**Module 8 Questions: Nutrition Support**

**I. Abbreviations/Definitions**

**Shock** - a critical condition that is brought on by a sudden drop in blood flow through the body. The circulatory system fails to maintain adequate blood flow, sharply curtailing the delivery of oxygen and nutrients to vital organs. It also compromises the kidneys and so restricts the removal of wastes from the body. Shock can be due to a number of different mechanisms, including not enough blood volume and not enough output of blood by the heart.

**Refeeding Syndrome**- Refeeding syndrome can be defined as the potentially fatal shifts in fluids and electrolytes that may occur in malnourished patients receiving artificial refeeding (whether enterally or parenterally). These shifts result from hormonal and metabolic changes and may cause serious clinical complications.

**ARDS**- Acute respiratory distress syndrome (ARDS) is a rapidly progressive disease occurring in critically ill patients. The main complication in ARDS is that fluid leaks into the lungs making breathing difficult or impossible.

**Pancreatitis**- is a disease in which the pancreas becomes inflamed. Pancreatic damage happens when the digestive enzymes are activated before they are released into the small intestine and begin attacking the pancreas.

**Respiratory Quotient**- is a dimensionless number used in calculations of basal metabolic rate (BMR) when estimated from carbon dioxide production. It is calculated from the ratio of carbon dioxide produced by the body to oxygen consumed by the body. Such measurements, like measurements of oxygen uptake, are forms of indirect calorimetry. It is measured using a respirometer. The Respiratory Quotient value indicates which macronutrients are being metabolized, as different energy pathways are used for fats, carbohydrates, and proteins.

**Ileus**- is the medical term for this lack of movement somewhere in the intestines that leads to a buildup and potential blockage of food material. An ileus can lead to an intestinal obstruction. This means no food material, gas, or liquids can get through. It can occur as a side effect after surgery.

**Pulmonary Edema**- a condition in which the lungs fill with fluid. It's also known as lung congestion, lung water, and pulmonary congestion. When pulmonary edema occurs, the body struggles to get enough oxygen and you start to have shortness of breath.

**Sepsis**- is a serious illness, It happens when the body has an overwhelming immune response to a bacterial infection. The chemicals released into the blood to fight the infection trigger widespread inflammation. This leads to blood clots and leaky blood vessels.

**II. Pathophysiology**

A**. Describe the physiologic and biochemical changes which occur during the**

**Post-operative period for a patient having major surgery. How this impact might plans for nutrition support?** Metabolic response affects most pathways which can result in net negative nitrogen balance and muscle wasting. The ebb phase response to injury decrease cardiac output, oxygen consumption, body temperature also insulin levels fall in response to increase in glucagon. Increase cardiac output, oxygen consumption, body temperature and energy expenditure and total body the flow phase which occurs after fluid resuscitation and restoration of oxygen transport.

**Physiologic**: an increase in glucose production, free fatty acid release circulating levels of insulin, glucagon and cortisol. After injury energy production depends on protein the protein level and pre-albumin levels decrease. The breakdown of protein causes increased urinary losses of potassium, phosphorus, and magnesium. Lipid metabolism may also be altered. Patients after major surgery usually NPO with IV fluid sand TPN. Evaluate for advance to enteral with an elemental formula after10 days if unable to tolerate PO.

**B. Describe the physiologic and biochemical changes which occur during sepsis/septic shock. How this impact might plans for nutrition support?** The patient has decrease body temperature, rapid heartbeat and respiratory rate, change in white blood cell count which causes damage to organs. Muscle tissue breaks down and gluconeogenesis occurs at risk for malnutrition. This results in alteration to serum protein levels and decrease in albumin levels. Nutrition support to promote protein synthesis and increase calories.

**C. What effect can malnutrition have on respiratory function? How this impact might plans for nutrition support?** Malnutrition has a tremendous impact on respiratory functions. It affects respiratory muscle performance, lung structure, defense mechanisms, and control of ventilation and predisposes to respiratory failure and prolonged mechanical ventilation. Malnutrition can be reversed with the appropriate refeeding.

**III. Nutritional Management**

**A. Describe the different routes for administration of enteral feedings (PEG, NG, and PEJ). Include indications for each route of administration in your description.**

**B. Review the enteral feeding formulary for your institution and discuss appropriate enteral feeding formula use for each route. (You may want to do this in chart form.)**

**Percutaneous Endoscopic Gastrostomy (PEG)-**is a nonsurgical technique for placing a tube directly into the stomach through the abdominal wall guided by an endoscope under local anesthesia. PEG uses French size a large bore which reduces clogging.

