in 20 European countries had 75.7% of ICUs using an enteral feeding guideline (Roynette et al., 2008). They asserted that ICUs with NSTs were more likely to have a nutrition support guideline available compared to those without NSTs. Facilities that used a formal, written enteral feeding guideline recorded significant improvement in their practice than those that do not (Heyland et al., 2010).

However, more than half (54.9%) of the respondents reported that they had a formal nutrition support team. Contrary to this finding, another study had 46% of respondents indicating

presence of a nutrition support team in their hospital (Hill, 2015). Over one-third of ICUs (36.1%) surveyed in Europe had a nutrition support team (NST), ranging from less than 5% in Germany, Hungary and Finland to about 75% in the UK (Roynette et al., 2008). In agreement with these findings, a previous study on the structure and performance of NST in Germany established that a total of 47 NSTs existed in Germany reflecting a 5.6% prevalence (Senkal, Doorman, Stehle, Shang and Suchner, 2002). The probable reasons for not having a NST may include lack of skills and competence in nutrition support, time constraint, low staff strength and lack of resources.

There was an association between the representation of dietitians on the NST and the professions of the respondents ($p= 0.002$). This shows that the dietitian is an integral part of the nutrition support team as perceived by the other team members. Pharmacists (11.9%) were underrepresented in the nutrition support team of most hospitals. This is in contrast with the traditional assertion that nutrition support team is mainly comprised of four (4) key professionals; doctors, nurses, dietitians and pharmacist (National Collaborating Centre for Acute Care (UK, 2006). Moreover, Hvas et al., (2014), confirm results from this present study that composition of nutrition support teams is diverse both locally and across countries. Lopes et al., (2019), and ASPEN Strategic Taskforce et al., (2010) reiterate that the structure and activities of the NST vary according to the needs, organizational culture, available personnel and the hospital characteristics. Results from this present study confirms the finding that despite the usefulness of nutrition support teams, they are non-existent in majority of hospitals globally (Ceniccola et al., 2016). Furthermore, Schneider, (2016) recommends that for a nutrition support team to be effective, their practice ought to be evidenced-based and their performance measured. This can be achieved through cross discipline training, certification and regulation of practice based on approved standards.

5.3 Nutrition Support Practices

Majority of the respondents (84.7%) indicated that they routinely screened patients in their facility. Nutrition screening is a simple and rapid process that helps to identify patients at risk of malnutrition or malnourished before hospital admission (Reber et al., 2019). Although, dietitians were noted to be the professionals mainly responsible for nutrition screening, a greater proportion of nurses reported screening patients routinely. This is probably due to the high ratio of beds to dietitians compared to nurses in the hospitals. Similarly, in a cross-sectional study conducted in 21,007 patients from 325 hospitals in 25 European countries, only half of the hospitals routinely screened patients (Schindler et al., 2010). On the contrary, findings by Abi et al. (2018) showed that majority of the hospitals they surveyed in Lebanon did not screen patients routinely. Early identification of patients at risk of malnutrition or who are malnourished is essential for an adequate and timely initiation of nutrition support (Reber et al., 2019). Nutrition screening or nutritional status assessment should be routinely performed as a mandatory initial key step in the assessment process on each patient on admission (Kozeniecki, McAndrew & Patel, 2016; Miller, Kiraly, Lowen, Martindale & McClave, 2011; White et al., 2012). This should be done by an expert (dietitian) using both subjective and objective parameters such as anthropometry, biochemicals test, clinical findings and dietary history (Reber et al., 2019).

Majority of the respondents reported using body mass index only (80.5%) and the combined nutrition assessment methods (ABCD approach) (78.8%) in screening patients. Of all these screening tools listed, the nutrition risk screening 2002 (NRS-2002) was the least used (0.85%). However, NRS-2002 is a recommended and globally the most commonly used nutrition risk screening tool for adults in hospitals (Reber et al., 2019). Among the professionals, a greater proportion of dietitians (78.0%) used the combined nutrition assessment methods (ABCD

approach) in screening patients ($p< 0.001$). This is probably because it is less time consuming and considers both objective and subjective parameters related to a patient's food and nutrient intake, lifestyle and medical history. This is consistent with a previous study, where less than two-third of dietitians mainly used the combined ABCD approach for nutrition screening (Hill, 2015). Contrary to these findings, the ESPEN recommends the following nutrition risk screening tools; the Nutrition Risk Screening 2002 (NRS-2002), Malnutrition Universal Screening Tool (MUST) and the Mini Nutritional Assessment (MNA) (Kondrup, Allison, Elia, Vellas & Plauth, 2003).

5.3.1 Factors Influencing Nutrition Support Decision-Making

The main method used by most respondents in estimating nutritional requirements of patients was body weight-based methods (59.3%). The use of this method can be attributed to the less time spent and quick results involved. Contrary to the findings of this present study, current evidence recommends indirect calorimetry (IC) as the gold standard in determining calorie requirements. However, the restraints of using indirect calorimetry in routine clinical practice includes the cost and maintenance of equipment and time constraints. Therefore, in the absence of indirect calorimetry, weight-based predictive equation is the accepted alternative with clinical judgment (Sioson et al., 2018).

More than half of the respondents reported using unsuccessful oral nutrition and poor nutritional status as a determinant of initiating enteral feeding. Enteral tube feeding is indicated in malnourished patients or at risk patients with inadequate oral intake, and functional accessible gastrointestinal tract (National Collaborating Centre for Acute Care (UK), 2006). Current ASPEN/SCCM and ESPEN guidelines recommend initiating enteral feeding preferably within 24–48 hours in the critically ill patient who is unable to maintain regular

intake (McClave et al., 2016; Mehta et al., 2018). However, a significantly higher proportion of doctors (60.7%) reported using presence of bowel sounds in initiating enteral feeding (p= 0.001). Bowel sounds (passing of flatus or stool) are only indicative of contractility of the GIT and not related to mucosal integrity, barrier functions and absorptive capacity of the GIT (McClave et al., 2016).

