Katie Gallagher

KNH 413

Case Study 4

14 April 2015

Case Study 4 – Metabolic Stress

1. What is the Glasgow Coma Scale?
   1. The Glasgow Coma Scale is used to evaluate and rank the severity of a traumatic brain injury. The individual is given points based on their eye opening response, verbal response, and motor response. A coma is categorized by no eye opening, no ability to follow commands, and no word verbalizations (score of 3-8). Scoring is as follows: GCS score of 8 or less= severe head injury; GCS score of 9 to 12= moderate head injury; and a GCS score of 13 to 15= mild head injury. (Nelms, 2011, p. 634)
2. What was Chelsea’s initial GCS score? Is anything in the initial assessment consistent with this score? Explain.
   1. The patient’s initial GCS score was 10 E4V2M4. This score shows that she has a moderate head injury. The patient’s general appearance, no verbal response, and withdrawal and moaning when touched indicate the reasoning for her score. Her eye opening response was 4, indicating spontaneous with open and blinking at baseline. Her verbal response was 2, meaning she had incomprehensible speech. Her motor response was 4, showing that she was withdrawing from pain. All three scores are consistent with her physical assessment.
3. Define the following terms found in the admitting history and physical:
   1. **Intensivist**: a physician who specializes in the care and treatment of patients in intensive care. (Merriam-Webster, n.d.)
   2. **L-sided hemiparesis**: weakness or inability to move the left side of the body. (National Stroke Association, 2012)
4. Read the CT scan and MRI report. The CT scan report was very general, noting density in the frontal lobe. The MRI indicated more localized areas of edema and blood in the frontal lobe. It also discusses a shearing injury.
   1. What causes edema and bleeding in a traumatic brain injury?
      1. Cerebral edema is the initial injury to the brain that can cause the brain tissue to swell. Also, broken pieces of bone can rupture blood vessels in any part of the head. Bleeding and swelling could be the body’s response to the injury. Too much swelling can prevent fluids from leaving the brain. (*Serendip*, 2012).
   2. What general functions occur in the frontal lobe? How might Chelsea’s injury affect her in the long term?
      1. The frontal lobe is generally responsible for motor functions, higher order functions, planning, reasoning, judgment, impulse control, and memory. If Chelsea’s injury is bad, then she could have problems in the long run. She could be forgetful, difficulty playing sports right away, and have a difficult time telling right from wrong. (*Serendip*, 2012).
5. What factors place the patient with traumatic brain injury at nutritional risk?
   1. Traumatic brain injury results in the systemic inflammatory response that results in hypermetabolism, hyperglycemia and insulin resistance, increased gluconeogenesis, lipolysis, and protein wasting. If not nutritionally supported, patients who have suffered from a traumatic brain injury could lose as much as 15% of their body weight in 1 week. (Nelms, 2011, p. 634)
6. Chelsea’s height is 132 cm, her weight on admission is 27.7 kg. At 9 years of age, what is the most appropriate method to evaluate her height and weight? Assess her height and weight.
   1. The most appropriate way to evaluate Chelsea’s height and weight would be to use the CDC growth charts. According to the growth charts, Chelsea falls within the 35th percentile for her weight for age and the 49th percentile for her height for age. Her BMI is 15.9 kg/m­2, placing her at the 38th percentile for her BMI for age, which is considered a healthy weight.
      1. BMI = 27.7kg/1.32m2 =15.9kg/m2
7. What method should you use to determine Chelsea’s energy and protein requirements? After specifying your method, determine her energy and protein needs.
   1. To determine Chelsea’s energy needs, the EER for females 9-18 years equation is appropriate:
   2. 135.3 – 30.8 x age + PA x (10 x weight + 934 x height) + 25
      1. EER= 135.3 -30.8 x 9 + 1.5 x (10 x 27.7 kg + 934 x 1.32 m) + 25= 2,148 kcal
      2. PA= 1.5 (head injury)
      3. (Nelms, 2011, p. 242, 60)
   3. To determine Chelsea’s protein requirements, her weight in kg can be multiplied by 1.5g of protein to account for the traumatic injury her body has encountered.
      1. 1.5 g x 27.7 kg= 42 g protein/day
      2. (Nelms, 2011, p. 60)
8. Chelsea was to receive a goal rate of Nutren Jr with fiber @ 85 cc/hour. How much energy and protein would this provide? Show your calculations. Does it meet her needs?
