

## Dietitian Role in Parenteral Nutrition Administration among a Multidisciplinary Team

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### Abstract

### Original Research Article

Dietitians play an important role in the reduce of morbidity and mortality rates by effective nutrition support especially in hospitals whether in the wards or in intensive care unit to detect and to prevent or curtail the metabolic complications of overfeeding by identifying patients at risk. The multidisciplinary team inside ICU It brings together nutritional experts from medicine/surgery, nursing, dietetics and pharmacy that can co-ordinate the contributions of each of these specialties into coherent nutritional support. The aim of this study was to confirm the dietitian role in parenteral nutrition administration among a multidisciplinary team according to international organizations associated with parenteral and enteral nutrition. An extensive literature review was conducted across internet using the Google scholar, books as well as a various literature databases written in English. The search was conducted based on a diversity of key words related to the review topic. The dietitian evolved from the nursing profession and established herself as an authority on nutrition and dietetics. In conclusion all associations of parenteral and enteral nutrition have repeatedly recommended the development of multidisciplinary nutrition support teams, which include dietitians, to optimize management of patients on parenteral nutrition and to improve patient outcomes and save costs.

**Keywords:** Dietitians, Nutrition support team, parenteral nutrition, Multidisciplinary team.

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## INTRODUCTION

Multidisciplinary team is a multi-professional team they include: doctors, nutrition, nurse specialist, dietitian, and pharmacist. It brings together nutritional experts from medicine/surgery, nursing, dietetics and pharmacy that can co-ordinate the contributions of each of these specialties into coherent nutritional support. It manifestly cannot do all the ward delivery of nutritional care itself, but serves to organize it and enhance it. It becomes particularly involved when there are problems requiring complex artificial nutritional support, especially parenteral nutrition. It may have a specialist role in supporting Home Parenteral Nutrition. The dietitian and pharmacist need to be senior staff and will have a supervisory role within their departments [1].

Dietitians play a big role in nutrition support especially in hospitals whether in the wards or in intensive care unit to detect and to prevent or curtail the metabolic complications of overfeeding by identifying patients at risk. They act to providing adequate assessment, coordinating interdisciplinary care plans, and delivering timely and appropriate monitoring and intervention. Dietitians need to document complications, interventions, and the outcomes of their

clinical care to evaluate the appropriateness of existing nutrition guidelines [1, 2].

National and international organizations, British Association for Parenteral and Enteral Nutrition, National Institute for Health and Care Excellence, European Society for Parenteral and Enteral Nutrition, and American Society for Parenteral and Enteral Nutrition [1-4], have repeatedly recommended the development of multidisciplinary nutrition support teams (NSTs), which include dietitians, to optimize management of patients on parenteral nutrition. Kennedy & Nightingale shown to improve patient outcomes and save costs the MDTs should be activated, despite only 60% of hospitals currently have nutrition teams (NCEPOD, 2010) and only 19% of adult PN cases received a good standard of practice, with a significant percentage of cases not receiving any dietetic input [3, 2].

By 1992, when the King's Fund report, a positive approach to nutrition as treatment was published in agreement with British Association of Parenteral and Enteral Nutrition (BAPEN) was founded, the team approach had been demonstrated to

be superior to a less organized approach to artificial feeding and had become widely accepted by experts [4].

Despite this, a survey in the UK suggested that only a third of hospitals regarded as a nutrition team. A repeat survey of all 206 district dietitians in 1991 showed no increase between 1988 and 1991, 32.5% of respondents had access to nutrition support teams, compared with 27% in 1988. A small increase occurred subsequently so that by 1994 around 37% claimed access to nutrition support team [4, 5].

## METHODOLOGY

An extensive literature review was conducted across internet using the Google scholar, books as well as a various literature databases written in English including, German Medical Science (GMS), British Medical Journals (BMJ), Nutrition Clinical Medicine Journal (NCMJ), Parenteral Enteral Nutrition Journal (JPENJ), Journal of the American Dietetic Association (JADA), Saudi Pharmaceutical Journal (SPJ), Indian J Crit Care Med (IJCCM), ASPEN, SCCM, Science Direct, and Pub Med Central. The search was conducted based on a diversity of key words related to the review topic, during the period from 1939 to 2020. The studies were written in English. The period of literature age has extended from the inception of the search engine to the beginning of April 2020. The search generated about 225 sources, of which 86 sources were used. These 86 articles were considered relevant because they answered the objectives of the review. Keywords used for searching in various data sources were, total parenteral nutrition, parenteral nutrition, parenteral vs. enteral, intensive care unit, dietitian, nutrition and clinical nutrition. The included literatures cover a wide range of different dietitian involvements in the parenteral nutrition practice, ranging from only compounding the PN admixtures through monitoring and participation in the decision-making process to the point of writing PN orders. The inclusive criteria included in this study of history, route of administration, recommendation, complication, management, monitoring and lastly the role of dietitian in parenteral nutrition.

