Name: Heidi Washburn **I used 2nd edition IDNT

CLINICAL WORKSHEET #1
Cancer and Trauma

Purpose(s)

1. To complete nutrition assessment, diagnosis, and intervention for a case patient.
2. To practice the application of clinical judgment. *Note:* When using "Clinical Judgment" there may be no "one" right answer to most of the questions asked, therefore it is important to explain or justify your answers.

General Guidelines

1. Complete both case studies in the worksheet
2. Worksheets must be completed electronically
3. Upload the cases in Learning Suite in the assignment section.
    a. The worksheets must be uploaded as a Word document (.doc or .docx an .rtf file is also acceptable)
    b. Name file LastName_FirstName_Worksheet_1 For example if my name was John Doe the file would be names Doe_John_Worksheet_1
4. Graded assignments will be returned, with comments, via Learning Suite

Sources for completing worksheet.

Assume these are the sources available:

- Nutrition Care Manual -- Adult and Pediatric (online)
- IDNT Manual
- Any textbooks from NDFS courses
- ADA Evidence Analysis Library (online) and noted journal articles
- Class Lecture Notes from any NDFS course
- Websites for formula companies (e.g. Nestle, Mead Johnson, Abbot)

Citations.

List sources used at the end of the case and cite sources as appropriate throughout worksheet. Cite works as indicated in the student handbook.

Points

Each case is worth 12.5 points a total of 25 points for the full worksheet.

Case #1: Esophageal Cancer and Enteral Feedings

Doctor's Office Workup

JQ is a 69-year old retired military officer. He sought medical attention after several months of increased difficulty swallowing, lethargy and unintentional weight loss. JQ's physician ordered blood lab work and did an upper GI series. The upper GI revealed an esophageal lesion which when biopsied, was positive for squamous cell carcinoma. A chest x-ray was negative. Available lab results from the doctor's office visit follow:

Hgb	11 g/dl	Prealbumin	20 mg/dl
Hct	32%	Glucose	105 mg/dl
Albumin	2.9 g/dl	Calcium	7.6 mg/dl

Hospital Admission

JQ was admitted to the hospital for further work up and surgery. Information from his Doctor's Office workup was available in the hospital chart. His admitting diagnoses were:

1. Esophageal squamous cell CA
2. Dysphagia 2° to #1
3. Anemia
4. Malnutrition

JQ has never had any previous medical problems; however, he has a long standing history of smoking (1 pack per day) and moderate social drinking. He is happily married with three grown children. He has adequate medical insurance and a substantial retirement pension.

Additional radiographic studies indicated the carcinoma was quite extensive and radical surgery was necessary. JQ was NPO for surgery. He tolerated the surgery fairly well, but would not be able to take an oral po for several weeks. The physician ordered a diet consult for nutrition support.

As JQ had difficulty speaking, the dietitian spoke with his wife regarding his diet history. Mrs. Q stated that JQ's height was 5'10" and he weighed 170 lbs three months ago, which was his usual weight. He ate three meals a day and enjoyed a dish of ice cream in the evenings. Although he followed no special diet, lately he preferred soft, moist foods such as casseroles or meat loaf with lots of gravy and seemed to be eating smaller portions. The last two weeks he had barely eaten anything. He drank water with his meals as large amounts of milk gave him gas and cramping. He had no food allergies.

The nurse weighed JQ using the bed scale and recorded his hospital admit weight at 151 lbs.

Section 1: Nutrition Assessment

Complete a Nutrition Assessment by working through the following

Food/Nutrition Related History (AKA Dietary)

1. Are JQ's nutritional needs being met? Explain. (*Type text in box below*)

No. He has not been eating adequate food or a variety of food per his wife. He had not been eating anything in preparation for his surgery. Also, upon admit he was diagnosed with malnutrition.

2. What other information (not provided in the case) regarding his diet history would help in your assessment and why? Hint: Use the IDNT book for other possible Food/Nutrition Related History terms. (*Type text in box below*)

Micronutrient intake, particularly iron.[1] (He is anemic. I want to make sure that that is because he has been malnourished and not because of another reason.) Medication and herbal supplements. (Again, I want to make sure that other things are not interfering with his nutritional status.)

