Hepatic Encephalopathy Case Study

Alexandra Tatis

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University of New Hampshire
One of the most imperative skills a nurse must possess in order to provide the best, well-rounded care to his or her patient is the ability to use critical thinking. This skill is defined by the Foundation for Critical Thinking as, “the ability to recognize problems and raise questions, gather evidence to support answers and solutions, evaluate alternative solutions, and communicate effectively with others to implement solutions for the best possible outcomes.” Each one of these aspects relates directly to the thought process a nurse must utilize with every situation they face in the healthcare setting. Along with the use of critical thinking, a nurse must understand the concept around individualized patient-centered care. Although two patients may have the same physiological disease, each patient is different with regards to how they are presenting and the personalized nursing care that they require. One of the ways in which nurses and nursing students can prepare and excel in their skills of critical thinking and patient-centered care is through the use of case studies. In Harding and Snyder’s, Winningham’s Critical Thinking Cases in Nursing, case number 47 follows the hospitalization of an unidentified 50-year-old alcoholic with rule out hepatic encephalopathy, known as John Doe (Harding, Snyder, Preusser, & Winningham, 2013). Through careful analysis, a progressive plan of care is developed with intent to provide the necessary treatment and most effective individualized care for John Doe.

**Pathophysiology**

With an estimated range of between seven and eleven million cases in the United States alone, chronic liver disease is evidently a major health care problem that we face today (Chronic Liver Disease Foundation, 2009). With over 500 estimated functions, the liver can most certainly be considered one of the most vital glands in the body (Sargent, 2006). Some of the most important functions of the liver include filtering the blood, detoxifying chemicals and metabolizing drugs. With most cases of chronic liver disease, liver cirrhosis comes hand in hand,
that is the formation of fibrous tissue and the development of nodules with repeated hepatocyte damage (Sargent, 2006). There are a multitude of causes that can contribute to cirrhosis of the liver, for instance Hepatitis B, Hepatitis C and Nonalcoholic Fatty Liver Disease. Additionally, chronic alcohol abuse remains a huge risk factor. Out of these patients who have developed cirrhosis of the liver, approximately 80% present with a potentially fatal complication known as hepatic encephalopathy (Chronic Liver Disease Foundation, 2009). In a normal healthy liver, the ammonia, a byproduct of protein, is metabolized, converted into urea and excreted in the urine through what is known as the urea cycle (Sargent, 2007). However, with a buildup of scar tissue in a cirrhotic liver, this function of the liver is unable to be completed, thus causing a buildup of ammonia in the bloodstream. As this ammonia eventually crosses the blood-brain barrier, this exerts a direct effect on the Central Nervous System (CNS), more specifically the stimulation of GABA (Hinkle & Cheever, 2013). When GABA, a neurotransmitter in the brain, is stimulated, this causes depression of the CNS, which leads to sleep and behavior patterns that are associated with hepatic encephalopathy (Hinkle & Cheever, 2013). With this loss of brain function, the occurrence of confusion and altered levels of consciousness begins.

**Case Study**

As previously mentioned, the following case study examines a patient presenting with possible hepatic encephalopathy, a complication of liver cirrhosis. The case is as follows:

“John Doe, approximately 50 years old, is admitted to your unit for observation from the emergency department (ED) with the diagnosis of rule out hepatic encephalopathy with acute alcohol intoxication. This man was sent to the ED by local police, who found him lying unresponsive along a rural road. Examination and x-ray studies are negative for any injury, and you are awaiting the results of the blood alcohol level and toxicology tests. He has no identification and is not awake or coherent enough to give any history or to answer questions. He is lethargic, has a cachectic appearance, does not follow commands consistently, and is mildly combative when aroused. He smells strongly of alcohol and has a notably distended abdomen and edematous lower extremities. He has a Foley catheter and an IV of D5½NS with 20mEq KCl and 1 ampule of multivitamins infusing at 75 mL/hr.”
John Doe’s admitting orders are the following:

- IV D5½NS with 20mEq KCl at 75 mL/hr; add 1 ampule multivitamins to 1L of IV fluid per day
- Insert Salem Sump NG tube and attach to low continuous suction
- Insert Foley catheter to gravity drainage
- Elevate HOB at 30-45 degrees at all times
- Check all stools for occult blood
- Lactulose (Cephulac) 45mL PO qid until diarrhea
- Abdominal ultrasound in AM
- Vitamin K (AquaMEPHYTON) 10 mg/day IV or PO (when alert and able to swallow) x3 doses
- Vitamin B1/thiamine 100 mg/day IV; change to PO when alert and able to swallow
- Vitamin B9/folic acid 0.4 mg/day IM
- Vitamin B6/pyridoxine 100 mg/day PO
- Labs: CBC with differential, BMP, LFTs, PT/INR and PTT, serum ammonia now and in AM
- Once patient is alert and able to swallow, may have low-protein diet. Observe for any difficulty swallowing, and offer assistance with meals if needed
- Call house officer for any sign of GI bleed; delirium tremens; systolic BP over 140 or less than 100 mmHg; diastolic BP less than 50 mmHg; or pulse over 120 beats/min”

As a nurse with such an extensive list of admitting orders, it is expected that anything that can be completed by the nursing assistive personnel, also known as the NAP, will be delegated as such. This creates an efficient team effort when trying to complete as many necessary tasks as possible. The orders in which the nurse must perform for John Doe include providing a head-to-toe assessment, providing the ordered nutritional requirements, inserting the Foley catheter and Salem Sump NG tube and ensuring that the ultrasound and labs are scheduled appropriately. While this is being completed, a NAP can assist with providing a safe environment (i.e. placing seizure pads on the side rails of the bed, providing restraints and sitting for a 1:1 observation if necessary), positioning the head-of-bed to 30-40 degrees, gathering a stool sample and taking his vital signs. Considering John Doe’s apparent level of intoxication, additional tasks such as helping him to the bathroom, ordering low-protein meals and assisting him with feeding if any
difficulty swallowing is notable, is necessary.

After taking John Doe’s entire situation thus far into perspective, it is clear as to why multiple vitamins may have been included in his admitting orders. Although we do not know his complete medical history, the state in which he was found makes it safe to assume that John Doe’s nutritional intake was most likely not sufficient. Each of the four vitamins ordered, Vitamin K, Vitamin B1, Vitamin B9 and Vitamin B6, all play an important role in the body. However, with a cirrhotic liver, the absorption of these vitamins is significantly impaired. Assuming this vitamin deficiency, one must take into consideration the negative effects this may have on his body, especially being intoxicated. This being said, although each vitamin is significant for their own reason, nurses must prioritize which should be given immediately.

With John Doe’s liver being unable to absorb Vitamin K, the liver cells are subsequently unable to produce prothrombin, thus decreasing the production of clotting factors (Hinkle & Cheever, 2013). In addition, Pyridoxine, also known as Vitamin B6, aids in skin and mucous membrane lesions. Folic acid, or Vitamin B9, can result in macrocytic anemia. Lastly, a deficiency in Vitamin B1, also known as Thiamine, can lead to complications of the nervous system, muscles and heart. These include beriberi, polyneuritis and Wernicke-Korsakoff psychosis (Hinkle & Cheever, 2013). There are two types of the disease beriberi; the first of which affects the cardiovascular system and the other affecting the nervous system. Polyneuritis is ultimately a symptom of this disease (Hinkle & Cheever, 2013). Wernicke-Korsakoff psychosis is commonly associated with hepatic encephalopathy, affecting many different parts of the brain (Hinkle & Cheever, 2013). With this all being said, it is crucial that Thiamine be given a priority out of all of these vitamins in order to ensure that John Doe’s condition does not worsen.
Following the completed lab work that was drawn in the ED, John Doe’s blood alcohol level, blood ammonia, protein and albumin level were all evaluated. With the blood alcohol level being 320mg/dL, it is apparent that John Doe was very intoxicated during the time of admission. The normal blood ammonia level in the body is 9.5 to 49mcg/dL (RN Adult Medical Surgical, 2016). With his level coming up as 155mcg/dL, it is evident that this was also very high. Knowing the pathophysiology of hepatic encephalopathy, this high level of ammonia is a clear sign that this is in fact what John Doe is experiencing. With a protein level of 5.3 and an albumin level of 2.1, these are both fairly low. While a low protein level indicates that his liver cannot absorb proteins, the low albumin level represents the body’s inability to keep fluid in the blood from leaking out into the tissues (RN Adult Medical Surgical, 2016). All of these values are expected with John Doe’s case.