## DISCUSSION

To our best knowledge this is the first time in the middle east do this type of review. The dietitian is considered central to the provision of nutrition support to those patients in need of it, and is ideally placed to provide nutritional screening and assessment. Dedicated dietetic staffing to ICU has been associated with better provision of nutrition support and may result in improved patient outcomes. A recent international multicenter prospective observational study outlined best achievable nutrition practices in participating ICUs relative to evidence based critical care nutrition clinical practice guidelines. Analysis of the data showed that the presence or absence of a dietitian in intensive care had a significant effect on determining performance with respect to nutrition practices. The presence of a dietitian

was associated with top performance, and was considered a primary enabling factor that affected adherence to internationally recognized nutrition guidelines in ICU. Another recent study showed improvements in early introduction and route of feeding, as well as better achievement of nutritional targets associated with the presence of an ICU dietitian [6, 7].

Study has been done in 2015 by Culkin on twenty-seven patients were staying on PN showed that the initial nutritional assessment and calculation of requirements was completed by a dietitian in 100% of cases, including the prevention of refeeding syndrome. Nine patients were considered at risk of refeeding syndrome but none developed refeeding, the 27 cases the legal prescription was signed by a junior doctor. Of these 27 patients the doctor was directly involved in the patients nutritional care in only 7 cases and the rest of cases were involved by dietitian and pharmacist. The nutrition supports for patients were some receiving oral diet, others trophic enteral nutrition and nil by mouth. This study showed that when a dietitian and a pharmacist work together to describe a parenteral nutrition with complete management, the results are safe and this will decrease the probability of malnutrition and refeeding syndrome. Supplementary prescribing would enable dietitians to work in conjunction with pharmacists to take clinical and legal responsibility for the PN they are recommending instead of asking junior doctors to take on responsibility for their clinical decisions. This is likely to save doctors time and improve patient safety [8-10].

Another study has been done by Fitz Patrick *et al.*, on a 560 members of the Parenteral and Enteral Nutrition Group and Critical Care Group of the British Dietetic Association that workers in a different places in the hospitals (general ICUs, specialist ICUs including cardiac units, neurosciences units, transplant units, HPB/ liver units, trauma centers, burns units, intestinal failure units and oncology unit), to find out who is responsible for applying nutrition inside hospitals. Around 153 respondents said all patients on parenteral nutrition would receive dietitian input on their unit, 132 said all those on enteral nutrition would have dietitian input, and only 60 respondents said all ICU patients would have dietitian input. Another survey was conducted on dietitian of England, Scotland, and Wales Only 88 respondents said their unit had a dedicated ICU dietitian, although 149 had regular dietitian support. Only 78 respondents said their unit had dietitian input every weekday, and 137 respondents said their unit had access to an nutrition support team, but only 103 stated the nutrition support team attended the ICU regularly [11, 12].

In a comparative study has been done on a number of responding clinicians were asked who made the decision to commence parenteral nutrition, the

commonest response being a doctor or a combination of a doctor and dietitian; approximately half the time they were a member of a nutrition team. Whilst it is not unreasonable for the requirement for PN to be decided by a member of staff who is not part of a nutrition team it is desirable that a multidisciplinary nutrition team should have some input into the decision making process or, as a very minimum, be aware of the patient so as to ensure high standards of management and adequate monitoring [13].

## Assessment and Requirements

### Nutritional Screening

All ICU admissions should be screened to assess their need for nutrition support. Recommend nutrition support within 24 to 48 hours of ICU admission (or once hemodynamically stable) for, undernourished or hyper catabolic patients., patients expected to stay in ICU for 3 days or more, and patients

not expected to commence diet within next 5 days or more [14].

Nutritional assessment is the cornerstone in identifying patients at risk of malnutrition and it has to be done within 48 h of hospital admission. A number of nutritional assessment tools are available for screening patients and they use various criteria to identify patients at nutritional risk including anthropometric data, physical examination, and history of weight loss, dietary intake, and clinical diagnosis. Most of the nutritional screening tools available are validated in hospitalized patients; no specific tool is available for ICU patients [15, 16]. As organizations mentioned the dietitian detailed nutrition assessment should be undertaken before initiating PN. Clinical assessment should consider baseline biochemistry and hydration status, as well as noting concurrent fluids and electrolytes therapy. Table 8 shows the parameters to be considered.