Regarding the initiation of parenteral nutrition, less than half of the respondents indicated using apparent/obvious clinical indications and when enteral feeding is unsuccessful within 3 days to initiate parenteral feeding. Parenteral nutrition should be initiated as soon as possible when enteral nutrition is not feasible (McClave et al., 2016). Similarly, in another study more than three fourth of the respondents (78%) indicated that they initiated parenteral nutrition when the presence of gastrointestinal factors were likely to make enteral feeding unsuccessful (Hill, 2015). Parenteral nutrition is indicated in this case to ensure that the patient meets or is towards meeting their nutritional goals.

5.3.2 Basis for Nutrition Support Decision

There was an association between the use of either clinical judgement, professional experience, and published guidelines as the basis for enteral nutrition support decision-making and the professions of the respondents (all p values < 0.05). Among the professionals, a significantly higher proportion of doctors (96.6%) reported using mainly clinical judgement in making enteral nutrition support decisions. Contrary to findings by Hill, 2015, the dietitian and doctor subgroup indicated combining published guidelines and clinical judgement to make enteral nutrition support decisions. Clinical judgment is a central element of the work of health professionals. It is honed through practice, professional experience, knowledge and continuous critical thinking and reasoning (Kienle & Kiene, 2011).

Similarly, more than two-thirds of the respondents (73.2%) indicated using clinical judgement as the basis for parenteral nutrition decision-making. On the contrary, less than half of the respondents (43.0%) mainly used clinical judgement in making parenteral nutrition support decisions (Hill, 2015). Clinical judgement relies upon both experience and evidence-based knowledge, specific to the health professional's area of specialty (Vo, Smith & Patton, 2020). The high reliance on clinical judgement and professional experience in this study is probably due to the absence of nutrition support guidelines in most cases and evidence specific to a patient's condition. Nonetheless, experts caution that the clinical judgment of the health professional must always take precedence over published recommendations based on individual circumstances of the patient (McClave et al., 2016).

5.3.3 Enteral Nutrition Administration, Delivery and Monitoring

Less than half of the respondents (39.0%) indicated initiating enteral feeding once gastric residual volume were below predefined threshold. On the contrary, most respondents initiated enteral feeding within 24 hours (47%) or 48 hours (22%) of ICU admission (Hill, 2015). However, less than one-third of the respondents (20.7%) indicated to initiate enteral feeding within 24 hours of ICU admission. Gastric residual volume was mainly used as a measure to assess feeding tolerance and risk of aspiration. Gastric residual volume is mainly used as a preventive measure to assess the risk of aspiration before enteral feeding is initiated. The ASPEN/SCCM and ESPEN guidelines recommend that early EN be initiated within 24–48 hours in the critically ill patients who are haemodynamically stable and have a functioning GIT (Kreymann et al., 2006; McClave et al., 2016).

Studies recommend that, gastric feeding (through nasal or oral gastric tubes) should be attempted unless there is a contraindication (Pearce & Duncan, 2002; Sioson et al., 2018). The nasogastric route is the preferred route of enteral feed delivery due to the easy access and less

risk of infection (Pearce & Duncan, 2002). Most of the respondents (93.8%) indicated that they used the nasogastric route for enteral feed delivery. Despite it benefits, the nasogastric tube is not recommended for long term enteral nutrition due to risk of tube misplacement ((Pearce & Duncan, 2002). Furthermore, it is reported that critically ill patients often develop large gastric residual volumes during nasogastric feeding due to poor gastroduodenal motility (Davies et al., 2002).

Most the respondents (83.6%) reported using the blind, bedside placement method in placing enteral feeding tubes. Due to the potentially life-threatening outcomes associated with bedside blind placement of feeding tubes, all safety measures must be ensured prior and during the tube insertion. Training and competency assessment of all clinicians involved in tube insertion should be clearly defined (Boullata et al., 2017). However, documented evidence gathered over the years assert that 1 to 2% of enteral feeding tubes that are placed blindly at the bedside enter the airway undetected, resulting in pulmonary injury that is not preventable even by a single confirmatory radiograph (Krenitsky, 2011). The routine use of blind, bedside placement in this study could be attributed to ease of the procedure, low cost and lack of familiarity with the evidence on the risks associated with the procedure (Krenitsky, 2011).

More than half of the respondents (62.6%) indicated that they used auscultation of injected air in checking feeding tube positions. Similarly, in another study the tube position of most cases (84.7%) were checked by the auscultation of injected air (Roynette et al., 2008). Among the respondents, less than a quarter (7.0%) of them indicated using chest x-ray in checking the position of feeding tubes. However, chest x-ray is recommended as the gold standard in checking correct nasogastric tube positioning before initiating EN (McClave et al., 2016). The drawbacks associated with it use include possible misinterpretation, repeated exposure to x-rays, extra cost and feeding delays (Boeykens, 2018).

Contrary to the use of intermittent boluses (56.8%) pattern of feed delivery in this current study, Roynette and colleagues (2008), reported that majority of the ICUs surveyed instituted continuous feeding (86.6%) rather than intermittent bolus (13.4%) feeding. In comparison with cited studies, it is evident that bolus feeding is as effective as continuous (16-24 hours) feeding taking into consideration the issues associated with each pattern of feed delivery (National Collaborating Centre for Acute Care (UK), 2006). In agreement with expert consensus, it is recommended that patients should be monitored daily for tolerance of enteral nutrition (Boeykens, 2018). This is to ensure that patients gradually move towards meeting their nutrition goals. Interestingly, a similar proportion of respondents indicated that they assessed feed tolerance every 4-6 hours until feeds were established (34.6%), and never assessed feed tolerance (32.7%). This is probably due to time constraints on the side of the clinicians, lack of personnel and lack of knowledge on the benefits of assessing feed tolerance in nutrition support.

