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Management of Nutrition in Neuro Intensive Care Patients

Stan odżywienia pacjentów Neurochirurgicznego Oddziału Intensywnej Opieki Medycznej

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Abstract

Neurosurgical patients present important metabolic alterations that trigger increased energy and protein expenditure. The clinical condition in neuro patients associated with the use of sedatives, steroids, barbiturates and muscle-relaxing drugs postpones the use of nutrients in these patients and, thus, complications, including infection and longer hospitalization, may occur. Weight loss, negative nitrogen balance and immune dysfunction constitute a characteristic response in neurosurgical patients. There is a strong relationship between adequate nutritional status and recovery from critical illness. Improved nutritional status is associated with positive clinical outcomes. The health care team, nurses in particular, play a major role in the management and maintenance of an optimal nutritional status in patients who are in the neurosurgical clinic. This compilation aims at highlighting the fact that inadequate nutrition is a serious problem which increases incidence of morbidity and mortality especially in neurosurgical patients. The article also emphasises the importance of nursing assessment. (JNNN 2017;6(1):33–38)

Key Words: neuro patients, neurosurgery, nutrition

Streszczenie

U pacjentów Neurochirurgicznego Oddziału Intensywnej Opieki Medycznej występują istotne zmiany metaboliczne, które powodują zwiększone wydatkowanie energii i białka. Neurochirurgiczny stan kliniczny w wyniku stosowania środków uspokajających, steroidów, barbituranów i leków zwiotczających mięśnie opóźnia wykorzystanie składników pokarmowych w tej grupie pacjentów, a zatem mogą wystąpić powikłania, w tym infekcje i dłuższa hospitalizacja. Utrata masy ciała, ujemny bilans azotu i dysfunkcja układu odpornościowego stanowią charakterystyczną odpowiedź u pacjentów neurochirurgicznych. Istnieje silny związek pomiędzy odpowiednim stanem odżywienia i regeneracją po chorobie krytycznej. Dobry stan odżywienia jest związany z pozytywnymi wynikami klinicznymi. Zespół opieki zdrowotnej, w szczególności pielęgniarki, odgrywają ważną rolę w utrzymaniu optymalnego stanu odżywienia u pacjentów neurochirurgicznych. Przegląd ten ma na celu podkreślenie, że przeciętny stan odżywienia jest poważnym problemem w kontekście zwiększonej zachorowalności i śmiertelności, zwłaszcza u pacjentów neurochirurgicznych. Artykuł zwraca również uwagę na duże znaczenie oceny pielęgniarstwa. (PNN 2017;6(1):33–38)

Słowa kluczowe: pacjenci neurologiczni, neurochirurgia, odżywianie

Introduction

The patients in a neuro intensive care unit have individually nutrition-related requirements to the extent of their condition. It is a difficult task for the health team to assess the nutritional requirements of individuals [1].

Parenteral and enteral nutrition are often needed by the patients who are neurologically disrupted with

modified dysphagia or mental status. Trauma, stroke, head injury, spinal cord injury, brain tumor, degenerative disease (amyotrophic lateral sclerosis, multiple sclerosis, Parkinson's, Alzheimer's) or a mobility disorder (Guillain-Barre syndrome, myasthenia gravis) are included among the general diagnoses made for the patients in a neurosurgery intensive care unit. The destruction of skeletal musculature and visceral protein reduction via

insufficient oral intake, hyper-catabolism or dysmobility that are minor compared to disease course are potentially prompted by all of these conditions. Because of the characteristics of their diseases and the invasive interferences that are necessary to support the non-surgical patients while they are treated and recovered, even these patients may suffer from a hyper-catabolic and hypermetabolic status [2–5].

