

## ORIGINAL ARTICLE

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# Survival and nutritional factors on home parenteral nutrition (HPN): Our initial experience

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### Summary

**Purpose:** Home parenteral nutrition (HPN) has been proposed as the treatment of choice in patients suffering from intestinal failure (IF) and has been claimed to improve survival and quality of life either in patients with benign disorders or even in those with malignancies. The purpose of the present analysis was to report characteristics and outcomes of adult patients with IF receiving HPN in Greece.

**Methods:** Patients that received HPN between 2011 and 2017 were included in this retrospective analysis. Characteristics of the included patients, cause of HPN, duration of HPN, route of HPN administration, complications as well as survival rates were recorded.

**Results:** A total of 189 patients were included in the present analysis. Of these, 163 (86.3%) suffered from cancer while 26 (13.7%) received HPN due to non-malignant diseases. The reported mortality was 74.6% while overall severe complications rate was 77%.

**Conclusions:** According to the findings of our study, HPN seems to have beneficial effect but it should be considered with caution by the physicians who should take into account the indications of each patient to receive parenteral nutrition, the underlying disease and prognosis and the access of each patient to home care services.

**Key words:** cancer, home parenteral nutrition, intestinal failure

### Introduction

HPN has been proposed as the treatment of choice in patients suffered from IF which is characterized by insufficiency of the intestine to absorb nutrients [1]. Through this procedure, sufficient nutrients, water and electrolytes are allowed to meet metabolic requirements. The introduction of HPN in the early 70's has been claimed as an efficient and safe procedure resulting in significant improvement of the survival and prognosis of those patients [2,3]. Furthermore, HPN has been claimed to improve survival and quality of life in patients with cancer suffering from malnutrition and cachexia [4]. A significant proportion of pa-

tients with cancer die due to insufficient nutrition. Both anorexia and increase in the metabolic processes of the body due to cancer - specifically in patients with GI malignancies - have been accused of this condition [5,6]. Nonetheless, prolonged HPN has been related with major complications regarding infections - mainly catheter-related -, metabolic disorders such as hyperglycemia and damage of the liver due to liver cholestasis connected with the patient's underlying diseases [7].

We herein report a retrospective analysis of 189 clinical records of adult patients receiving HPN from two institutes in Greece.

## Methods

Patients who were cared in our departments and presented with nutrition disorders from 2011 till 2017 were assessed in the present study. Patients were identified and collected from a retrospectively maintained database. All patients had to be prescribed calorie-containing fluids at least 3 nights per week for at least 2 months. The majority of patients were managed with a single or double tunneled venous catheter and HPN was administered using a catheter care protocol trained by nursing staff using protocol in accordance to the European Society for Clinical Nutrition and Metabolism (ESPEN) guidance [8]. Parenteral nutrition was prepared by commercial provider in an aseptic facility. HPN was administered to those patients by their care providers at home (nurse or family members) through Port-A-Cath, Hickman, Central Venous Catheter (CVC), Peripherally Inserted Central Catheters (PICCs) or Peripheral venous catheter. Patient characteristics, main disease, HPN indication, duration of HPN, HPN administration route, complications as well as survival rates were recorded.

### Statistics

Data were expressed as frequencies and medians as appropriate and statistical analyses were performed by using SPSS software (version 22.0; SPSS Inc. Delaware, USA).

## Results

A total of 189 patients were included in this study. Among them 100 were men and 89 women who received HPN with a median age of 55.5 years (range 18-98). Characteristics of the included patients are presented in Table 1. Concerning somatometric characteristics of the recruited patients, their mean weight was 57.6 kg (range 40-80), whereas mean height was 107.5 cm (range 154-192). Of the included patients 163 (86.3%) suffered from various cancer types while 26 (13.7%) received HPN due to non-malignant diseases. Concerning non-malignant diseases 19 patients suffered from small bowel disease, 3 from Crohn's disease and 4 had brain stroke. Indications for administration of HPN included loss of weight reported in 142 (75.1%) patients, difficulties in per os alimentation in 177 (93.7%) cases, vomiting in 77 (40.8%) as well as abdominal pain in 80 (42.3%) patients. Sixty patients received only total parenteral nutrition (TPN), while 129 were fed with parenteral nutrition plus either elementary enteral or per os nutrition. Table 2 presents complications related to HPN administration, mortality, as well as the main reasons to stop HPN. Patients received HPN for a mean period of 5.7 months (range 1-20). During this period,