With the accumulation of ammonia in John Doe’s body, one of the most effective medications to treat this is Lactulose, an ammonium detoxicant and osmotic laxative (Weber, 1996). When lactulose is metabolized in the colon, lactic acid is formed, thus creating an acidic environment in which ammonia is unable to be further produced or travel back to the blood, subsequently being excreted out into the feces (Phongsamran, 2010). Whenever a laxative is used, it is always important to keep in mind that dehydration and hypokalemia, a low potassium level, can easily occur. As seen in John Doe’s admitting orders, IV D5½NS with 20mEq KCl at 75 mL/hr was ordered. These fluids combined with potassium chloride will prevent both of these from occurring.

“While John Doe is getting settled, you continue your assessment…

- **Neurological Findings:** PERRL (Pupils Equal, Round, Reactive to Light), moves all extremities, but patient is sluggish, pulling away during assessment, and follows commands sporadically.
• **Cerebrovascular Findings:** Pulse is regular but tachycardic without adventitious sounds. All peripheral pulses are palpable, with 3+ bilateral and 3+ pitting edema in lower extremities.

• **Respiratory Assessment:** Breath sounds decreased to all lobes, no adventitious sounds audible, patient not cooperating with cough and deep breathing, and SaO₂ at 90% on room air.

• **GI Assessment:** Tongue and gums are beefy red and swollen, abdomen is enlarged and protuberant, girth is 141 cm, and abdominal skin is taught and slightly tender to palpation. His Salem Sump NGT is patent, connected to LCS with small to moderate greenish drainage; bowel sounds positive with NGT clamped.

• **Genitourinary (GU) Assessment:** Foley to gravity drainage, with 75 mL dark amber urine since admission (2 hours).

• **Skin:** Pale on torso and lower extremities; heavily sunburned on upper extremities and head. Skin appears thin and dry. Numerous spider angiomas are found on the upper abdomen with several dilated veins across abdomen.

• **Vital Signs:** 120/60, 104, 32, 99.1 degrees F (37.3 C)”

When scar tissue builds up over the portal vein in the liver, this obstruction in venous flow causes pressure in the portal circulation of blood, thus causing portal hypertension (Hinkle & Cheever, 2013). This elevated pressure is the cause for many physical findings on a patient with liver cirrhosis, such as spider angimoas, dilated abdominal veins and a distended abdomen. As noted in the skin assessment, several spider angiomas were found on the upper abdomen. Also known as spider nevus, these are a central, elevated, red point from which small blood vessels radiate from the center (Hane, 2014). Although the pathogenesis behind spider angiomas is not quite clear, it is known that these are more common with alcoholic cirrhosis than any other type of viral cirrhosis (Hane, 2014). While portal hypertension is the expected cause of these dilated blood vessels, there have been many other hypothesis made, such as having an involvement with elevated plasma levels of vascular endothelial growth factor (Hane, 2014). In addition to spider angiomas, dilated abdominal veins are expected with this patient. With the resistance from the portal hypertension, these veins expand to a point where they become visible during a physical examination (Hinkle & Cheever, 2013). Considering that a damaged liver cannot produce as much albumin, the main protein in the blood, the kidneys therefore retain salt
and water (Hinkle & Cheever, 2013). Consequently, John Doe is presenting with 3+ bilateral and 3+ pitting edema in his lower extremities.

As previously mentioned, John Doe’s distended abdomen is a direct result from the portal hypertension. The medical term for this distended abdomen is known as ascites, defined as bloating or swelling due to fluid buildup in the abdomen (RN Adult Medical Surgical, 2016). In order to further assess these findings, a basic abdominal assessment would need to be done first. This includes inspection, auscultation, palpation and percussion, in this specific order (RN Adult Medical Surgical, 2016). With the presence of ascites, percussion is the most significant piece of the assessment. A common test to detect the presence of ascites is known as shifting dullness. This technique involves percussing multiple areas of the abdomen to detect if the areas of dullness are shifting to the dependent site, contingent on the position of the patient (University of Washington School of Medicine). While flank dullness should be percussed while John Doe is in a supine position, as the fluid moves to the top with a side lying position, this air should be percussed at the top (University of Washington School of Medicine). Although this method is accurate in detecting ascites, there is a multitude of other ways to complete this assessment.