Current guidelines suggest that GRVs should not be used as part of routine tolerance monitoring in patients receiving EN. They have no correlation with incidence of pneumonia regurgitation, or aspiration (McClave et al., 2016). However, in this study more than two thirds (69.5%) of the respondents reported using gastric residual volume to assess feed tolerance in optimizing enteral nutrition. The use of prokinetic agents is recommended for patients at high risk of aspiration (McClave et al., 2016). These decisions may probably be based on clinical judgement or experience of the health professionals. Findings from this present study agrees with research evidence recommending daily assessment of GI symptoms as part of clinical monitoring of enteral nutrition (McClave et al., 2016). Daily monitoring of enteral nutrition helps to monitor tolerance, risk of aspiration and in turn ensuring that patients meet their nutritional goals.

5.3.4 Parenteral Nutrition Administration, Delivery and Monitoring

Approximately half of the respondents (46.3%) reported initiating parenteral nutrition as soon as clinical indication became apparent/obvious. In contrast, findings from Hill (2015) showed that 20% of respondents indicated initiating parenteral nutrition typically started within 24 hours of ICU admission. The apparent clinical indication may vary and probably be dependent on the patient's condition. Any obvious indication that is likely to interfere with oral food intake within 3 days must be considered.

Regardless of the timing, parenteral nutrition is clearly indicated if enteral nutrition or caloric targets are not feasible. Comparatively, PN in the first 24 hours of admission and standard care does not show any significant differences in mortality, quality of life, or infection (Itzhaki & Singer, 2020). Research recommends commencing PN only if EN is contraindicated or caloric targets are not feasible (Blaser et al., 2012). More than two-thirds of the respondents (73.2%) indicated using compliance with parenteral nutrition feeding guidelines to monitor parenteral nutrition. The varied responses regarding the administration, delivery and monitoring of nutrition support practices can be attributed to the absence of a documented nutrition support guideline and the lack of cross discipline collaboration among the nutrition support team members.

5.4 Types of Nutrition Products, Frequency of Use and Selection Criteria.

Majority of respondents (31%) indicated that no usual starter was administered. Research recommends using a standard polymeric formula as the goal standard for initiating EN whilst routine use of all specialty formulas and disease-specific formulas is not recommended (Choban et al., 2013; Itzhaki & Singer, 2020; McClave et al., 2016). The very important criterion for enteral feeding product choice was patient tolerance (94.7%). Similarly, according

to Hill (2015) the most important criterion for enteral product choice was patient tolerance (97%).

Due to increased costs of healthcare and the shift toward evidence-based practice, it is essential that clinicians employ clinical judgment with regard to quality, efficacy, tolerance and also cost in selection of an appropriate EN formula (Brown et al., 2015; McClave et al., 2016; Sioson et al., 2018). Furthermore, the criterion considered very important in parenteral product selection is that product meets protein requirements (92.5%). Meeting the protein and energy requirements of patients is a key goal in reducing the risk of malnutrition. In another study, the respondents indicated the most important criterion in parenteral product selection was meeting nutrition requirements (91%) (Hill, 2015).

All-in-one compound bags (52.5%) were the commonly administered parenteral feeding product. Similarly, ESPEN guidelines recommend that parenteral nutrition admixtures should be administered as a complete all-in-one bag (Brown et al., 2015). Among the available feeding products All-in-one compound bags are considered the least expensive. The use of All-in-one compound bags prevents component manipulation and requires only one intravenous access, thereby reducing risk of contamination and infection (Singer et al., 2018).

5.5 Respondents Skills and Competence in Nutrition Support

Findings from this study showed the disparity in nutrition support competence among health professionals involved in nutrition support. There was an association between the level of competence in nutrition support and the professions of the respondents ($p= 0.001$). More than two third of dietitians (69.2%) reported that they had an above average competence, whilst the doctors (59.0%) indicated having an average competence in nutrition support. This disparity can be attributed to lack of time and knowledge deficits specific to nutrition therapy for

physicians in critical care. This is in agreement with evidence from recent studies on the nutrition knowledge of physicians (Adamski, Gibson, Leech & Truby, 2018; Aggarwal et al., 2018; Mogre et al., 2018) .

The disparity in nutrition support competence among the respondents raises concern about the effectiveness and efficiency of the nutrition support team. The differences in nutrition support competence confirms the need for training or a certification as the process of validating an individual's qualification and level of knowledge to be involved in nutrition support based on regulated standards (Itzhaki & Singer, 2020).

5.6 Conclusion

Findings of this study showed that although the health professionals were involved in nutrition support, most of their practices were not consistent with recommended or published guidelines. Most of them relied greatly on clinical judgement as the basis for enteral and parenteral nutrition decision making.

5.7 Limitations

1. The study did not consider years of work experience in relation to nutrition support competence assessment.
2. Considering the nature of the data collection there is likelihood of selection bias towards dietitians.
3. Another limitation is that the study did not address the different roles of the nutrition support team members.

5.8 Recommendations

1. Future research can focus on barriers affecting the implementation of recommended or published guidelines among the nutrition support team.
2. Documented nutrition support guidelines should be made available and easily assessible in health facilities in Ghana.
3. Further research could investigate and document the role of the Ghanaian dietitian in Nutrition Support.
4. Health facilities and professional associations should organize periodic workshops and training for clinicians involved in nutrition care of patients to close the knowledge gap.

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APPENDICES

APPENDIX A: INFORMATION AND INFORMED CONSENT

Dear Respondent,

I am Prince Kweku Yalley Abban, final year Msc. Dietetics Student of the school of Biomedical and Allied Health Sciences, University of Ghana. I am carrying out a research on **"NUTRITION SUPPORT PRACTICES IN GHANAIAN HOSPITALS"** in pursuance of my MSc. degree in Dietetics. This study seeks to investigate nutrition support and related practices in Ghanaian hospitals. As part of this study you would be required to complete a survey on classification of dietitians in nutrition support in Ghana. You would also complete a nutrition support practices survey for health professionals working in facilities where nutrition support is offered. This would cover hospital demographics, profile of nutrition prescribers and nutrition support, delivery and monitoring practices.

Please respond carefully and sincerely to the best of your knowledge. All information given will be kept confidential and used for the research purpose only. Participation in this survey is completely voluntary and you are free to withdraw your participation at any stage of this study without giving any reason. There would be no compensation.

Thank you.