Anthropometric Measurements

1. List JQ's

Ht	1.78 m
Wt	68.6 kg
Usual Wt	77.3 kg
%IBW	93.7%
BMI	21.7

2. Evaluate JQ's current wt and any significant wt changes. (*Type text box below)*

JQ is within the normal BMI range, but has lost more than 10% of his body weight in 3 months.

Biochemical Data, Medical Tests and Procedures

1. List abnormal lab values and explain possible causes for each.

Lab and Value	Possible Causes
Hgb: 11 g/dl	Malnutrition[3], dietary iron deficiency
Hct: 32%	Malnutrition[3], dietary iron deficiency
Albumin: 2.9 g/dl	Malnutrition[2], protein deficiency[2]
Calcium: 7.6 mg/dl	Malnutrition[2], dietary calcium deficiency

2. What other lab tests would help in your nutritional assessment and why? (*Type text box below)*

C-reactive protein: It would help me know how hard his body is working to fight off the cancer and deal with the surgery. I would then be better able to analyze albumin and prealbumin.[2]
Electrolyte labs (sodium, potassium, chloride, magnesium): These will help me know his hydration status as well as assess refeeding syndrome as we begin feeding him.[2]
Glucose[2]: Analyze refeeding syndrome and keeping blood glucose levels in check to promote healing.

Nutrition-Focused Physical Findings (AKA Clinical)

1. List and explain any pertinent nutrition-related physical characteristics found in the nutrition-focused physical exam, interview, or medical record. (*Type text in box below.)*

JQ has lost more than 10% of his weight in the last 6 months. He is in need to nourishment. JQ was diagnosed with esophageal cancer and has dysphagia 2° to #1. Because he has a hard time swallowing, he will be unable to eat for the next couple of weeks, per doctor. Also, enteral nutrition may not be a good option due to the throat surgery that he experienced.

Client History

1. List and explain any pertinent nutrition-related concerns found in the client history

He has drunk some alcohol in the past, which is associated with esophageal cancer.[3] For the past 2 weeks he has not eaten much at all and had no food before his surgery. He has been malnourished for a while now and he needs to get adequate nutrition soon. The large amounts of milk give him gas and cramping. Though his wife states that he has no food allergies, we may want to steer away from milk-based formulas if possible.

Comparative Standards

1. Determine JQ's needs for energy, protein, and fluid. (*Type needs in chart below.)* Indicate wt used for calculations, formula used (e.e. HBE, Penn, Kcal/Kg, etc.) write out name of formula **and** equation as appropriate, and any activity/stress factors.

	Needs	**Equation Used**	**Activity/Stress Factors**
Energy (Kcals)	1863 kcal	Harris-Benedict[2] (RMR) = 66.47 + 13.75(W) + 5(H) – 6.76(A)	1.3[3]
Protein (g/d)	82-103 g	1.2-1.5 g/kg[3]	
Fluid (ml/d)	1863 mL	1 ml of fluid per 1 kcal[3]	
Weight Used (lb and Kg)	68.6 kg		

Use the box below to show your calculations

(RMR) = 66.47 + 13.75(68.6) + 5(178) – 6.76(69) = 1433 kcal x 1.3 = 1863 kcal
Protein g = (1.2-1.4) x 68.6 = 82-96 g

2. Justify the following:
   - Formula used for energy needs and any activity/stress factors used.
   - Protein need calculation
   - Weight used

Remember to cite sources used for justification; sources should be listed at end of case. (*Type text in box below*.)

For energy I used the Harris-Benedict equation because looking at the Nutrition Care Manual for Cancer of the throat, it said that while indirect calorimetry was better, the Harris-Benedict equation should be used if it was not available.[2] Also, looking in Krause for stress factors, it said that factors from 1.1 to 1.6 could be used.[3] I chose 1.3 because he is recovering from surgery and will need some extra energy. However, the doctor also stated that he tolerated the surgery fairly well, so his body is not severely stressed.

For protein needs I found in Krause a chart describing protein needs.[3] For a hypercatabolic

cancer patient (which I chose because he is recovering from surgery), the protein requirements are 1.2-1.6 g/kg. I feel that he is closer to "nonstressed" than "severely stressed" on the chart, so I altered the recommendation to a narrower 1.2-1.5 g/kg.

