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| Minor Case Study | Nutrition Support and Intracranial Hemorrhage |

Table of Contents

[Introduction 4](#_Toc349503323)

[Social History 4](#_Toc349503324)

[Normal Anatomy and Physiology of Applicable Body Functions 4](#_Toc349503325)

[Present Medical Status and Treatment 5](#_Toc349503326)

[Theoretical Discussion of Disease Condition 5](#_Toc349503328)

[Usual Treatment of the Condition 6](#_Toc349503329)

[Nutrition Treatment 6](#_Toc349503330)

[Medical Treatment 6](#_Toc349503331)

[Patient’s Symptoms upon Admission Leading to Present Diagnosis 7](#_Toc349503332)

[Laboratory Findings and Interpretation 7](#_Toc349503333)

[Medications 8](#_Toc349503334)

[Observable Physical and Psychological Changes in Patient 8](#_Toc349503335)

[Treatment 8](#_Toc349503336)

[Medical 8](#_Toc349503337)

[Surgical 8](#_Toc349503338)

[Medical Nutrition Therapy 9](#_Toc349503339)

[Nutrition History and Analysis of Previous Diet (24 hour recall) 9](#_Toc349503340)

[Current Prescribed Diet & Responses 9](#_Toc349503341)

[Nutrition-Related Problems 9](#_Toc349503342)

[Evaluation of Present Nutritional Status and other Nutrients to Address 9](#_Toc349503343)

[Goals, Interventions, Monitoring, and Evaluation 10](#_Toc349503344)

[Patient’s Nutrition Education Process 10](#_Toc349503345)

[General Conditions upon Discharge 10](#_Toc349503346)

[Prognosis 11](#_Toc349503347)

[Summary & Conclusion 11](#_Toc349503348)

[Appendix A - Medications 12](#_Toc349503349)

[Bibliography 13](#_Toc349503350)

# Introduction

The patient chosen for this case study, DH, is a 47 year old Caucasian female who has been diagnosed with unspecified intracranial hemorrhage, later classified as a subarachnoid hemorrhage. The patient also suffered from ventilator-dependent respiratory failure. The height of the patient is 5 feet 6 inches (167.64 cm) and she weighs 150 pounds (68 kg). The patient was chosen for the nutrition support case study because she was on a ventilator and receiving propofol, both of which have an effect on tube feeding. The patient was admitted to the hospital on February 2nd and is still in the hospital.

# Social History

The patient is not married but does have a boyfriend that she lives with. She also has a sister that filled out her PHH. She is does not have any religious affiliations and therefore has no special religious dietary guidelines to follow.

# Normal Anatomy and Physiology of Applicable Body Functions

The brain consists of non-replaceable neural tissue. The main parts are the cerebral cortex, brain stem, and reticular activating system. The brain is responsible for cognition, voluntary and involuntary movements, and sensation. It is protected by the surrounding skin, skull, meninges, and cerebrospinal fluid. Blood is transported to the brain via blood vessels. The blood vessels deliver oxygen and nutrients to the brain (1).

# Present Medical Status and Treatment

## 2 subarachnoid hemorrhage

Normal brain Brain with subarachnoid hemorrhage

## Theoretical Discussion of Disease Condition

An intracranial hemorrhage is described as bleeding that occurs inside the skull. This is usually the result of an external head injury but can also come from an internal cause (1, 2). These causes include head trauma from a fall or accident, hypertensive damage to blood vessels causing leakages or breaking, blockage of an artery, treatment with blood thinners, smoking, excessive alcohol use, or conditions related to pregnancy or childbirth (3). The brain is unable to store oxygen and, therefore, relies on the blood vessels to supply it along with nutrients. If bleeding occurs inside the skull, this puts pressure on the brain, depriving it of oxygen (2, 3).

Symptoms of intracranial hemorrhage include sudden tingling, weakness, numbness, or paralysis of the face, arm, or leg, especially on one side of the body, sudden, severe headaches, difficulty swallowing, loss of balance or coordination, difficulty understanding, speaking, reading, or writing, change in level of consciousness or alertness (1). Depending on the location of the hemorrhage and the amount of damage it has caused, there can be long-term effects such as paralysis, numbness or weakness, difficulty swallowing, vision loss, inability to speak or understand words, confusion, memory loss, personality changes (1, 3).

Intracranial hemorrhage accounts for approximately 10% of all strokes in the nation, and stroke is not only the 3rd leading cause of death in the nation, but also the leading cause of disability (3).