With the assumption that John Doe’s nutrition was poor prior to hospitalization, along with his malabsorption of vitamins and Thiamine deficiency, his current nutritional status is of a large concern. The objective findings that support this nutritional concern include being sluggish, sporadically following commands, a high BAL, beefy red and swollen gums, 3+ bilateral and 3+ pitting edema in his lower extremities, taut abdominal skin that is tender to palpation, dark, amber urine, spider angiomas and dilated veins along his abdomen and thin, dry skin. All of these physical findings bring concern to the lack of nutrition the John Doe’s body currently has. Because of this, the priority intervention would be to prevent any further malnutrition. This can
be done by providing consistent meals, encouraging PO fluids, continuing his IV fluids and vitamin supplementation and arguably the most important, ensuring he is consuming a low-protein diet. Since ammonia is a waste product of protein, including protein in the diet could increase the production of ammonia in the body (Hinkle & Cheever, 2013). Since the main goal in hepatic encephalopathy is to reduce the ammonia levels with Lactulose, consuming protein would be counterproductive. Doing so could exaggerate John Doe’s condition even further.

As John Doe’s assessment and admitting orders are being completed, another nurse comes to help and states, “Why are we wasting time with this wino? He isn’t worth the time or money. Why don’t they let him die?” When situations like these occur, it is important to remind nurses like this the responsibilities and ethical morals we as nurses have no matter who the patient is. Considering nurses have the obligation not to judge their patients, in John Doe’s case, we do not know the reasons leading up to his alcoholism. Therefore, it is unfair to presume that his situation is the result of his choices. Additionally, three ethical principles stand out greatly in this situation. These include beneficence, non-maleficence and justice. Beneficence simply means seeking to do good and benefiting participants (Doody, 2016). In addition, non-maleficence means seeking to do no harm, while justice means giving fair treatment to all patients (Doody, 2016). Regardless of John Doe’s appearance, he deserves to be treated with the same dignity and respect that any other patient would receive.

Not only is safety the primary concern with every hospitalized patient, this becomes even more imperative with a patient who is withdrawing from alcohol. With John Doe’s current situation, he is at a very high risk of developing a condition known as delirium tremens. The criteria for this condition include a rapid-onset of fluctuating attention and cognition combined with alcohol withdrawal (Schuckit, 2014). After monitoring John Doe for this condition, mild
symptoms are noted such as restlessness, tremors and a low-grade fever. While these symptoms can be associated with a more mild form of delirium tremens, more severe symptoms would include GI bleeding, hallucinations, somnolence, extreme diaphoresis and tachycardia (Talikoti, 2017). With any of these symptoms, his risk of injury must be accounted for. Measures that can be taken include providing a calm and safe environment, implementing seizure precautions and providing a 1:1 observation.

Another safety concern to keep in mind with John Doe is his high risk for falls. Along with his disorientation of his surroundings, his poor nutrition and fluid balance are a major concern with a potential fall. With the Vitamin K deficiency and low clotting factors that he is experiencing, the damage caused from a fall could be extra harmful to his body. If he were to excessively bleed, a hemorrhage could easily occur. Furthermore, John Doe’s malnutrition is an indicator for poor wound healing, thus putting him at an even further risk for infection. In order to prevent a fall from happening, a fall risk score should be completed in order to implement the necessary measures. These measures include providing constant re-orientation, preventing dehydration, using a bed alarm and chair alarm if a 1:1 observation is not executed and placing John in a room closest to the nursing station. The occurrence of a fall would not only make his condition worse, this would ultimately lead to a prolonged hospitalization stay.