There were several equations in Krause that could be used to estimate the fluid requirements.[3] I used the 1 ml of fluid per 1 kcal of estimated needs because it was the greatest amount of liquid. JQ seems to have adequate renal function, so if it is extra, he can excrete it. However, in order to insure healing, he will need to be hydrated.

Document Nutrition Assessment

From your assessment of this patient, **complete the following table**.

- Enter a one or more assessment terms for each assessment category along with terminology number. The term used should be at least in the second level, but can be third or fourth level as appropriate for the case. For example
    - First level Food and Nutrient Intake (1)
        - Second level Energy Intake (1.1.)
            - Third level Food intake (1.2.2)
                - Fourth level Amount of food (FH-1.2.2.1).
    - See pages 73-75 of IDNT.
- Write a brief assessment statement for each term chosen.
    - Hint: Sample nutrition assessment documentation statements can be found in the IDNT (pg 87-198.)
- *Note:* only enter information if it applies to this case**.** Add additional rows as needed.

I used the second edition of the IDNT book.

Assessment Category	Assessment term and number	Assessment Statement
Food/Nutrition-Related History	FH-1.5.1	"moderate social drinking"
	FH-4.4	Generally eats 3 meals with his wife
Anthropometric Measurements	AD-1.1	Ht: 1.78 m, Current Wt: 68.6 kg, Usual wt: 77.3 kg
		BMI: 21.7
Biochemical Data, Medical Tests, and Procedures	BD-1.10	Patient's hemoglobin is 11 g/dl and hematocrit is 32%, which are both below the expected range for adult males.[3]
	BD-1.11	Patient's albumin is 2.9 g/dl, which is below the expected range.[3]
	BD-1.2	Patient's serum calcium is 7.6 mg/dl, which is below the expected range.[3]
Nutrition-Focused	PD-1.1	Patient experiences compromised swallowing

Physical Findings		function and difficulty speaking.
Client History	CH-1.1	Patient is a 69 year old male who has smoked 1 pack of cigarettes per day.

Section 2. Nutrition Diagnosis

Determine Nutrition Diagnosis/Problem

1. List the problems JQ has in the Intake Domain (if any)

Diagnosis term number	Diagnosis Term
NI-2.1	Inadequate oral food/beverage intake
NI-5.2	Malnutrition

2. List the problems JQ has in the Clinical Domain (if any)

Diagnosis term number	Diagnosis Term
NC-1.1	Swallowing difficulty
NC-3.4	Involuntary weight loss

3. List the problems JQ has in the Behavioral-Environmental Domain (if any)

Diagnosis term number	Diagnosis Term

Write a Nutrition Diagnosis PES Statement

Write a Diagnosis Statement using PES format for two of JQ's problems:

Diagnosis Term/		Etiology		Signs and/or

Problem				Symptoms
Inadequate oral food/beverage intake	*Related to*	Difficulty swallowing	*As evidenced by*	A history of "eating barely anything" for the past two weeks.
Involuntary weight loss	*Related to*	Inability to eat adequate calories	*As evidenced by*	11% weight loss in the past 3 months.

Section 3. Nutrition Intervention

Analyze Potential Nutrition Interventions

1. Is TPN appropriate for JQ? Explain. (*Type text in box below*.)

TPN would not be appropriate for JQ. Only if the patient is unable to receive enteral feedings would TPN be advised.[4] JQ has already had surgery on his upper GI tract and there is no indication by the doctor that additional surgery is needed. While JQ doesn't have adequate swallowing capabilities, his GI tract is believed to be adequate to accept enteral feedings.

2. Is PPN appropriate? Explain. (*Type text in box below*.)

PPN may be appropriate. If JQ does not tolerate adequate nutrition through enteral feedings, he may need to be supplemented through PPN. However, at this time we should not initiate PPN.

3. Is enteral feeding appropriate? Explain. (*Type text in box below*.)

Yes. The Nutrition Care Manual states that enteral feeding is the first choice for cancer patients with inadequate oral intake with a functioning GI tract.[2] JQ does not fall under one of the exceptions

4. List two enteral formulas which would be appropriate for JQ. Justify why the formula is appropriate.

Formula Name	Justification for Use
IMPACT®	The Aspen guidelines indicate in E-1 that immune-modulating enteral formulations are indicated for individuals with neck cancers.[4] With his calculated fluid needs as 1 mL for each calorie, Impact 1 would be appropriate.
IMPACT®Glutamine	Glutamine has also been found to decrease hospital stay when given to patients with neck cancers.[4] A formula with glutamine may help JQ recover faster. This formula is 1.3 cal for each mL, so we may need to give additional fluid if this one is chosen.