The poor mortality rate and prognosis are often seen in the unconscious patients in the neuro intensive care unit. The requirement for nutrition support due to the risk of aspiration arising from respiratory muscle weakness, failure to protect the airway and gastrointestinal reflux or gastroparesis and to dysphagia may be caused by the damaged oral feeding that may also lead to the damaged appetite control centres in the brain. Cerebrovascular accident, traumatic brain damage or spinal cord injury may severely result in neurologic damage that may also be caused by chronic degenerative courses. The physiologic, metabolic and functional modifications in a complicated series can be created by acute neurologic damage such as intense traumatic brain injury [6]. Based on the severity of spinal cord injury, the patients with such injury have hypo-metabolism and energy consumption around 94% predicted by the Harris-Benedict equation contrary to the patients having traumatic brain injury. Since majority of physiologic and metabolic alterations are seen in chronic phase of disease not the acute stage, the cerebrovascular accident and degenerative neurological diseases (e.g., amyotrophic lateral sclerosis, Parkinson's disease and multiple sclerosis) vary. Despite the particular slight differences of neurologic diseases, the feeding challenges constitute a frequent reason of malnutrition [6–8].

The patients in the neurosurgery intensive care unit are confined to bed for a long time and they don't have the capability to do some living activities themselves. Insufficient nutrition is among the common problems which may be suffered by the patients in neurosurgery intensive care unit [9]. For the treatment of disease, a well-timed and sufficient nutritional support is crucial and it is related with staying longer in the intensive care unit [4]. Due to the reasons including sedation, mechanical ventilation or reduced consciousness, majority of neurosurgery intensive care patients are not able to eat by mouth. As a form of nutritional support, enteral feeding is favoured for these patients [10]. Specially, it has been demonstrated that early enteral feeding reduces the duration of stay in hospital, medical expenses and the ratios of infection of neurosurgery intensive care patients [4,10].

As demonstrated by the new analyses, the mortality and morbidity ratios of the patients who are severely ill are affected by nutritional support [3,4,11,12]. Among the patients who are severely ill and get nutritional

support, the rate of use of parenteral nutrition (PN) is 12–71% while the rate of use of enteral nutrition (EN) is 33–92% [13]. The route may be less significant than the scheduling of commencement of feeding which is also influential on the result. Namely, it has been demonstrated that early commencement of EN (by 24–48 hours) decreases the trauma patients' mortality rate [14].

For the adult patients who are severely ill, nutritional support constitutes a part of the standard care. Various factors might affect the selection of route for nutritional support for ordinary patients that stay in the intensive care unit and don't have any contraindications to enteral nutrition (EN) or parenteral nutrition (PN) [11,13]. Nutritional support creates common benefits including a decrease in translocation of bacteria, duration of stay, complication ratio and catabolic response to damage and also an increase in healing the wound, gastrointestinal permeability and clinical results. Nonetheless, there are also negative impacts and risks of nutritional support. These complications concern mechanic and metabolic troubles, gastrointestinal complications, infections and tube insertion [12].

Assessment

The data on the patients are gathered, confirmed and arranged in a systematic and constant way in the process of assessment. These data show how the applications that better health strengthens well-being or how a disease or injury destructs health [9,15].

For neurosurgical patients, it is considerably significant to perform an assessment of nutrition. An increase of 200% of ordinary values may be seen in energy consumption. However, sufficient nutrition in such patients is impeded by the factors including careless displacement of feeding tubes, slowed gastric emptying and fasting medical interventions [8]. In the assessment of nutrition, the assessment tools are used in order to take nursing history, make physical diagnosis and general observation and measure the energy requirement and body parts.

Nursing History

Through nutritional assessment, the nutritional condition of individuals is evaluated and their requirement for support and/or instruction is defined and the nutrition disorders are identified. Firstly, all patients are subjected to screening in order to define the need for additional inspection and following nutritional support [9].

Physical Examination

General observation; the significant data on nutritional condition is collected by general observation. A person who is sufficiently nourished seems to have a good health and normal vitals while his/her nails, hair and skin have a healthy appearance [16].

Anthropometric measurements; the measurements of weight, height, waist and arm circumference are included in the anthropometric measurements. The comparison of weight and height with the findings is performed in a table where the standard measurements are given as classified by gender, age, body frame as well as Body Mass Index (BMI) that is calculated by the values of weight and height. Waist measurements that constitute a clinical measure of abdominal fat cells are made just above the top of hip bones. With the purpose of getting data on the muscle mass, mid-arm circumference of the upper arm is measured [16].

Calorie count; the predictive equations are generally used by the nutritionists and intensivists in neuro intensive care units in order to predict the basal energy consumption of patients and define target calorie for them [12,16]. The daily calorie intake and risk of malnutrition of patients are defined by the nutritional therapy in these units. However, it is sometimes possible that nutrition is disrupted due to gastrointestinal symptoms and the procedure that is used inside or outside critical care unit [4,17].