Researcher's Contact	Principal Investigator / Supervisor's Contact
Prince K. Yalley Abban	Dr. Laurene Boateng
Department of Dietetics	Department of Dietetics
School of Biomedical and Allied Health Sciences	School of Biomedical and Allied Health Sciences
University of Ghana	University of Ghana
Tel: 0547947392	Tel: 0244742893

INFORMED CONSENT FORM

TITLE: NUTRITION SUPPORT PRACTICES IN GHANAIAN HOSPITALS

STUDENT: PRINCE K. YALLEY ABBAN

PRINCIPAL INVESTIGATOR: DR. LAURENE BOATENG

ADDRESS: SCHOOL OF BIOMEDICAL AND ALLIED HEALTH SCIENCES

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

KORLE BU CAMPUS.

I have been invited to take part in this study for the research titled above. My role is to complete an attached questionnaire. I acknowledge that the research procedures have been explained to me and all questions have been answered to my satisfaction. I have been informed that the confidentiality of the information I will provide will be safeguarded and that the privacy and anonymity will be ensured in the collection, storage and publication of the research material.

I…… have fully understood the aims, methods and collections of participation in this study, I therefore consent to my participation.

…… ……

Participant's signature Date

…… ……

Researcher's signature Date

APPENDIX B: QUESTIONNAIRE

DEPARTMENT OF NUTRITION AND DIETETICS,

SCHOOL OF BIOMEDICAL AND ALLIED HEALTH SCIENCES

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

QUESTIONNAIRE ON ‘’NUTRITON SUPPORT PRACTICES IN GHANAIAN HOSPITALS”.

<u>PHASE 1</u>: NUTRITION SUPPORT DIETITIANS IN GHANA SURVEY <u>(FOR DIETITIANS ONLY)</u>

1. Name of hospital?

   ……

2. Classification of hospital. [ ] Public [ ] Private

3. What is the bed capacity of your hospital?

   [ ] Less than 100

   [ ] 100 -500

   [ ] More than 500 but less than 1000

   [ ] Above 1000

4. How many dietitians are in your hospital? .....

a) How many are permanent? ……..

b) How many are on contract or volunteers? …….

5. Does your work in the hospital involve nutrition support (oral nutrition supplements, enteral/tube feeding, parenteral nutrition) for patients?

   [ ] Yes [ ] No

6. If Yes, (to question no 5) are patients who need nutrition support referred to you (the dietitian)?

   [ ] Yes [ ] No

7. If Yes (to question no 6) please estimate how many nutrition support cases were referred to you last month …….

<u>PHASE 2</u>: NUTRITION SUPPORT PRACTICES SURVEY FOR HEALTH PROFESSIONALS WORKING IN FACILITIES WHERE NUTRITION SUPPORT IS OFFERED

Please complete this survey to best reflect your overall practices in nutrition support.

1. Please indicate your region of location?
   [ ] Western
   [ ] Central
   [ ] Eastern
   [ ] Volta
   [ ] Greater Accra
   [ ] Brong Ahafo
   [ ] Ashanti
   [ ] Northern
   [ ] Upper East
   [ ] Upper West

2. Type of specialty area where you practice (multiple options possible)
   [ ] General (OPD)

[ ] Surgical

[ ] Medical

[ ] Cardiothoracic

[ ] Neuro

[ ] Burns

[ ] Trauma

[ ] Intensive Care Unit / Emergency

[ ] Other…. Please specify……..

3. Does the hospital have a formal Nutrition Support Team?

   [ ] Yes [ ] No

4. If yes, select which professions are represented on the team (multiple choices possible):

   [ ] Dietitian

   [ ] Nurse (General)

   [ ] Nurse (ICU-trained)

   [ ] Medical doctor (General practitioner)

   [ ] Medical doctor (Specialist)

   [ ] Pharmacist

   [ ] Other (Please specify) **…….. ……..**

5. Select your own professional qualification

   [ ] Dietitian

   [ ] Nurse (General)

   [ ] Nurse (ICU-trained)

   [ ] Nurse (ICU Unit Manager)

   [ ] Medical doctor (general practitioner)

   [ ] Medical doctor (specialist physician)

   [ ] Medical doctor (anaesthesiologist)

[ ] Medical doctor (surgeon)

[ ] Medical doctor (intensivist)

[ ] Medical doctor (other specialist)

6. Is nutrition screening or nutritional status assessment routinely practiced in your hospital?

   [ ] Yes [ ] No

7. If yes, what is the profession of the person who mainly performs this assessment?

   [ ] Dietitian

   [ ] Nurse (General)

   [ ] Nurse (ICU-trained)

   [ ] Medical doctor (General practitioner)

   [ ] Medical doctor (Specialist)

8. Which nutrition screening/assessment methods or tools are used (multiple choices possible):

   [ ] BMI/body weight assessment

   [ ] Subjective Global Assessment

   [ ] Nutrition Risk Index

   [ ] Prognostic Nutrition Index

   [ ] Hospital Prognostic Index

   [ ] Combination of anthropometric, biochemical, clinical and dietary (ABCD approach)

   [ ] Don't know/not sure

   [ ] Other (Please specify) …….

9. Usual method for calculating nutritional requirements (multiple choices possible)

[ ] ESPEN/ASPEN or other published guidelines

[ ] Clinical judgement

[ ] Indirect calorimetry

[ ] Illness severity

[ ] Body weight-based methods

[ ] Formulas (Harris-Benedict, Schofield or other)

[ ] Don't know/not sure

[ ] Other (Please specify) …….