 **Nasogastric (NG)-**is a tube inserted through the nose into the stomach. It is used when the patient has a functioning GI usually short term3-4 weeks. Percutaneous Endoscopic Gastrostomy

**PEJ**-a tube is inserted into the jejunum with an endoscope. The tip of the tube passes through the pylorus into the duodenum into the jejunum. It’s for patients who cannot tolerate gastric feedings or bowel resection.

|  |  |  |
| --- | --- | --- |
| Nepro  | Carbohydrate steady blend for blood glucose response. For dialysis | PEG/NG |
| Suplena  | Carbohydrate steady low protein high in calories, low phosphorus, potassium and sodium, good source of fiber. Chronic kidney disease. | PEG/NG |
| Two Cal HN | High calorie, high protein, increase lean body mass  | PEG/NG |
| Pulmonare | Cystic fibrosis, or respiratory failure. High calorie, modified carbohydrate and fat may help reduce diet-inducedCO2 production.  | PEG/NG |
| Ensure plus | High protein, high calorie  | PEG/NG |
| Prostat  | High protein | PEG |
| Vital 1.2 | Elemental  | PEG |
| Jevity 1.2 | High-protein, fiber fortified | PEG/NG |
| Jevity 1.5 | High calorie , with fiber | PEG/NG |
| Glucerna 1.5 | Carbohydrate steady with fish oil | PEG/NG |
| Pivot 1.5 | High protein /calorie. Metabolic stress peptide base protein easy absorption w/ arginine. | PEG/NG |

**C. Discuss re-feeding syndrome. Include in your discussion, the role of phosphorus in respiratory function. What are some possible consequences of over feeding a patient who requires mechanical ventilation?** Re-feeding syndrome causes hormonal and metabolic changes and may cause serious clinical complications. The biochemical feature of refeeding syndrome is hypophosphataemia. However, the syndrome is complex and may also feature abnormal sodium and fluid balance; changes in glucose, protein, and fat metabolism; thiamine deficiency; hypokalemia; and hypomagnesaemia. Phosphorus regulates the affinity of hemoglobin for oxygen and thus regulates oxygen delivery to tissues. It is also important in the renal acid-base buffer system. Over feeding a patient who requires mechanical ventilation may result in respiratory failure.

D. **What is propofol (Diprivan)? How might use of this drug impact recommendations for nutrition support?** Is a prescription, injectable drug. It's an anesthetic used to put people to sleep before surgery. It's also given for sedation in hospital intensive care units (ICUs). Use for > 72 hours need low fat enteral feeding or low fat TPN subtract drug fat calorie from TPN fat requirements. Fat free TPN often used It causes decrease renal function, decrease hepatic function, seizures.

**E. What is the rationale for using MCT oil in the diets of patients with malabsorption syndrome?**

MCTs are more easily absorbed into the bloodstream from the gastrointestinal tract. These features of MCTs confer unique benefits in the management of gastrointestinal disorders. MCTs have historically been used to treat steatorrhea resulting from malabsorptive disorders, such as pancreatic insufficiency, prior gastrectomy and small bowel resection.

**IV. Nutrition Support Practice Calculations**

**Using the enteral feeding formulary at your clinical placement, complete the following care plans:**

1. Pt A. is an 80 year old F admitted to the ICU with CHF. Ht: 5’5” Wt: 50 kg

She required intubation secondary to pulmonary edema. A naso-jejunal feeding tube has been placed. You are consulted to suggest an appropriate feeding.

Calculate her estimated calorie and protein needs.

Write a feeding prescription for this patient.

Calculate calorie and protein needs.

BMI=18.3 underweight

Calories = 30-35 kcal/kg/BW= 1500-1750 Kcal/day

Protein = 1- 1.2gm/kg/BW=50-60g/day

Fluid = 20ml-25/kg/day=1000-1250ml/day Free water 785ml

Write a feeding prescription for this patient. Pulmocare 1000 ml continuous @ 42 ml /hr. start at 15 ml / hr. then advance to 20 ml after 24 hours until a goal rate of 42 ml is achieved. Flush with 155 ml H2O q shift. 1000 ml Pulmocare provides 1500 kcal 62.5 gms protein 1000ml fluids

**2. Pt B. is a 74year old M s/p CVA 7 days ago. Ht: 68” Wt: 160 pounds**

He is NPO x 1 week. A PEG was placed yesterday. You are consulted to suggest an appropriate feeding.

Calculate his estimated calorie and protein needs.

Write a diet prescription for this patient.

Calculate calorie and protein needs.

BMI 24.3

IBW 154 lbs. +/-5 %.

Calories = 25-30 cals/kg/BW= 1825-2190 kcal

Protein= 1-1.2 gm/kg/BW/day= 73- 88g/day

Fluid=25-30ml/kg/day=1825-2190ml/day/day

Write a diet prescription for this patient. Jevity 1.2 1500 ml @ 63ml /hr. start feeding @ 30 ml x 24 hours then increase by 10-20 ml Q 4 hours until goal rate achieved. 250 flush Q shift. Free water 1211 ml. Feeding provides 1800 cal, 83gms protein daily.

**Sources**

Escott-Stump, S, Nutrition and Diagnosis Related care 8 (e). (2015). Wolters Kluwer Health /Lippiincott Williams & Wilkins

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2440847/>

<https://www.webmd.com/digestive-disorders/digestive-diseases-pancreatitis#1>

<https://www.ncbi.nlm.nih.gov/pubmed/3081450>

Pharmacologic influence on nutrition support therapy: use of propofol in a patient receiving combined enteral and parenteral nutrition support. Lowrey TS1, Dunlap AW, Brown RO, Dickerson RN, Kudsk KA.