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Guidelines of Nutrition of Cardiac Patients in ICU

Essay

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General Intensive Care

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List of Abbreviations

ABW	:	Adjusted body weight
ACS	:	Acute coronary syndrome
ADH	:	Anti-diuretic hormone
ADMA	:	Asymmetric dimethylarginine
AMA	:	The arm muscle area
ATP	:	Adenosine triphosphate
BEE	:	Basal energy expenditure
BIA	:	Bioelectrical impedance analysis
BMI	:	Body mass index
BMR	:	Basal metabolic rate
CHF	:	Congestive heart failure
CNS	:	Central nervous system
COPD	:	Chronic obstructive pulmonary disease
CPN	:	Complementary parenteral nutrition
CRS	:	Catheter-related sepsis
CVD	:	Cardiovascular disease
DASH	:	Dietary Approaches to Stop Hypertension
EN	:	Enteral Nutrition

FAD	:	Flavin adenine dinucleotide
GALT	:	Gut-associated lymphoid tissue
GIT	:	Gastrointestinal tract
HBE	:	Harris–Benedict equation
HF	:	Heart failure
IC	:	Indirect calorimetry
ICU	:	Intensive care unit
I κ B	:	Inhibitory κ B protein
IL 1, IL-2	:	Interleukin 1- 2
LDLs	:	Low-density lipoproteins
LVEF	:	Left ventricular ejection fraction
MALT	:	MUCOSA-associated Lymphoid Tissue
NF-B	:	Nuclear transcription factor -B
NO	:	Nitric oxide
NOS	:	NO synthase
NPO	:	Nil per os
PCM	:	Protein-calorie malnutrition
PE	:	Percutaneous endoscopy
PEM	:	Protein energy malnutrition

PN	:	Parenteral nutrition
PONV	:	Post operative nausea-vomiting
REE	:	Resting energy expenditure
ROS	:	Reactive oxygen species
TG:HDL-C	:	Triglycerides to high-density lipoprotein-cholesterol
TNF a	:	Tumor necrosis factor a
TPN	:	Total parenteral nutrition
TSF	:	Triceps skinfold
UUN	:	Urinary urea nitrogen
VKDPs	:	Vitamin K-dependent proteins

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Abstract

It is well-known that malnutrition, a common problem in patients admitted to ICU, has a negative impact on clinical outcomes**.** Moreover, it has been proposed that the incidence of malnutrition will be more frequent in coming decades because of the increasing number of ICU patients who are older and/or obese and have chronic diseases, which inevitably aggravate Stress-related catabolism and negative energy balance .

Heart failure is associated with neurohormonal and immune changes that contribute to a hypercatabolic state, with intestinal malabsorption induced by different factors**.**

Patients with heart disease may present different types of malnutrition with heart disease classical heart cachexia, appearing in situations of chronic congestive heart failure (CHF), and a form of malnutrition secondary to complications of cardiac surgery or any major surgery in patients with heart disease**.**

Key words: malnutrition common problem in patients admitted to ICU

Introduction

It is well-known that malnutrition, a common problem in patients admitted to ICU, has a negative impact on clinical outcomes**.** Moreover, it has been proposed that the incidence of malnutrition will be more frequent in coming decades because of the increasing number of ICU patients who are older and/or obese and have chronic diseases, which inevitably aggravate Stress-related catabolism and negative energy balance ***(Thibault and Pichard, 2010).***

Heart failure is associated with neurohormonal and immune changes that contribute to a hypercatabolic state, with intestinal malabsorption induced by different factors ***(Von Haehling et al., 2007).***

Patients with heart disease may present different types of malnutrition with heart disease classical heart cachexia, appearing in situations of chronic congestive heart failure (CHF), and a form of malnutrition secondary to complications of cardiac surgery or any major surgery in patients with heart disease ***(Sandek et al., 2009).***

Early enteral nutrition should be attempted if the oral route cannot be used. When cardiac function is severely compromised, enteral nutrition is feasible, but

supplementation with parenteral nutrition is sometimes required ***(Jiménez Jiméneza et al., 2011).***