Diagnostic Tests

With the help of biochemical data, a diagnosis can be made, the required alterations of diet can be defined or the particular insufficiencies of nutrition can be determined before appearance of clinical signs Haemoglobin, serum transferrin, haematocrit, prealbumin, serum albumin and total lymphocyte count are the laboratory data commonly used. Via a weekly assessment of laboratory tests and anthropometric measurements, it is required to monitor the patients getting nutritional support with regard to their weight and vital signs [16]. Moreover, it is highly crucial to control blood sugar of such patients. Through strict sugar control, hypo/hyperglycaemia episodes are avoided in neurologic patients that suffer from traumatic brain injury, subarachnoid haemorrhage and intracranial haemorrhage [12].

Nutritional Status Evaluation Tools

In order to calculate the risk of malnutrition, the factors such as the patients' height (or ulna length as surrogate) and weight, acuteness of illness or serum albumin and history of late serious loss of weight are used by majority of these tools [12] (Table).

Table. Malnutrition screening tools used in the intensive care unit population

Screening test	History	Clinical data
Subjective global assessment	Weight change over 2 weeks–6 months	Subcutaneous fat
	Change in diet intake (amount and type)	Muscle wasting
	Gastrointestinal symptoms	Oedema
	Functional capacity (change in)	Ascitis
Malnutrition universal screening tool	Unplanned weight loss over 3–6 months	Body mass index Acute disease effect
Nutritional risk screening	Acute weight loss in 3–6 months	Body mass index
	Reduced dietary intake in last week	Severe illness
Mini nutrition assessment	Food intake	Body mass index
	Weight loss	Mobility

Tripathy S. Nutrition in the neurocritical care unit. *J Neuroanaesthesiol Crit Care*. 2015;2:88–96.

Nutritional Support

It is essential to provide neurosurgery patients with sufficient nutritional for their overall management [18]. With the purpose of bettering the nutritional management, several various feeding methods have been tested [19,20]. Such management has two objectives to

decrease the negative nitrogen balance and replace calorie and protein early. Oral nutritional supplements, parenteral nutrition, food fortification and tube feeding are contained in the nutritional support as stated by ESPEN (European Society of Parenteral and Enteral Nutrition Guidelines) [18,21].

Food Fortification

With the help of food fortification, sufficient food intake can be provided and the nutritional insufficiency can be avoided. In order to improve the nutrient content which naturally emerges, mineral and vitamin compounds are joined to foods. With a view to improving protein and/or calorie intake, a drink in the form of milkshake is given between meals three or four times a day [22,23]. It has been demonstrated that food fortification improves nutritional intake of the neurosurgical patients that often do not eat up whole meal served on their plates [24]. Since food fortification supplies based on such particular patients' requirements, it is considerably recommended. That is because various reasons (like appetite loss) cause such patients to have difficulty in handling an intake of sufficient food, as it has been suggested. Therefore, nurses may demand food fortifications ordered by physicians [16,25].

Enteral Nutrition

Nutrients are directly delivered into GI system in enteral nutrition with avoiding the mouth. As an active therapy, enteral nutrition diminishes the organism's metabolic reaction to stress and adapts the immune system well. Compared to parenteral nutrition, enteral nutrition is less expensive and it is favoured mostly because it has less serious complications and creates more favourable patient results including infections, and length of stay and hospital cost [16,20].

Tube feedings

Containing the commercial formulas that are nutritionally balanced, tube feedings involve a tube inserted straight into the stomach, jejunum or duodenum. By inserting a tube into intestine or stomach via nose or abdominal wall percutaneously, the GI system can be accessed [16,20,26]. The patients that have active GI system but a problem with swallowing or an illness promoting malnutrition are provided with nutrition by tube feedings. Upon reduction of consciousness level, the tube feedings have been shown to hamper safe eating. For the neurosurgical patients that are able to eat but fail to satisfy the nutritional requirement of body by sufficient nutrients, the tube feedings are applied as a combined therapy. It is proper to use tube feedings on the condition that it is possible to absorb the nutrients from GI tract [16]. The use of these tubes for a long time might create different complications and troubles influential on quality of life and lead to some outcomes on the use of health care economically even if the lower

rate of morbidity is associated with the insertion of such tubes [20,27].