5. Calculate the following information to meet JQ's current nutritional needs which you determined in the comparative standards section above.

List energy, pro, fluid needs from above:

	Formula #1	**Formula #2**
Formula Name	IMPACT®[5]	IMPACT®Glutamine[5]
Goal rate ml/hr	79 ml/hr	60 ml/hr
Total ml/day	1850 ml	1450 ml
Total Kcals	1850 kcal	1885 kcal
Non-Pro Kcal	1436 kcal	1433 kcal
Pro g and Kcals	103 g and 414 kcal	113 g and 452 kcal
CHO g and Kcals	240 g and 817 kcal	217 g and 739 kcal
Fat g and Kcals	51.8 g and 619 kcal	43 g and 694 kcal
Osmolality	375 mOsm/kg	630 mOsm/kg
Total Fluid	1850 ml	1900 ml
Free fluid (ml)	0 ml	450 ml
Additional fluid need (ml)	0 ml	450 ml
Comment on adequacy of your formula recommendation(s) in meeting estimated nutrient needs: The IMPACT®Glutamine provides about 10 extra grams of protein. If this formula is chosen it is important to assess deviations in liver and kidney function. The extra protein may be appropriate for enhanced healing.		

6. Where the tube should be placed? Why? (*Type text in box below*.)

The tube should be placed in the stomach. The Aspen guidelines indicate that the gastric tube placement is appropriate if the patient is not at risk for aspiration.[4] JQ has not previously showed risk for aspiration.

7. What tube lumen is appropriate? (*Type text in box below*.)

A tube lumen of 8-12 French units would be appropriate.[6]

8. The nurse is crushing an enteric-coated pain med and flushing it through the feeding tube. Evaluate this practice. (*Type text in box below*.)

Because the pain med is enteric-coated, it should not be given through a feeding tube for any reason. The medicine inside will damage the stomach cells.[7]

9. What are the general guidelines regarding the use of the feeding tube for medications.

(*Type text in box below*.)

In general, it is better to not use the feeding tube for medications due to the risk of blockage. However, if needed liquid medications can be given or crushed pills may also be given (not enteric-coated.) If medication needs to be given it is best to flush the tube with water before and after giving the medication.[7]

10. How can you increase the fiber in a tube feeding? Evaluate the practice of adding Metamucil to a feeding tube. (*Type text in box below*.)

IMPACT®Glutamine has more fiber than IMPACT does. IMPACT also has a specific product with fiber in it.[5] Adding Metamucil to the solution already being used can jell within the tube and cause complications, so that should be avoided.

11. Complete the following table regarding common nutrition-related problems in the tube-fed patient. Fill in 3-4 causes and corrective measures for each problem area (*Type text in box below*.)

Problem	Possible Causes	Suggested Corrective Measures
Nausea Vomiting	High osmolality formula[3]	Pick a formula with lower osmolality[3] (i.e. standard formula instead of elemental)
	Cold formula[6]	Warm before infusing formula[6]
	Sepsis	Treat sepsis[6]
	Smell[6]	Use a closed sytem[6]
	Infusing formula too fast[6]	Decrease infusion rate to 20-25 ml/hr[6]
Diarrhea	Hyperosmolar formula[3]	Give a formula with lower osmolality[2]
	Bacterial overgrowth[3]	Give a formula with more fiber[3]
	Medications (sorbitol based) or antibiotics[6]	Suggest medications are altered[6]
	Fat intolerance[6]	Give less fat[6]
Constipation	Too little fiber[3]	Give a formula with more fiber[3]
	Milk based formula[7]	Give adequate fiber and fluid[7]
	Too much fluid[7]	Give a formula with sorbital[7]
	Inactivity[7]	

Determine Appropriate Nutrition Interventions

12. Complete the following table
    a. Fill in the nutrition prescription
    b. Fill in at least two interventions. Use the IDNT manual nutrition intervention terminology. Be sure that the interventions match your PES statements**.** That means the interventions should be directed at fixing the nutrition problem/diagnosis.

c. Remember these interventions should be things done at the initial overall nutrition assessment, not interventions that will come later at f/u encounters or future outpatient visit.