The promotion of effective nutrition can only be achieved with a standardized Nutritional support protocol that incorporates regular assessments of gastrointestinal function and tolerance of parenteral and enteral feeding ***(Hiesmayr, 2012).***

The screening of nutritional status is a necessary aspect of good nutritional practice ***(Mueller et al., 2011).*** .Nutritional screening is a simple tool that allows the quick and effective identification of the group of patients at high risk of malnutrition ***(Velasco et al., 2011).***

Energy requirements may be calculated by predictive equations or measured by indirect calorimetry ***(Martindale et al., 2009).***

Before elaborating on enteral and parenteral nutrition, it is essential to focus on very important areas of nutritional assessment. Nutritional assessment is very important so as to avoid harmful effects of over-feeding or under-feeding. It mainly comprises of combination of clinical evaluation and laboratory findings such as: History and clinical examination, Anthropometric measurements and biochemical data ***(Prins, 2010).***

Aim of the Work

Providing greater understanding and explanation of the role of nutrition in management of critically cardiac patient and giving an overview on adequate and optimal nutrition therapy for cardiac patient in ICU and insight into evaluation of nutritional status to avoid malnutrition.

The Indications of Nutritional Support in Critically-Ill Cardiac Patients

Nutritional support has now come to be recognized as essential in management of critically ill patients. It has gained importance with better understanding of the pathophysiology of protein energy malnutrition (PEM), patients and optimal modalities in administration of nutritional therapy. Its status has changed from being adjunct in critical care to that of definitive therapy ***(Artinian et al., 2006)***.

It is known that an impaired nutritional status interferes with response to clinical or surgical therapeutic interventions and with adverse outcomes so, nutritional support is generally considered an essential part of managing ICU patients ***(Singer et al., 2009).***

The indications for nutritional support in critically ill cardiac patients are as follow-

I. Cardiac cachexia.

A. Definition:

Cachexia is a major cause of weight loss and increased mortality and affects more than 5 million people in the United States ***(Stephan and Stefan, 2014).***

It has been defined as a body mass loss of 27% or decrease of 80-85% from the ideal weight, but the most widely accepted meaning is defined as patients with CHF starting weight loss in the past 6 months of at least 6% from the previous weight. Mortality is very high in cachectic patients, 18% at 3 months, 29% at 6 months, and 50% at 18 months ***(Anker et al., 2009).***

Factors contributing to that mortality *include*: a deficient diet, the associated malabsorption syndrome, loss of nutrients through the intestinal and renal tract and imbalance in supply and losses in a hypermetabolism state ***(Azhar and Wei, 2006).***

Clinically, cachexia manifests with excessive weight loss in the setting of ongoing disease, usually with disproportionate muscle wasting. Differentiation from other syndromes of weight loss is needed to prompt recognition and effective management of cachexia. Weight loss resulting from the syndrome of *starvation* occurs as a direct result of caloric deprivation. Starved persons generally lose more fat than muscle tissue. *Sarcopenia* is yet another weight-loss syndrome that results primarily from muscle atrophy due to a variety of causes. A fourth, often neglected, cause of weight loss is *dehydration*, in which fluid loss accounts for the reduction in measured weight ***(Stephan and Stefan, 2014).***

B. Pathophysiology of cardiac cachexia (Figure 1):

Heart failure is associated with:

1) Vasoconstriction and stimulation of the sympathetic nervous system are compensatory mechanisms of heart failure, which influences the inadequate use of nutrients ***(Heather et al., 2014).***
2) Deficiency in micronutrients due to increased loss caused by diuretic therapy. A multivitamin may be recommended after nutritional assessment ***(Wooley, 2008).***
3) Decrease food ingestion secondary to anorexia, increase of energy expenditure and metabolic changes mediated by neurohormonal and inflammatory stimuli favoring the catabolic routes ***(Heather et al., 2014).***
4) Release of the tumor necrosis factor a (TNF-α) and other cytokines that participate in the catabolism process, with subsequent loss of weight at HF ***(Heather et al., 2014).***

In the Framingham Study, elderly subjects with no history of myocardial infarction or congestive heart failure had a significant increase in congestive heart failure risk with increment in cytokine concentration (60% for TNF-α