10. Which criteria determine whether you commence enteral nutrition support (multiple choices possible)

[ ] First day in ICU

[ ] Low gastric residual volume/aspirate volumes

[ ] Haemodynamic stability

[ ] Reasonable gastrointestinal function

[ ] Presence of bowel sounds

[ ] Low intra-abdominal pressure

[ ] Reasonable nutritional status of patient

[ ] Presence of any gastrointestinal symptoms

[ ] Poor nutritional status of patient

[ ] Unsuccessful oral nutrition

11. Does the ICU have formal, written nutrition support protocol(s)?

[ ] No

[ ] Yes, for enteral nutrition

[ ] Yes, for parenteral nutrition

[ ] Yes, for both enteral and parenteral nutrition

[ ] Don't know / Not sure

Enteral Nutrition Support

17. What is the basis for your enteral nutrition decision-making (multiple choices possible):

[ ] Clinical judgement

[ ] Professional experience

[ ] Published guidelines (ESPEN/ASPEN, other professional society)

18. What is the optimal timing for the initiation of enteral nutrition?

[ ] Mainly within 3 days of ICU admission

[ ] As soon as the patient is haemodynamically stable, but within 5 days

[ ] Once gastric residual volumes are below our pre-defined threshold

19. Indicate your most commonly used route of enteral nutrition delivery

[ ] Nasogastric

[ ] Orogastric

[ ] Naso-jejunal

[ ] Surgical jejunostomy

[ ] PEG

[ ] Other (Please specify) ……

20. Indicate your usual procedures for placing enteral feeding tubes

[ ] Endoscopy-assisted

[ ] Blind, bedside placement

[ ] Fluoroscopy-assisted

[ ] In the operating theatre

[ ] Other (Please specify) …….

21. Indicate your usual procedure for checking the position of enteral feeding tubes

[ ] Chest X-ray

[ ] Auscultation of injected air

[ ] pH measurement/litmus paper

[ ] Aspiration of bile-stained fluid

[ ] Other (Please specify) …….

23. Indicate your usual pattern of enteral nutrition delivery

[ ] Continuous over 24 hours without any breaks

[ ] Continuous, but with short holds for tolerance testing/gastric aspirations

[ ] Continuous during the day, stopped during the night for several hours

[ ] Intermittent boluses

24. Usual frequency of changing enteral feeding tubes

[ ] Only if clinically indicated (blockages, dislodgement etc.)

[ ] Routine daily

[ ] Never

25. Usual frequency of changing enteral feed giving sets

[ ] Never

[ ] Once a day

[ ] Every time a new feed package is hung up

[ ] Randomly (no specific routine)

26. Usual frequency of assessing enteral feed tolerance

[ ] Every 4-6 hours throughout ICU stay

[ ] Every 4-6 hours only until enteral feeds established

[ ] Once daily

[ ] Never

[ ] Other (Please specify) …….

27. Usual method of assessing enteral feed tolerance (multiple choices possible)

[ ] Gastric residual volume/aspirate volume

[ ] Number and nature of gastrointestinal symptoms

[ ] Intra-abdominal pressure monitoring

27. Enteral formula commonly used to initiate feeding

[ ] Semi-elemental feed

[ ] Standard feed with fibre

[ ] Standard feed without fibre

[ ] High protein feed

[ ] High energy feed

[ ] Disease-specific feed (e.g. Diabetic, renal etc)

[ ] Immune-supporting feed

[ ] No usual starter, depends on clinical conditions

28. Frequency of use of enteral feed types. For each enteral feed type indicate the frequency of use (never, rarely, sometimes, often, always).

Semi-elemental feed

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Standard feed with fibre

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Standard feed without fibre

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

High protein feed

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

High energy feed

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Disease-specific feed (E.g. Diabetic, renal etc)

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Immune-supporting feed

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

29. Indicate the criteria which determine the choice of enteral feeding product. For each indicate the importance of the factor (not important at all, somewhat important, very important)

Cost

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Product features

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Patient tolerance

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Availability on hospital formulary

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Service support from feed manufacturer

[ ] Not Important at all [ ] Somewhat important [ ] Very important

30. Usual methods of optimizing enteral nutrition

[ ] Routine use of gastric suppression agents

[ ] Routine use of prokinetic agents

[ ] Routine use of post-pyloric feeding

[ ] Above methods only applied when relevant problems with enteral feeding arise

31. Usual frequency of monitoring enteral nutrition support

[ ] Daily

[ ] Only as clinically indicated

[ ] Randomly

32. Usual methods of monitoring enteral nutrition support (multiple choices possible)

[ ] Compliance with enteral feeding protocols

[ ] Compliance with prescribed product

[ ] Compliance with prescribed rate

[ ] Compliance with nutritional goals

[ ] Clinical signs/symptoms of intolerance

Oral Nutrition Supplements

31. Does the facility have a protocol for the use of oral nutrition supplements?

[ ] Yes [ ] No

32. Usual rationale for use of oral nutrition supplements (multiple choices possible)

[ ] To replace ward diet

[ ] To supplement ward diet

[ ] To avoid enteral tube-feeding

[ ] To supplement enteral tube-feeding

[ ] To supplement parenteral nutrition

[ ] To supplement energy

[ ] To supplement protein

33. Frequency of assessment of tolerance and patient acceptability of oral nutrition supplements.

[ ] Daily

[ ] Randomly

[ ] Never

34. Frequency of use of oral supplement types. For each oral supplement type indicate the frequency of use (never, rarely, sometimes, often, always).

Semi-elemental drink

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

High energy drink

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

High protein drink

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Fibre-containing drink

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Immune-supporting drink

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Disease-specific (e.g. Diabetic, Renal etc)

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

Oral glutamine

[ ] Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always

35. Indicate the criteria which determine the choice of oral supplement. Indicate the factor of most importance.

[ ] Cost

[ ] Product features

[ ] Patient acceptability

[ ] Availability on hospital formulary

[ ] Service support from feed manufacturer

36. If you agree to share your written enteral or parenteral nutrition protocols in an anonymized/de-identified form to add to study data, **kindly attach them.**

37. How competent/skilled do you consider yourself in nutrition support?

[ ] Expert/Highly skilled – there is nothing to do with nutrition support I cannot manage

[ ] Above average – I can manage most nutrition support with confidence

[ ] Satisfactory/average – I get by, unless the patient is complex

[ ] Below average – I am not confident in managing most nutrition support

[ ] Totally unskilled – I don't have even basic knowledge of nutrition support

Parenteral Nutrition Support

NOTE : Please ignore this section if you are not involved in parenteral nutrition