The problems with swallowing that necessitate placement of EN tubes for a long time are likely to be seen in the neuro intensive care unit patients [28,29]. The patients having the risk of dysphagia are required to be defined by the neuro ICU staff and they must be provided with EN tube feeding [12]. The complications including diarrhoea, tube occlusion, electrolyte and fluid imbalance, vomiting, intestinal cramping, hyperglycaemia, nausea and aspiration must be avoided and evaluated as a matter of nursing responsibilities for the patients that are provided with tube feedings. Although enteral feeding has mostly minor complications, they can be rather severe. Nonetheless, it is possible for nurses to decrease the occurrence and acuteness of these complications by means of assessing the nutritional needs and clinical condition of the patients, placing the feeding tube cautiously, tracking the feeding course and choosing and developing the formula [16,26,30].

Oral Nutritional Supplements

Oral nutritional supplements (ONS) constitute a significant part of nutritional therapy. Malnutrition can be treated and prevented effectively by means of management of ONS. All critical nutrients are combined in a balanced way in these supplements distinguished by dense nutrients and considerable energy [31].

Various systematic examinations and meta-analyses which were performed with varying atmospheres and patients with different illnesses and status have demonstrated that ONS creates such benefits as decrease in the risk of infections, complications and mortality and improvement of nutritional condition and cognition as well as effective costs. With the purpose of bettering or sustaining the nutritional condition and improving the intake of nutrients and energy, it is recommended by the ESPEN guidelines related to enteral nutrition to use ONS for the undernourished patients or those having the risk of undernutrition [16,31].

When it is deemed that there is serious malnutrition and/or nutrition intakes aren't proper in spite of nutritional advices, it is suggested to use ONS. As it has been reported, the underdiagnoses of malnutrition are the leading restriction of this approach [32].

Parenteral Nutrition

The patients that cannot digest nutrients from the gastrointestinal tract are provided with carbohydrate, electrolytes, protein, minerals, fat, vitamins and fluids supplied by parenteral nutrition. When it is shown that

enteral nutrition isn't proper or able to satisfy the patients' nutritional needs, the parenteral nutrition is referred. Enteral nutrition is always more favourable than parenteral nutrition when possible. In terms of nutrition, the term "parenteral" means intravenous nutrition even if it suggests any route outside the gastrointestinal tract [19,33].

Total parenteral nutrition (TPN) means that all nutritional needs are solely administered through the intravenous route [34]. Including 20–50% dextrose, minerals, proteins and vitamins, TPN is hypertonic solution administered into the venous system. When the absorption of nutrients from the gastrointestinal tract is interfered or it is necessary to ensure full bowel rest to heal, TPN is referred [19].

For managing hydration and nutrition in the neurosurgery patients, parenteral nutrition is a well-known method. The patients that get parenteral nutrition suffer from risk of different complications. A great number of complications including air embolism and pneumothorax that are possibly severe are related with central line placement. Fluid overload, infection, and metabolic alterations are the other complications [19,33].

Conclusion

Through cooperation with the interdisciplinary team, the nurse has an important role in the nutritional support for the neurosurgery patients that are critical. As the first step of nutrition treatment, the condition is defined and assessed. It is significant for the nurses to assess the patients' individual nutritional requirements. The protein and energy needs of patients in neurosurgical intensive care are necessary for reducing the risk of morbidity. Therefore, in order to assess the patients' nutritional requirements and preparedness for nutritional support, nurses work in cooperation with the nurse practitioners, neurosurgeon, dieticians and other critical care professionals. As a next step, the nutrition therapy is initiated by monitoring the complications and gastric tolerations and controlling lines and tubes [35]. It is required to demonstrate the administration of feeding intolerance requirements and also the protocol given as a beneficial measure should be pursued exactly and continuously by the nurses. Regarding the use of screening tools, the ESPEN and other organizations that are internationally active have produced guidelines to comply with. It will possible to create a basis for a holistic approach and a chance to enable the patients to have a nutritional treatment individualized and bettered consequences by a unified guideline [36].

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