   1. If Chelsea was to receive a goal rate of Nutren Jr with Fiber @ 85 cc/hr for 16 hours she would be provided with 1,360 kcal and 40.8 g of protein. This formula would provide Chelsea with about 800 kcal less per day then her estimated energy need of 2,148 kcal per day. This formula would fall slightly short of her estimated protein need of 42 g/day.
      1. Nutren Jr with Fiber provides 1 kcal/cc
      2. 85 cc/hr x 1.0 kcal/cc= 85 kcal/hour
      3. 85 kcal/hr x 16 hours= 1,360 kcal
      4. 12% of kcal comes from protein= 1,360 kcal x .12= 163.2 kcal of protein/4 kcal/g= 40.8 g protein (Nestle Health Science, 2013).
9. Using the patient care summary sheet, answer the following:
   1. What was the total volume of feeding she received on June 5?
      1. 1580 cc from Nutren Jr formula
      2. 85 cc/hour x 18 hours= 1530 cc + 50 cc in the 23rd hour= 1,580 cc
   2. What was the nutritional value of her feeding for that day? Calculate the total energy and protein.
      1. Total energy:
         1. cc = 1 ml, Received Nutren Jr with fiber @ 85 cc/hr contains 1.0 kcal/ml Received 1,580 calories on June 5th.
      2. Total protein:
         1. 1,580 x .12 = 189.6 kcal of protein / 4 kcal per gram = 47.4 grams
   3. What percentage of her needs was met?
      1. 1,580 kcal/2,148 kcal= 74% of kcal
      2. 47.4g/42g= 113% of protein
   4. There is a note on the evening shift that the feeding was held for high residual. What does that mean?
      1. High gastric volume residual indicates that the patient has a volume of fluid remaining in the stomach during enteral nutrition that may be correlated with increased rates of aspiration, which may lead to aspiration pneumonia. Chelsea’s feeding was held in order to prevent her from aspirating. (Parrish, 2008).
   5. What is aspiration? What are the potential consequences?
      1. Aspiration occurs when food or liquid enter the airways of the lungs. Consequences may include pneumonia, apnea during feedings, or refusal to eat. (Nelms, 2011).
   6. What is the usual procedure for handling a high gastric residual? How do you think Chelsea’s situation was handled?
      1. The usual procedure for handling a high gastric residual would be to monitor for excessive gastric residual volume. The recommendations state that the volume be checked every 4 to 6 hours and feedings held for one hour if the residual value is 1.5 times the hourly rate. Patients fed intermittently through enteral nutrition, the value should be checked prior to each administration and held for one hour if the residual value exceeds 100 mls. For Chelsea’s case, the feeding was held and a gastrointestinal evaluation was most likely performed before the feeding could be continued.
      2. Fessler, T. Gastric Residuals — Understand Their Significance to Optimize Care. *Today's Dietitian* , *12*, 8.
   7. What other information would you assess on a daily flow sheet to determine her tolerance to the enteral feeding?
      1. Assessing the patient’s input and output levels would be another important factor to determine her tolerance to the enteral feeding.
   8. Look at the additional information on the patient care summary sheet. Are there any factors of concern? Explain.
      1. One concerning factor would be her lack of output. 1-soft bowel movement was noted in the patient care summary sheet that could indicate intolerance to the feedings. Her weight should also be closely monitored.
10. Evaluate Chelsea’s laboratory data. Note any changes from admission day labs to June 3. Are any changes of nutritional concern?
    1. Chelsea’s low albumin and preablumin levels may be indicative of inadequate protein intake. Her fluctuations in sodium, potassium, chloride, and osmolality may represent a dehydrated state. A low BUN level may be a result of a low protein diet or malnutrition. (NIH, 2013)
11. On June 6, a 24‐hour urine sample was collected for nitrogen balance. On this day, she received 1650 cc of Nutren Jr. Her total nitrogen output was 14 grams.
    1. Calculate her nitrogen balance from this information. Show all your calculations.
       1. N2 Balance= (dietary protein intake/6.25)- urine urea nitrogen – 4
       2. 650 x .12= 198 kcal protein
       3. 198 kcal/4 kcal/g= 49.5 g protein
       4. [49.5/6.25] – 14 g-4= -10.08 g
       5. (Nelms, 2011, p. 54)
    2. How would you assess this information? Explain your response in the context of her hypermetabolism.