38. What is the basis for parenteral nutrition support decision-making?

[ ] Clinical judgement

[ ] Professional experience

[ ] Published guidelines (ESPEN/ASPEN, other professional society)

39. Indicate the usual timing of parenteral nutrition support initiation (multiple choices possible)

[ ] Mainly within 24 hours of ICU admission

[ ] As soon as a clinical indication becomes apparent

[ ] Within 3 days if enteral feeding unsuccessful

[ ] After 7 days if enteral feeding unsuccessful

[ ] Immediately in malnourished patients

40. Usual rationale for parenteral nutrition use

[ ] To provide requirements only when enteral nutrition not possible

[ ] To provide requirements in all ICU patients

[ ] To supplement enteral nutrition in all malnourished patients

[ ] To supplement enteral nutrition in all patients who don't meet their requirements with enteral nutrition

41. Indicate your most commonly used vascular access for parenteral nutrition delivery

[ ] Central via central venous catheter

[ ] Central via peripherally inserted central catheter (long line)

[ ] Via haemodialysis catheter/Vas Cath

[ ] Peripheral venous line

42. Indicate your usual method of parenteral nutrition delivery

[ ] Via dedicated, single lumen line

[ ] Via dedicated port on multi-lumen line

[ ] Via side-port of another line

[ ] Via dedicated port of multichannel manifold (clave or stopcock)

43. Frequency of changing parenteral nutrition giving sets

[ ] Daily

[ ] Every time a new bag is hung

[ ] Randomly (no specific routine)

[ ] Never

44. Usual frequency of biochemical monitoring parenteral nutrition safety and tolerance

[ ] Daily

[ ] 1-3 times weekly

[ ] Randomly, as clinically indicated

45. Indicate the criteria for determining parenteral product selection. For each indicate the importance of the factor (not important at all, somewhat important, very important)

Meets energy requirements

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Meets protein requirements

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Meets both energy and protein requirements

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Appropriate electrolyte profile

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Indication stated on product detailer matches patient's diagnosis

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Glutamine-free

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Glutamine-containing

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Type of lipid

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Cost

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Shelf-life

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Availability on hospital formulary

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Service support from manufacturer

[ ] Not Important at all [ ] Somewhat important [ ] Very important

Methods and frequency of monitoring of parenteral nutrition support

[ ] Not Important at all [ ] Somewhat important [ ] Very important

46. Usual parenteral product type used

[ ] All-in-one compounded bags

[ ] 3-chamber bags

[ ] Mainly 3-chamber bags, but occasionally also All-in-one products

[ ] Mainly All-in-one products, but occasionally also 3-chamber bags

47. Usual methods of monitoring parenteral nutrition support (multiple choices possible)

[ ] Compliance with parenteral feeding protocol

[ ] Compliance with prescribed product

[ ] Compliance with prescribed rate

[ ] Compliance with nutritional goals

[ ] Clinical signs/symptoms of intolerance

APPENDIX C: NUTRITION SUPPORT TEAM

Professions Represented on the Nutrition Support Team (N=118)

Characteristics	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Dietitian					
Yes	60 (50.8)	13 (31.7)	21 (75.0)	26 (53.1)	
No	58 (49.2)	28 (68.3)	7 (25.0)	23 (46.9)	0.002*
General Nurse					
Yes	36 (30.5)	8 (19.5)	10 (35.7)	18 (36.7)	
No	82 (69.5)	33 (80.5)	18 (64.3)	31(63.3)	0.166
ICU Nurse					
Yes	21 (17.8)	5 (12.2)	6 (21.4)	10 (20.4)	
No	97 (82.2)	36 (87.8)	22 (78.6)	39 (79.6)	0.507
Doctor (General)					
Yes	30 (25.4)	7 (17.1)	9 (32.1)	14 (28.6)	
No	88 (74.6)	34 (82.9)	19 (67.9)	35 (71.4)	0.297
Doctor (Specialist)					
Yes	28 (23.7)	7 (17.1)	6 (17.9)	15 (30.6)	
No	90 (76.3)	34 (82.9)	22 (82.1)	34 (69.4)	0.306
Pharmacist					
Yes	14 (11.9)	5 (12.2)	3 (10.7)	6 (12.2)	
No	104 (88.1)	36 (87.8)	25 (89.3)	43 (87.8)	0.977
Diet Cooks					
Yes	2 (1.7)	1 (2.4)	1 (3.6)	0 (0.0)	
No	116 (98.3)	40 (97.6)	27 (96.4)	49 (100)	0.455
Nutritionist					
Yes	8 (6.8)	3 (7.3)	4 (14.3)	1(2.0)	
No	110 (93.2)	38 (92.7)	24 (85.7)	48 (98.0)	0.119
Occupational Therapist					
Yes	1 (0.8)	0 (0.0)	0 (0.0)	1(2.0)	
No	117 (99.2)	41 (100)	28 (100)	48 (98.0)	0.492

Pearson's chi-square test, p-value < 0.05 was considered significant

APPENDIX D: NUTRITION SCREENING TOOLS

Nutrition Screening/Assessment Tools (N=118)

Tools	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Body Weight Assessment					
Yes	95 (80.5)	35 (85.4)	19 (67.9)	41 (83.7)	
No	23 (19.5)	6 (14.6)	9 (32.1)	8 (16.3)	0.151
Subjective Global Assessment					
Yes	13 (11.0)	7 (17.0)	2 (7.1)	4 (8.2)	
No	105 (89.0)	34 (82.9)	26 (92.9)	45 (91.8)	0.306
Nutrition Risk Index					
Yes	17 (41.4)	5 (12.2)	2 (7.1)	10 (20.8)	
No	101 (85.6)	36 (87.8)	26 (92.9)	39 (79.2)	0.248
Prognostic Index					
Yes	1 (0.8)	1(2.4)	0 (0.0)	0 (0.0)	
No	117 (99.2)	40 (97.6)	28 (100)	49 (100)	0.388
Hospital Prognostic Index					
Yes	7 (5.9)	2 (4.9)	0 (0.0)	5 (10.2)	
No	111 (94.1)	39 (95.1)	28 (100)	44 (89.8)	0.178
ABCD Approach					
Yes	93 (78.8)	32 (78.0)	14 (50.0)	15 (30.6)	
No	25 (21.2)	9 (22.0)	14 (50.0)	34 (69.4)	< 0.001*
Don't Know					
Yes	10 (8.5)	0 (0.0)	4 (14.3)	6 (12.2)	
No	108 (91.5)	41 (100)	24 (85.7)	43 (87.8)	0.052
Nutrition Risk Score					
Yes	1 (0.8)	1 (2.4)	0 (0.0)	0 (0.0)	
No	117 (99.2)	40 (97.6)	28 (100)	49 (100)	0.388