## Usual Treatment of the Condition

### Nutrition Treatment

When a patient has been through an intracranial hemorrhage, nothing by mouth may be ordered at first and the patient will be put on IV fluids. As the patient progresses, an enteral tube feeding diet may be prescribed or even an oral diet. In some cases, the patient may not progress and total parenteral nutrition may be needed (2, 4).

Cerebral edema is common and limiting fluids and sodium as necessary can help reduce it. Decreasing or managing hyper tension is important as well as avoiding constipation or straining at stools. Decreasing or managing hypertension is necessary, therefore, saturated fat and cholesterol may need to be restricted. Potassium may need to be increased (2, 4, 5).

### Medical Treatment

Intracranial hemorrhaging can be diagnosed in multiple ways. Evaluating the patient’s physical symptoms is one of the first ways. A CT scan of the brain to confirm bleeding and an MRI to more clearly see the cause of bleeding are two other common diagnosing methods. Surgical treatment for an intracranial hemorrhage includes decompressing the brain to release pooled blood and repairing damaged blood vessels. This is usually done via a craniotomy. If the hemorrhage was caused by a ruptured vessel, clipping of that vessel through a craniotomy may be necessary. Medications that are used during treatment include anti-anxiety drugs and other medications to control blood pressure, anti-epileptic drugs for seizure control, and other medications to control symptoms such as painkillers for headaches and stool softeners to prevent constipation and straining (1, 3, 5).

## Patient’s Symptoms upon Admission Leading to Present Diagnosis

According to the notes in the chart, the patient became unresponsive in a local bar. There was question of seizure activity and she was taken to Winter Park where she was almost immediately intubated. It was also noted that the patient had aspiration prior to intubation.

## Laboratory Findings and Interpretation

There are not many clinical indicators for intracranial hemorrhaging that can be seen in a patient’s lab work that are specific to only intracranial hemorrhaging. Labs may show elevated cholesterol and triglycerides, as well as elevated glucose, sodium, potassium, and albumin. Blood pressure may be increased. The patient may also have pneumonia or a fever. CT scans of the brain and brain MRIs are the best way to reveal internal bleeding or blood accumulation in the brain and make a diagnosis (1-3). Below is a list of the lab values out of the normal range for the patient.

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|  | **Lab Value** | **Normal Value Range** |
| Glucose | 207, 170 | 70-100 |
| Accuchecks | 172, 188, 152 | 70-100 |

## Medications

 A list of the medications the patient was on when at the hospital is provided in Appendix B. Also listed are the uses, descriptions, and possible side effects that relate to the patient (6).

## Observable Physical and Psychological Changes in Patient

The major physical change seen in the patient was that she was intubated. Due to the severity of her condition, she was no longer able to breathe on her own and had to have a tube placed to help her breathe.

## Treatment

### Medical

According to her notes and documents, at Florida Hospital Winter Park, a CT scan of brain was performed. It revealed a diffuse subarachnoid hemorrhage. The patient was then transferred to Florida Hospital South for neurosurgical evaluation. On February 8th, a transcranial Doppler showed mild vasospasm involving left middle, anterior, and posterior, and right middle and posterior cerebral arteries.

### Surgical

On February 6th, the patient had a right lateral ventriculostomy procedure performed to allowed drainage. The procedure was repeated on February 11th. On February 17th, a central line was placed using the right subclavian vein to initiate total parenteral nutrition.

# Medical Nutrition Therapy

## Nutrition History and Analysis of Previous Diet (24 hour recall)

The patient was intubated during each visit and no family members or friends were in the room at the time, therefore, a nutrition history and 24 hour recall were not obtained.

## Current Prescribed Diet & Responses

The patient was started with Promote enteral feedings due to her intubation. She received Promote with a goal rate of 55 through a transpyloric tube. This was calculated using a 22 hour infusion rate. The objective of the treatment was to meet her calorie needs while also meeting her protein needs for healing. It was later noted that the patient was not tolerating the tube feeding as evidenced by vomiting and TPN was initiated.

## Nutrition-Related Problems

Upon admission to the hospital, the patient had inadequate protein-energy intake related to decreased ability to consume sufficient energy as evidenced intake from diet less than recommended levels.

