Case Study #2: Enteral and Parenteral Nutrition
Due 2/14/14
60 points

Mr. R, a 35 yo drug user, is hospitalized after a motor vehicle accident (MVA). He is currently suffering from a severe concussion and lapses of consciousness, a broken jaw, multiple broken bones, and possible internal injuries. He had not eaten anything for several days PTA because he was overdosing on drugs. Enteral feeding has been recommended in order to improve his nutritional status and given his decreased level of alertness. The patient will be bedridden until his mental status improves. A nasogastric feeding tube has been inserted and the physician has asked for your recommendation regarding the type of formula and amounts of kcal/protein needed for this patient.

Ht: 5’11”          Current wt: 156 #          UBW: 167 #          Serum albumin: 3.0 mg/dL

1. Write 1 PES statement for this patient. (2 pts)

Inadequate oral food/beverage intake r/t MVA and the patient hasn’t been eaten anything for several days PTA aeb patient’s nutritional status and decreased level of alertness

2. Is the nasogastric feeding route appropriate for this patient? Why or why not? (3 pts)

No, it is not appropriate for this patient to use nasogastric feeding. It is important to specify what are the enteral feeding routes. For this patient, the best rout is nasoduodenal tube. Since the patient has possible internal injuries and multiple broken bones, his gastric emptying is slow. In addition, ND tube is the easiest and provide the most nutrients to the patient. Furthermore, this patient might be having difficulty breathing, therefore it might not be appropriate to use nasogastric feeding route due to possibility on blocking the airway.

3. What daily intake of kcals, protein, and fluids would you recommend for this patient and why? Show calculations for estimated needs, give recommendations as kcal/d, g protein/d, ml fluid/d. (6 pts)

Ht: (5’x0.3048m)+(11”x0.0254) = ~1.8m
Current Wt: 156#/2.2 = ~ 70.9 kg
UBW: 167#/2.2 = 75.9 kg
BMI: (70.9)/(1.8)^2 = 21.9
Daily intake kcal:
10 (70.9 kg) + 6.25 (180 cm) – 5 (35 yo) + 5 = 1664 kcal x 1.2 (AF confined to bed) = 1996.8 kcal x 1.5 (IF head injury) = 2995.2 kcal = ~ 3000 kcal

Reference: NTP pg.60

Protein Needs:
Because Mr. R has multiple fracture and head injury, he is classified as “critically ill or excess losses”.
1.8-2.0 g/kg/day x 70.9 kg = 127.62 – 141.8 g/day

Reference: PR pg. 22

Fluid Needs:
70.9 kg x 30 mL = 2127 mL

Reference: PR pg. 23

4. Based on the needs of this patient, describe three desirable characteristics for the type of formula you would recommend. Give one example of an appropriate enteral formula meeting these characteristics. Use Appendix C2 in NTP text or websites of formula companies, such as Nestlenutrition.com/us or Abbottnutrition.com. (4 pts)

One example of an appropriate enteral formula meeting these characteristic is Jevity 1.5 Cal and it contains the following three desirable characteristics:

- high protein – 64 g/L
- high calories – 1500 kcal/mL
- high carbohydrate – 216 g/L

5. a) Based on the enteral formula you selected in question 3 above, what daily total volume of formula would meet Mr. R’s estimated kcal and protein needs? Show calculations. (3 pts)

Using Nutren 2.0 (Nestle):
3000 kcal / 1.5 = 2000 ml total volume TF/day

   b) What would be the hourly rate for delivery of this tube feeding as a continuous 24hr infusion? Show calculations. (1 pt)

2000 ml / 24 hrs = 83.3 ml/hour = ~85 ml/hr
c) Is this volume of tube feeding adequate to meet his fluid needs? If not, indicate what else is needed and how it would be added to the current tube feeding. Show calculations. (4 pts)

No, this volume of tube feeding is inadequate to meet his fluid needs. 
% of H2O in the formula: 2000 ml x .76 = 1520 ml

Additional Fluid Need:
2127 ml – 1520 ml = 607 mL

607 mL/ 6 water flushes = 101 mL every 4 hrs → give 101 mL free water flushes every 4 hrs

6. Give 3 blood values that you would monitor for this patient and the reasons why. (6 pts)

1. Serum Albumin: in order to check whether the body is absorbing enough protein and whether the patient has liver or kidney disease
2. C-Reactive Protein: in order to see if there is any inflammation and how severe it is
3. Blood glucose: in order to check how patient tolerating the EN and whether they are absorbing the nutrients well.