Pearson's chi-square test, p-value < 0.05 was considered significant

APPENDIX E: NUTRITION SUPPORT DECISION-MAKING

Methods for Calculating Nutritional Requirements (N=118)

Method	Total n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
ESPEN / ASPEN guidelines					
Yes	18 (15.3)	12 (29.3)	0 (0.0)	6 (12.2)	
No	100 (84.7)	29 (70.7)	28 (100)	43 (87.8)	0.003*
Clinical Judgement					
Yes	53 (44.9)	23 (56.1)	9 (32.1)	21 (4.1)	
No	65 (55.1)	18 (43.9)	19 (67.9)	28 (57.1)	0.135
Indirect Calorimetry					
Yes	6 (5.1)	3 (7.3)	1 (3.6)	2 (4.1)	
No	112 (94.9)	38 (92.7)	27 (96.4)	47 (95.9)	0.720
Illness Severity					
Yes	30 (25.4)	10 (24.4)	5 (17.9)	15 (30.6)	
No	88 (74.6)	31 (92.7)	23 (82.1)	34 (69.4)	0.457
Body weight-based methods					
Yes	70 (59.3)	30 (73.2)	13 (46.4)	27 (55.1)	
No	48 (40.7)	11 (26. 8)	15 (53.6)	22 (44.9)	0.062
Formulas					
Yes	39 (33.1)	28 (68.3)	3 (10.7)	8 (16.3)	
No	79 (66.9)	13 (31.7)	25 (89.3)	41 (83.7)	< 0.001*
Don't Know					
Yes	23 (19.5)	0 (0.0)	12 (42.9)	11 (22.4)	
No	95 (80.5)	41 (100)	16 (57.1)	38 (77.6)	< 0.001*

Pearson's chi-square test, p-value < 0.05 was considered significant

Determinants of Enteral Feed Initiation (N=118)

Criteria	Total group n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
First Day in ICU					
Yes	15 (12.7)	2 (4.9)	4 (14.3)	9 (18.4)	
No	103 (87.3)	39 (95.1)	24 (85.7)	40 (81.6)	0.154
Low Gastric Residual Vol.					
Yes	25(21.2)	9 (22.0)	5 (17.9)	11 (22.4)	
No	93 (78.8)	32 (78.0)	23 (82.1)	38 (77.6)	0.884
Hemodynamic Stability					
Yes	16 (13.6)	3 (7.3)	7 (25.0)	6 (12.2)	
No	102 (86.4)	38 (92.7)	21 (75.0)	43 (87.8)	0.102
Reasonable GIT Function					
Yes	42 (35.6)	12 (29.3)	14 (50.0)	16 (32.7)	
No	76 (64.4)	29 (70.7)	14 (50.0)	33 (67.3)	0.179
Presence of bowel sounds					
Yes	40 (33.9)	8 (19.5)	17 (60.7)	17 (30.6)	
No	78 (66.1)	33 (80. 5)	11 (39.3)	34 (69.4)	0.001*
Low intra-abdominal pressure					
Yes	3 (2.5)	0 (0.0)	2 (7.1)	1 (2.0)	
No	115 (97.5)	41 (100)	26 (92.9)	48 (98.0)	0.173
Reasonable Nutritional Status					
Yes	18 (15.3)	8 (19.5)	2 (7.1)	8 (16.3)	
No	100 (84.7)	33 (80.5)	26 (92.9)	41 (83.7)	0.360
Presence of any Gastrointestinal Symptoms					
Yes	17 (14.4)	8 (19.5)	3 (10.7)	6 (12.2)	
No	101 (85.6)	33 (80.5)	25 (89.3)	43(87.8)	0.506

Pearson's chi-square test, p-value < 0.05 was considered significant

Usual Timing for Parenteral Nutrition Initiation (N=41)

Timing	Total group n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Mainly within 24 hours of ICU admission					
Yes	12 (29.3)	1 (11.1)	3 (27.3)	8 (38.1)	
No	29 (70.7)	8 (88.9)	8 (72.7)	13 (61.9)	0.325
As soon as clinical indications becomes apparent					
Yes	19 (46.3)	4 (44.4)	6 (54.5)	9 (42.9)	
No	22 (53.7)	5 (55.6)	5 (45.5)	12 (57.1)	0.813
Within 3 days if enteral feeding unsuccessful					
Yes	15 (36.6)	5 (55.6)	4 (36.4)	6 (28.6)	
No	26 (63.4)	4 (44.4)	7 (63.6)	15 (57.1)	0.372
After 7 days if enteral feeding unsuccessful					
Yes	4 (9.8)	1 (11.1)	0 (0.0)	3 (14.3)	
No	37 (90.2)	8 (88.9)	11 (100)	18 (85.7)	0.428
Immediately in malnourished patients					
Yes	7 (17.1)	0 (0.0)	3 (27.3)	4 (19.0)	
No	34 (82.9)	9 (100)	8 (72.7)	17 (81.0)	0.257

Pearson's chi-square test, p-value < 0.05 was considered significant

APPENDIX E: METHOD OF ASSESSING FEED TOLERANCE

Method of Assessing Feed Tolerance (N=118)

Method	Total group n (%)	Dietitians n (%)	Doctors n (%)	Nurses n (%)	P-value
Gastric residual volume/aspirate volume					
Yes	82 (69.5)	25 (61.0)	20 (71.4)	37 (75.5)	
No	36 (30.5)	16 (39.0)	8 (28.6)	12 (24.5)	0.318
Number and nature of gastrointestinal Symptoms					
Yes	53 (44.9)	25 (61.0)	11 (39.3)	17 (34.7)	
No	65 (55.1)	16 (39.0)	17 (60.7)	32 (65.3)	0.035*
Intra-abdominal pressure monitoring					
Yes	23 (19.5)	11 (26.8)	2 (7.1)	10 (20.4)	
No	95 (80.5)	30 (73.2)	26 (92.9)	39 (79.6)	0.125

Pearson's chi-square test, p-value < 0.05 was considered significant

APPENDIX F: ETHICAL CLEARANCE LETTER

UNIVERSITY OF GHANA
COLLEGE OF HEALTH SCIENCES

ETHICAL AND PROTOCOL REVIEW COMMITTEE

EPRC/MAR/2019 March 19, 2019

Ref. No.:.....