## Evaluation of Present Nutritional Status and other Nutrients to Address

Due to intubation, the Penn State equation was used to determine her resting metabolic rate. This equation uses a patient’s height, weight, sex, age, ventilation, and temperature. This patient had an RMR of 1726 kcals per day. Her protein needs were calculated to be 75-88 g protein per day based on 1.1-1.3 g protein per kg admission weight. The patient was receiving propofol at a rate of 20 mL/h. With a 24 hour infusion rate and 1.1 kcals per mL, the propofol provided 528 kcals. This has to be taken into account when deciding how much formula to provide. It was decided that Promote would be the formula of choice for this patient. It was started at 25 mL/h and increased 15 Ml every 8 hours to a goal rate 55 mL/h. At goal rate with a 22 hour infusion rate, Promote will provide 1210 mL of formula, 1201 kcals, 76 g protein (1.1 g protein/kg admission weight), and 1015 mL water. Kcals from the tube feeding (1210) + kcals from propofol (528) = 1738 kcals which is 101% of the patient’s RMR. As the amount of propofol decreases, the amount of kcals from the tube feeds will increase and the goal rate or formula may need to be changed. The patient’s RMR can also change as the vent changes or if the patient has a fever. As stated previously, the patient did not tolerate the tube feeding and was put on TPN in order to meet her kcal and protein needs. Since the patient was receiving tube feeding, she was getting > 100% RDIs and was not put on a multivitamin supplement.

### Goals, Interventions, Monitoring, and Evaluation

 The goal for this patient is to tolerate tube feedings of Promote at the goal rate of 55 mL/hour. The intervention for the patient includes enteral nutrition and the patient will be monitored and evaluated by checking her enteral nutrition infusion rate as well as monitoring her RMR and propofol infusion rate.

## Patient’s Nutrition Education Process

Since the patient was intubated, she was not able to be educated about her diets.

## General Conditions upon Discharge

 The patient is still currently in the ICU at this time with no plans to extubate.

# Prognosis

The patient is currently tolerating TPN at this time. If she can slowly start tube feeding again and tolerate it, she can be weaned off TPN and have only tube feeds. Once extubated and a swallow study is performed, she may be able to start eating a regular diet. If this is the progression of events then her prognosis is favorable. If she continues to not tolerate nutrients in the gut, her quality of life will not be as great as it was before.

# Summary & Conclusion

This case study helped me to understand how a patient with a ventilator can have drastically different needs from day to day. If they have a fever one day then their needs will be increased, if their ventilation rate changes, so will their needs. I also learned how propofol provides extra calories and that changes how many calories the patient will need from the tube feeding. Also, the propofol rate can vary each day causing either a need to increase or decrease the goal rate of the tube feeding or even a need to change the formula being used. Lastly, I learned that sometimes a patient just won’t tolerate tube feedings and will need TPN to get the needed nutrients.

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| **Drug** | **Use** | **Description** | **Side Effects** |
| Albuterol | for asthma and COPD | Bronchodilator that relaxes muscles in the airways and increases air flow to the lungs. Used to treat or prevent bronchospasm in people with reversible obstructive airway disease. | Headache, chest pain, breathing problems, nausea, vomiting |
| Clopidogrel (Plavix) | For atherosclerotic events | ADP-induced platelet aggregation inhibitor | Nosebleed, bloody stool, blood in urine, sudden headache, sudden numbness |
| Insulin isophane (Humulin) and insulin lispro (Humalog) | For elevated blood glucose | Man-made form of insulin hormone | hypoglycemia |
| Polyethylene glycol (Miralax) | for occasional constipation | Works by holding water in the stool to soften the stool and increases the number of bowel movements. | Nausea, abdominal cramping, or gas. |
| Nimodipine (Nimotop) | Improves neurological outcome for pateitns with ruptured intracranial aneurysms | Dihydropyridine calcium antagonist that increases blood flow to injured brain tissue | Decreased blood pressure |
| Midazolam (Versed) | for continuous sedation during intubation | Benzodiazepine that slows activity of brain to allow relaxation and sleep | Breathing problems |
| Meperidine (Demerol HCl) | For pain | Narcotic analgesic that changes the way the body senses pain | Breathing problems, seizures, heart problems |
| Ondansetron (Zofran) | Nausea and vomiting | Serotonin 5-HT3 receptor antagonist  | Diarrhea, headache, constipation, blurred vision, breathing problems |
| Propofol (Diprivan) | For continuous sedation during intubation | IV sedative-hypnotic  | Arrhythmia, breathing problems, seizure, numbness of hands or feet |

# Appendix A - Medications

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