**Table 1.** Characteristics of the included patients

Characteristics	n (%)
Age (years) mean (range)	55.5 (18-89)
Gender	
Male	100 (53)
Female	89 (47)
Weight (kg) mean (range)	57.6 (40-80)
Height (cm) mean (range)	170.5 (154-192)
Diagnosis (n=189)	
Malignancies	163 (86.2)
Crohn's disease	3 (1.6)
Small bowel syndrome	20 (10.6)
Brain stroke	3 (1.6)
Site of cancer (n=163)	
Gastric	49 (30)
Colorectal	39 (24)
Pancreas	13 (8.0)
Lung	8 (5.0)
Urogenital	27 (16.5)
Esophagus	5 (3)
Breast	4 (2.4)
Generalized carcinomatosis	6 (3.7)
Others	12 (7.4)
Treatment (n=189)	
Surgery	169 (89.4)
Chemotherapy	153 (81)
Radiation therapy	18 (9.5)
Cause of HPN administration (n=189)	
Weight loss	142 (75.1)
Difficulties in per os intake	177 (93.7)
Vomit	77 (40.8)
Abdominal pain	80 (42.3)
Type of nutrition	
TPN	60 (31.7)
TPN+ per os intake	113 (59.8)
TPN+ enteral tube feed	16 (8.5)
Days per week of HPN	
3 to 5	8 (4.2)
>5	181 (95.8)
Route of HPN administration	
Port-A-Cath	129 (68.2)
Central Venous Catheter	30 (15.9)
PICC	20 (10.6)
Peripheral Venous Catheter	9 (4.8)
Hickman line	1 (0.5)

HPN: home parenteral nutrition, PICC: peripherally inserted central catheter

**Table 2.** Survival and nutritional outcomes

Outcomes	n (%)
Complications	
Catheter-related	44 (30)
Metabolic complications	102 (47)
Cause to stop HPN	
Death	141 (74.6)
Conversion to total enteral nutrition	4 (2.1)
Conversion to total per os nutrition	25 (13.2)
Continuous HPN	19 (10.1)
Duration of therapy (months), mean (range)	5.7 (1-20)

metabolic disorders were the most common complications affecting 47% of the patients, whereas catheter-related complications affected 30% of them. During the study period 141(74.6%) patients died, while in 29 patients previous administered HPN was converted to enteral, either per os or through enteral tube.

## Discussion

According to the findings of the present study, of the 189 patients who received HPN 25.4% survived during the study period. Among them 15.3% converted to enteral nutrition. A seventy-seven percent of the patients developed severe complications related to HPN.

HPN has been proposed as a potential choice in the management of malnutrition in patients with IF. During the past decades HPN has played a significant role on survival and quality of life in patients with disorders resulted from IF, especially those with benign related IF [9]. According to ESPEN guidelines, HPN is indicated in patients unable to receive the daily calorie as well as their nutritional requirements through oral intake or enteral tube, either in patients with benign or in those with incurable malignancies [8]. HPN includes all the appropriate nutrients regarding proteins, lipids, vitamins, electrolytes and glucose and can support the nutritional and metabolic requirements of patients with IF provided that patients can receive home care [8]. In a review by Harisson et al. HPN was indicated to improve survival rates of patients with benign diseases such as Inflammatory Bowel Disease (IBD) and small bowel syndrome (SBS) and in particular in patients suffering from Crohn's disease [10]. On the other hand, utilization of HPN in patients with malignancies still remains elusive due to controversies concerning its potential improvement in

survival, quality of life and its cost-effectiveness [11,12]. Nonetheless, since cachexia and anorexia are commonly observed in patients suffering from various types of cancer and can even constitute a significant cause of death in those patients, improvement of malnutrition is considered of high importance for their survival [13]. In addition, malnutrition can delay the therapeutic procedure of those patients given the fact that cachectic patients are not able to tolerate chemotherapy or much so surgical therapy [14]. A recent study by Vashi et al. reported improvement in quality of life and nutrition profile in patients with advanced cancer which was related to the duration of HPN administration [15]. Another study presented statistical significant increase in weight of patients with cancer of the gastrointestinal tract ( $p < 0.001$ ) which reflected improvement in patients quality of life [16]. However, reaching to firm results concerning the benefit of HPN in patients with advanced cancer remains complicated since the quick evolution of the underlying malignancy leads to death in the majority of those cases. Furthermore, the complications that are associated with induction of HPN should be taken into account [17]. The most common major complications are those related to catheter and metabolism [18], which also were observed in 30% and 47% of the recruited subjects in the present study. Catheter-related complications include mainly catheter-related blood stream infections and catheter-related thrombosis. The aforementioned complications, apart from being the main reasons to stop therapy, they are also responsible for readmissions and severe morbidity in patients receiving HPN [19]. Also, Intestinal Failure Associated Liver Disease (IFALD) is the most commonly reported metabolic disorder in HPN patients associated with increased incidence of morbidity and mortality [18,20]. According to findings of the present study we came to the conclusion that HPN should be considered with caution by the physicians who should take into account the indications of each candidate patient to receive parenteral nutrition (the underlying disease and prognosis and the access of each patient to home care services).

### Limitations of the study

In the present study we dealt with patients referred to our department with oral intake disorders and signs of malnutrition. The fact that cancer and non-cancer patients were recruited resulted in study heterogeneity in combination with the variety in type, stage and treatment of cancer in patients who were chosen to receive HPN. Such

factors could inevitably influence the reported results. Additionally, the majority of the included patients in the present study received HPN due to cancer in advanced stages (86.3%). As a result, evaluating the benefits of HPN in those patients is confusing since the underlying disease seems to influence their survival. Hence, we cannot reach

firm conclusions concerning the contribution of HPN in survival in patients with malignancy and further research is needed in this field.

### Conflict of interests

The authors declare no conflict of interests.

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