Dr. Laurene Boateng
Department of
Nutrition and Dietetics
SBAHS
Korle-Bu

ETHICAL CLEARANCE

Protocol Identification Number: ***CHS-Et/M.7 – 4.8/2018-2019***

FWA: 000185779 **IORG: 0005170** **IRB: 00006220**

The College of Health Sciences Ethical and Protocol Review Committee (EPRC) at its February 28, 2019 full board meeting reviewed and approved your re-submitted research protocol.

Title of Protocol: "Nutrition support practices in Ghanaian hospitals"

Principal Investigator: Dr. Laurene Boateng

This approval requires that you submit six-monthly review report(s) of the study to the Committee and a final full review report to the EPRC at the completion of the study. The Committee may observe, or cause to be observed, procedures and records of the study before, during and after implementation.

Please note that any significant modification(s) to this project/study must be submitted to the Committee for review and approval before its implementation.

You are required to report all serious adverse events related to this study to the EPRC within seven (7) days verbally and fourteen (14) days in writing.

As part of the review process, it is the Committee's duty to review the ethical aspects of any manuscript that may be produced from this study. You will therefore be required to furnish the Committee with any manuscript for publication.

This ethical clearance is valid till March 20, 2020.

Please always quote the protocol identification number in all future correspondence in relation to this protocol.

Signed: .....

Professor Andrew Anthony Adjei
Chair, Ethical and Protocol Review Committee

cc: Provost, CHS
Dean, SBAHS
Head, Nutrition and Dietetics

• P. O. Box KB 52, Korle Bu, Accra, Ghana. Telephone: +233 (0) 302 665103/4 • Fax: +233 (0) 302 660762
• Email: admin.chs@ug.edu.gh /provost.chs@ug.edu.gh • Website: www.chs.ug.edu.gh

In case of reply the number
And the date of this
Letter should be quoted

My Ref. No. KBTH/Md/C3/19

Your Ref. No......

KORLE BU TEACHING HOSPITAL
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Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

15th August, 2019

DR. LAURENE BOATENG
DEPT. OF NUTRITION AND DIETETICS
UNIVERSITY OF GHANA
LEGON

INSTITUTIONAL APPROVAL: KORLE BU TEACHING HOSPITAL-SCIENTIFIC AND TECHNICAL COMMITTEE/INSTITUTIONAL REVIEW BOARD (KBTH-STC/IRB/000101/2019

Following approval of your study entitled "Nutrition support practices in Ghanaian Hospitals" by the Korle Bu Teaching Hospital-Scientific and Technical Committee/Institutional Review Board.

I am pleased to inform you that institutional approval has been granted for the conduct of your study in Korle Bu Teaching Hospital.

Please contact the Head of Department to discuss the commencement date of the study.

Please note that, this institutional approval is rendered invalid if the terms of the Institutional Reviewed Board/Scientific and Technical Committee approval are violated.

Sincere regards,

Dr. Ali Samba
Director of Medical Affairs
For: Chief Executive Officer

Cc: The Chief Executive
Korle Bu

Institutional Review Board
37 Military Hospital
Neghelli Barracks
ACCRA

Tel: 0302 769667
Email:irbmilhosp@gmail.com

18 September 2019

ETHICAL CLEARANCE

37MH-IRB IPN/321/2019

On 12 September 2019, the 37 Military Hospital (37MH) Institutional Review Board (IRB) at a Board Meeting reviewed and approved your protocol.

TITLE OF PROTOCOL : Nutrition Support Practices in Ghanaian Hospitals

INVESTIGATOR : Prince Abban

Please note that a final review report must be submitted to the Board at the completion of the study.

Please report all serious adverse events related to this study to 37MH-IRB within seven (7) days verbally and fourteen (14) days in writing.

This certificate is valid until 10 September 2020.

DR EDWARD ASUMANU
(37MH-IRB, Vice Chairman)

37 MILITARY HOSPITAL
INSTITUTIONAL REVIEW BOARD
DATE 18-09-19

Cc: Brig Gen (Dr) NA Obodai
Commander, 37 Military Hospital

In case of reply the reference number and the date of this Letter should be quoted

Our Ref.: CCTH

Your Ref.:

P. O. Box CT.1363
Cape Coast
CC-071-9967
Tel: 03321-34010-14
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Website: www.ccthghana.org
email: info@ccthghana.com

28th January, 2020

Prince Kweku Abban
Department of Dietetics
University Of Ghana
Accra

Dear Sir,

ETHICAL CLEARANCE – REF: CCTHERC/EC/2020/020

The Cape Coast Teaching Hospital Ethical Review Committee (CCTHERC) have reviewed your research protocol titled, "***Nutrition Support Practices in Ghanaian Hospitals***" which was submitted for Ethical Clearance. The ERC is glad to inform you that you have been granted provisional approval for implementation of your research protocol.

The CCTHERC requires that you submit periodic review of the protocol and a final full review to the ERC on completion of the research. The CCTHERC may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the CCTHERC for review and approval before its implementation.

You are required to report all serious adverse events related to this study to the CCTHERC within ten (10) days in writing. Also note that you are to submit a copy of your final report to the CCTHERC Office.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours sincerely

Prof. Ganiyu Rahman
Chairman, ERC