While a staff psychiatrist evaluates John Doe for further mental decline, part of this assessment includes checking for Wernicke’s encephalopathy and Korsakoff’s psychosis, commonly known as Wernicke-Korsakoff syndrome. Although these are different conditions, both are due to a lack of Vitamin B1, or Thiamine (Osiezagha, 2013). While Wernicke encephalopathy is an acute syndrome affecting the thalamus and hypothalamus, a consequence of this is Korsakoff’s psychosis, a chronic neurological condition, mainly affecting the memory
circuits (Osiezagha, 2013). Since two different areas of the brain are targeted with each condition, each one presents with different symptoms. Since Wernicke encephalopathy causes neurological dysfunctions, symptoms would include confusion, nystagmus and ataxia. Memory problems, however, would present with signs such as confabulation, inability to learn and short-term memory loss. Although commonly associated as one disorder, it is important to differentiate between the two, as they are both very different.

As John Doe’s hospitalization comes to an end, it is proclaimed that, “He survives a rocky course of hepatic encephalopathy and near-renal liver failure. After 27 days, including a week in the ICU, he is discharged to a drug and alcohol rehabilitation facility. He is employed as a longshoreman; fortunately, his insurance covers his month of in-house rehabilitation.”

Analysis

Based off of my extensive investigation on the case of John Doe, it is evident that an abundant amount of research exists regarding the pathophysiology and epidemiology on liver cirrhosis and hepatic encephalopathy. With regards to the specific manifestations and the corresponding nursing interventions for these diseases, I found that certain topics had a little more information on them than others. Beginning with the delegation of orders to the nursing assistive personnel, although I was able to separate these orders based off common knowledge of the skills an RN is permitted to do, research regarding an RN’s scope of practice in comparison to an NAP’s scope of practice is very easy to find. After understanding the pathophysiology behind liver cirrhosis, I was able to use critical thinking to determine the indications for John Doe’s altered lab values such as his BAL, ammonia, protein, and albumin levels. Being cognizant of the importance of the vitamins and medications John Doe was being given with regards to his diagnosis is crucial. Research about the physiology on Vitamin K, Thiamine,
Vitamin B9 and Vitamin B6 is copious. Many articles and academic resources provided information regarding the complications from the deficiency of these vitamins with regards to liver cirrhosis and hepatic encephalopathy. In addition, the physiology and significance of the medication, Lactulose, was just as abundant.

Continuing with my research following John Doe’s physical assessment, I began to come across some roadblocks with my investigation. Although finding the significance on spider angiomas, dilated abdominal veins, peripheral edema and his distended abdomen were not difficult, discovering the physiology behind spider angiomas was challenging. While some resources simply mentioned the relationship between portal hypertension and spider angiomas, most peer-reviewed articles discussed many more theories behind this manifestation. This was confusing; however, I decided it was important to mention the alternative pathogenesis considering the true cause for them is unknown. Furthermore, topics including the assessment of ascites, the ethical principles of nursing and the importance of a low protein diet in hepatic encephalopathy were very easy to come by. Two topics that were surprisingly lacking from peer-reviewed articles were delirium tremens and Wernicke-Korsakoff Syndrome. While the relationship between delirium tremens and alcohol withdrawal was clear, as well as the nursing interventions to ensure his safety with this condition, differentiating between mild and severe symptoms was harder to find. Additionally, the pathophysiology behind Wernicke Encephalopathy and Korsakoff syndrome as separate disorders was difficult to find.

**Conclusion**

After putting the pieces together through careful critical thinking and research, each concept of this case study began to relate to each other to create a larger, clearer picture of John Doe. For a patient to arrive to the hospital intoxicated, combative and lethargic, it is
disconcerting to a nurse as to whether or not the proper care and treatment for an unidentified man in this state is able be accomplished. With the proper assessments, however, efficient orders can be made to initiate effective treatment. With an understanding of liver cirrhosis and hepatic encephalopathy, as well as the manifestations of alcohol withdrawal, figuring out the key concepts of this case is less complicated than it may originally be perceived to be. Once the significance of ammonia, Lactulose, Thiamine (Vitamin B12), portal hypertension, and the symptoms of alcohol withdrawal are understood, everything else falls into place. By completing this case study, I have gained not only an exceptional amount of knowledge regarding these diseases; I have also gained a better understanding of all of the aspects that go into critical thinking. By digging deep into this case, it has helped me to understand just how significant each piece of a patient’s case has on one another. Much like how every order from the physician has a purpose, every nursing intervention is aimed towards one goal: treating each patient with the quality and respect that they deserve.
References


RN Adult Medical Surgical. (2016). ATI Nursing education