**Table-1: Baseline Assessment of a Patient Requiring Parenteral Nutrition (PN) [16, 7]**

Parameters	Rationale
Indication for PN	Degree of intestinal failure or reasons why enteral nutrition is not appropriate
Goal and expected duration of treatment	Goal of therapy should be determined from considering the overall clinical picture and patient prognosis
Access route for administration	To ensure PN is given via an appropriate route to reduce the risk of complications Central/peripheral route needs to be considered
Previous nutritional intake	To predict the risk of refeeding syndrome when PN begins
Weight, anthropometry	Assessment of nutritional status and fluid balance
Body mass index (BMI)	Assess nutritional status
Percentage weight loss	Predict degree of malnutrition and refeeding risk
Clinical status – appearance, blood pressure, temperature	General condition, fluid balance, presence of infection, which will help inform on requirements
Drug therapy	Fluid/electrolyte content of concurrent treatment, e.g. IV fluids/medications Whether the patient is on appropriate medication to help promote gut function
Hydration status (fluid balance charts)	Fluid balance, additional gastrointestinal losses that need to be replaced, e.g. vomit, fistula, drain output
Urea and creatinine	Fluid balance, renal function
Electrolytes – sodium, potassium, calcium, phosphate, magnesium	Fluid balance, electrolyte status, refeeding risk
Full blood count and C-reactive protein	Presence of infection and anaemia
Albumin	Used in combination with inflammatory markers to assess catabolic state
Coagulation parameters	Before insertion of line

The requirements should be assessed individually and provided according to tolerance. Overfeeding critically ill patients can have detrimental effects on outcome. Conversely, persistent underfeeding has been associated with increasing complications. Over aggressive feeding during the acute phase of injury may also promote adverse outcome effects [17].

The equations that use to determine the macronutrient requirements in ICU to patient on nutrition support its different according to patient health statuses, nutrition statuses and the guideline source that dietitian use to calculate the daily requirements from

energy, protein, carbohydrate and fat by specific equations.

The nutrition support team especially the dietitian should be concern on the medication infusions that used in ICU and possibly induced nutritional implications like, Inotropes drugs can cause: Increasing levels indicate severity of illness/unstable patient, inotropes can lead to hyperglycemia; inotropes can increase energy requirements, and avoid overfeeding patients with raised or increasing inotropic requirements. Sedative drugs cause: Reduce energy requirements; reduce gut motility by relaxing visceral

smooth muscle. Gastric acid reducing agents: Can stimulate gastrin which inhibits gastric emptying [18].

### Nutrition Assessment

Determine the severity of malnutrition; determine protein and energy needs, enteral and parenteral nutrition indicated appropriately, assess the adequacy of access for nutrition therapy, initiate and manage enteral and parenteral nutrition

Complete orders document in patient's record, daily patient assessment, recommended changes to therapy, transition feedings: parenteral to enteral to oral [19, 20].

### Monitoring of Nutrition Support

Monitoring guidelines should include regular: Nutritional assessments, measurement and interpretation of relevant biochemistry and hematological parameters, clinical assessment (including gastrointestinal function, and changes in clinical condition that may have implications for requirements, fluid status, presence of organ failure, mode of dialysis, etc.), TPN should be initiated slowly: 50% of goal first day, 75% second day, 100% the third day, triglycerides (TG) should be checked on day two of PN and once weekly thereafter, or more often in the presence of a propofol infusion. If hypertriglyceridemia is detected, alter PN prescription and check TG level more often, insulin infusion should be titrated to aim for a blood glucose level between 7 & 9 mmol/litre, with 1, 2, and 4 hourly glucometer checks, as appropriate, consider the fat content of propofol infusion when estimating requirements. For PN patients with open wounds healing by secondary intervention (eg open surgery wounds, burns wounds, multiple trauma wounds, etc.), consider:

Protein provision of 1.5 to 2g protein/kg edema free weight, additional ampoule of add trace daily (for supplemental zinc), follow up for urine output for edema, and follow up for input and output fluid per 24hours to assess nitrogen balance [21-23].

### CONCLUSION

According to many of institutions either national or international emphasis on the role dietitian within the multidisciplinary team to introduce best to overcome clinical problems of under nutrition enteral and parenteral .The nutrition assessment shall be performed within the time frame specified by the hospital and by a dietitian or a clinician with documented specialized expertise in nutrition to reduce severe parenteral nutrition complications occur in patients receiving PN on a long period of time such as, liver disease and metabolic bone diseases. Therefore, a lot of studies where done on the members of the parenteral and enteral nutrition group and critical care in hospitals found the working within nutrition support

team especially in intensive care units is very important to achieve all patient requirements.

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