       1. A negative nitrogen balance indicates a catabolic state, with a net loss of protein, which would indicate that there is a moderate amount of stress. This would be due to her traumatic brain injury that causes her tissues to be broken down, thus leading to the negative nitrogen balance. (Nelms, 2011, pg. 54).
    3. Are there any factors that may affect the accuracy of this test?
       1. Factors that may affect the accuracy of the nitrogen balance test include: inherent error of 24-hour urine collection, failure to account for renal impairment, and inability to measure nitrogen losses from some wounds, burns, diarrhea, and vomiting. (Nelms, 2011, p. 54)
    4. The intern taking care of Chelsea pages you when he reads your note regarding her negative nitrogen balance. He asks whether he should change the enteral formula to one higher in nitrogen. Explain the results in the context of the metabolic stress response.
       1. During a state of metabolic stress, the rate of gluconeogenesis increases, thus the body uses protein as a source of glucose. As a result, the body excretes more nitrogen to be taken in through the diet, leading to a negative balance. The enteral formula should not be adjusted to increase nitrogen content, but rather use a formula with a higher amount of protein should be considered in order to restore the nitrogen balance. (Nelms, 2011, p. 685).
12. Chelsea has worked with occupational therapy, speech therapy, and physical therapy. Summarize the training that each of these professionals receives and what their role might be for Chelsea’s rehabilitation.
    1. **Occupational therapists**: master’s degree in occupational therapy. Must be registered or licensed in practicing state. An OT will be able to assist Chelsea through the therapeutic use of everyday activities as she recovers.
    2. **Speech-Language Pathologists**: need at least a mater’s degree and licensed to practice in most states. Assess, diagnose, treat, and help to prevent communication and swallowing disorders in patients resulting from causes such as a brain injury. In Chelsea’s case, the SLP will be able to inform the rest of the medical staff when Chelsea is able to progress to an oral diet.
    3. **Physical Therapists**: need a Doctor of Physical Therapy (DPD) degree and must be licensed in the state they are practicing in. A PT will play a role in helping Chelsea improve her movement and manage her pain. (U.S. Bureau of Labor Statistics, 2014)
13. The speech pathologist saw Chelsea for a swallowing evaluation on hospital day 10.
    1. What is a video fluoroscopy?
       1. A video x-ray taken while the patient is drinking and/or eating typically performed to evaluate for aspiration. (Children's Hospitals and Clinics of Minnesota, 2014)
    2. What factors were noted that support the need for enteral feeding at this time?
       1. Factors noted were:
          1. GCS rating of 10
          2. No verbal responses
          3. Alternating between crying and unconsciousness
          4. Disoriented to place and time
          5. Withdrawal and moaning when touched
14. As Chelsea’s recovery proceeds, she begins a PO mechanical soft diet. Her calorie counts are as follows:
    1. Calculate her intake and average for these two days of calorie counts.
15. 10/14 energy intake= ~713 kcal
16. 10/15 energy intake= ~1,245 kcal
17. Combined average= ~979 kcal
18. (USDA, 2014)
    1. What recommendations would you make regarding her enteral feeding?
       1. As it can be seen from Chelsea’s two-day intake, she was able to consume an increased amount of calories on the second day. If this progress continues, I would suggest gradually decreasing her enteral feedings while increasing her oral intake. I would recommend a mechanical soft diet for Chelsea to easily consume during the day and enteral feeding at night until she can meet all of her recommended energy needs orally.
    2. **(10/14)** 
       1. Oatmeal ¼ c.- 36 kcal
       2. Brown Sugar 2 T.- 68 kcal
       3. Whole milk 1 c.- 149 kcal
       4. 240 cc Carnation Instant Breakfast (CIB) prepared with 2% milk-130 + 122 kcal= 252 kcal
       5. Mashed potatoes 1 c.- 193 kcal
       6. Gravy 2 T.- 15 kcal
       7. **Total energy intake= 713 kcal**
    3. **(10/15)** 
       1. Cheerios 1 c.- 110 calories
       2. Whole milk 1 c.- 149 kcal
       3. 240 cc CIB prepared with 2% milk- 130 + 122 kcal= 252 kcal
       4. Grilled cheese sandwich (2 slices bread, 1 oz. American Cheese, 1 t. margarine)- 138 + 95 + 100= 333 kcal
       5. Jell-o 1 c.- 149 kcal
       6. 240 cc CIB prepared with 2% milk-130 + 122 kcal= 252 kcal
       7. **Total energy intake= 1,245 kcal**