7. Give one urine value that you would monitor and the rationale for monitoring it. (2 pts)

Urea: in order to check nitrogen balance

The patient, Mr. R, is now 5 days s/p his MVA. He did not tolerate the enteral feedings well (diarrhea and pain) and now has been diagnosed with acute pancreatitis. The MD has ordered a nutrition consult for evaluation of parenteral nutrition (PN) support. For the purposes of answering questions 7-12, assume that your current estimated kcal and protein needs for Mr. R are: 2600 kcal/day and 110 g protein/day.

8. Write a PES statement. (2 pts)

Altered GI function r/t intolerance of enteral feeding aeb diarrhea and pain in addition to diagnosis with acute pancreatitis

9. Which type of PN support do you recommend – central or peripheral? Justify your answer. (2 pts)

I would recommend peripheral PN. Several reasons are considered. First, Mr. R need 2600 kcal/day which is indeed not very high. Second, there is no fluid restriction. Third, Mr. R does not need long term PN.
10. Calculate the amount of a 10% lipid emulsion that is needed to provide around 20% of Mr. R’s total kcal needs. Show calculations. (2 pts)

20% of total kcal: 2600 kcal x 0.2 = 520 kcal
520 kcal/ (11 kcal/gm) = 47.27 g, around to 50 g because only have this form
50 g x (11kcal/g) = 550 kcal

11. The MD wants the dextrose and amino acid solution to be a total volume of 2 L/day. (The volume of lipid emulsion is separate from this 2 L.)
   a) Determine the final amino acid concentration of this solution, which would supply 110 g protein/day. Show calculations. (2 pts)

110 g protein/ 2000 mL x 100% = 5.5% solution

   b) Determine the remaining kcals to be provided as CHO. Express your answer as kcals from CHO and as grams of dextrose. Show calculations. (3 pts)

Total Protein Kcal:
110g x 4 kcal/g = 440 kcal

Remaining Kcal for CHO:
2600 kcal – 550 lipid kcal – 440 protein kcal = 1610 kcal CHO

Grams of Dextrose:
1610 kcal/ (3.4 kcal/g) = 473.5 g

   c) Determine the final dextrose concentration of the solution. Show calculations. (2 pts)

473.5 g dextrose/ 2000 mL x 100% = 23.7% = ~ 24% solution

   d) If the PN solution had to be made from a starting stock solution of D50W (500 g dextrose in 1 L of water), what volume of this stock D50W would be needed to provide the grams of dextrose that you calculated in question 9b above? Show calculations. (2 pts)

473.5 g dextrose/ 500 g dextrose x 100% = 94.7%
94.7% x 1000 mL = 947 mL
e) Compare the grams of dextrose to be provided in this solution with the maximum glucose infusion rate for Mr. R of 5 mg/kg BW/min. Would you make any changes to the PN solution based on this information? If so, how would you change it? (2 pts)

Maximum CHO Oxidation per day:
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5 \text{ mg/kg BW/min} / (1000 \text{mg/1g}) \times 60 \text{ min} \times 24 \text{ hrs} = 7.2 \text{ g/kg BW/day}
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473.5 \text{ g dextrose/ 70.9 kg} = 6.7 \text{ g dextrose/ kg BW/ day}
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As a result and based on the calculation, I will not change the PN solution because 6.7 g/kg BW/day is below 7.2 g/kg BW/day and it is within the range.

12. List three lab values that you would monitor for this patient and the reasons why. (6 pts)

1. Magnesium, Potassium, Phosphorus: in order to monitor and prevent refeeding syndrome due to the depleting level of electrolytes.
2. Serum amylase: in order to monitor the severity of acute pancreatitis
3. BUN: in order to check whether the patient’s kidney is functioning well in terms of removal of urea from blood; it also indicates whether the patient is dehydrated or not

13. Mr. R develops hyperglycemia while on PN support. Describe two actions you would recommend to help lower blood glucose and achieve metabolic control of the patient. (2 pts)

1. I would implement insulin as part of the PN in order to further restrict the rapid uptake of glucose
2. I would restrict the intake of CHO in order to decrease too much glucose intake. Depending on patient tolerance, amount of CHO will slowly adjusted.

14. What is refeeding syndrome? Why is it important to monitor for refeeding syndrome in a severely malnourished patient who is started on PN? (4 pts)

Refeeding syndrome is the metabolic disturbance of fluid and electrolytes as a result of repleting severely malnourished and starved patients. It is important to monitor for refeeding syndrome because refeeding syndrome can cause clinical complication and result in death. During refeeding, increased insulin, due to rapid amount of CHO, will stimulate the synthesis of fat, protein and glycogen. In accommodate with that, phosphate, magnesium and potassium will depleted. In addition, sodium and water excretion will reduce causing fluid overload, result in edema and possibly renal failure.