Works Cited

CDC (n.d.). Growth charts. Retrieved from <http://www.cdc.gov/growthcharts/>

Children's Hospitals and Clinics of Minnesota (2014). Videofluoroscopic swallow study (VFSS). Retrieved from [www.childrensmn.org/services/other-programsand-services/other-programs-and-services-q-z/rehabilitationservices/videofluoroscopic-swallow-study-vfss](http://www.childrensmn.org/services/other-programsand-services/other-programs-and-services-q-z/rehabilitationservices/videofluoroscopic-swallow-study-vfss)

National Stroke Association (2012). Paralysis- Hemiparesis. Retrieved from <http://www.stroke.org/site/PageServer?pagename=hemiparesis>

Nelms, M. N., Sucher, K., Lacey, K., & Roth, S. L. (2011). Nutrition therapy and pathophysiology (2nd ed.). Belmont, CA: Brooks/Cole Cengage Learning.

Nestle Health Science (2013). Nutren Junior Fiber. Retrieved from <http://www.nestlehealthscience.us/products/nutren-junior%C2%AE-fiber>

NIH (2010). The brain—Lesson 1—What does this part of the brain do? Retrieved from [http://science.education.nih.gov/supplements/nih2/addiction/activities/less on1\_brainparts.htm](http://science.education.nih.gov/supplements/nih2/addiction/activities/less%20on1_brainparts.htm)

NIH (2013). BUN- blood test. Retrieved from <http://www.nlm.nih.gov/medlineplus/ency/article/003474.htm>

Ophardt, C. (2003). Protein metabolism. Retrieved from <http://www.elmhurst.edu/~chm/vchembook/630proteinmet.html>

Parrish, C. (2008). Checking gastric residual volumes: A practice in search of science? Practical Gastroenterology, 33-47. Retrieved from [http://www.medicine.virginia.edu/clinical/departments/medicine/divisions/ digestive-health/nutrition-support-team/nutritionarticles/Oct08\_ParrishArticle.pdf](http://www.medicine.virginia.edu/clinical/departments/medicine/divisions/%20digestive-health/nutrition-support-team/nutritionarticles/Oct08_ParrishArticle.pdf)

U.S. Bureau of Labor Statistics (2014). Healthcare occupations: Occupational outlook handbook. Retrieved from <http://www.bls.gov/ooh/healthcare/>

USDA (2014). SuperTracker. Retrieved from <https://www.supertracker.usda.gov/foodtracker.aspx>