Nutrition Prescription:	JQ should have a nasogastric tube placed and be given 79 mL/hr (totaling 1850 mL/day).

	Intervention	Goal(s)/Expected Outcome
Intervention # 1	ND-2.1 Initiate EN	JQ will obtain the recommended 1850 kcal needed per day.
Intervention # 2	ND-2.1 Initiate EN	JQ will begin to regain the lost weight, returning to his body weight of 77 kg.

Section 4. Nutrition Monitoring and Evaluation

1. What signs and symptoms should the dietitian look for when monitoring JQ's **tolerance** to the tube feeding. (*Type text in box below*.)

The Aspen guidelines say in A5 that signs of intolerance include abdominal distention, increasing nasogastric tube output or gastric residual volumes, decreased passage of stool and flatus, hypoactive bowel sounds, or increasing metabolic acidosis and/or base deficit.[4]

2. What tools can the dietitian use to monitor the **nutritional adequacy** of the enteral feeding? Include recommended lab tests. (*Type text in box below*.)

Monitor weight gain/loss. Rapid weight gain may indicate too much fluid, where weight loss may indicate inadequate calories. Monitor electrolyte levels in the blood: sodium, potassium, chloride, magnesium. Also, monitor glucose levels and prealbumin levels.[2]

3. Is JQ at risk for refeeding syndrome? Explain. (*Type text in box below*.)

Yes. He has not eaten much for the past 2 weeks and hasn't eaten anything since surgery. Already before that he was eating less than usual. Rapid refeeding could cause edema, heart failure, and neurological dysfunction.[2]

4. What indicators of refeeding syndrome will you watch for? (*Type text in box below*.)

Hypophosphatemia, hypokalemia, hypomagnesemia, water retention, acidosis, high blood glucose levels and hyperventilation.[2]

5. How can refeeding syndrome be avoided? (*Type text in box below*.)

Starting tube feeds below the recommended level and increasing the amount given over time if the patient tolerates it well.[2]

The physician ordered the TF protocol you recommended and JQ is tolerating the tube feed well. He has been on the TF for several weeks and has been progressing and recovering from his medical illness. A new swallow study indicated JQ could start trying po.

6. Outline your plans for advancement from TF to oral feedings. How will you progress from TF to oral feeds? Include how you would advance the oral feedings, and what kind of diet you would want him on orally. (*Type text in box below*.)

I would decrease the tube feed to a 12 hour cycle at night[3], giving 80% of the recommended calories, and ask him if anything sounds good to eat. I would encourage soft foods in small portions to help him want to eat such as mashed potatoes, soft vegetables, meatloaf, etc. He always has liked icecream in the evenings, so I will offer him that. As he begins to increase his intake, I will decrease his tube feed. As time goes on I will encourage him to eat a more rounded diet. As soon as he reaches 50% of his needs by mouth, I will pull him off the tube feed and encourage him to eat a normal diet.

7. What information would you monitor and why? (*Type text in box below*.)

Information Monitored	**Why**
Calorie intake	So that I know how many calories that he is getting by mouth.

8. List at least one potential nutrition related problem JQ might encounter during this transition phase and provide a realistic solution. (*Type text in boxes below*.)

Problem: JQ may not want to eat because food does not sound good. In particular, cancer patients often have trouble with meat tasting metallically.

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Solution: I will work with him to help him eat food that sounds and tastes good. Sometimes meat with something sweet will help take the metallic taste away.[7]

9. Complete the following table for the two interventions and goals you indicated above. Define the following
    a. The **indicators** you will use to measure change. The indicators should measure progress towards goal.
    b. The **criteria for evaluation** (be specific)

c. Note: the IDNT manual has listed indicators and criteria in the Assessment, monitoring, and evaluation section. Remember your interventions are aimed at resolving a nutrition problem/diagnosis.

Intervention (Copy from above)	**Goal/Expected Outcome (Copy form above)**	**Indicator(s)**	**Criteria for evaluation**
ND-2.1 Initiate EN	JQ will obtain the recommended 1850 kcal needed per day.	Nurses' notes saying the amount of TF given to JQ	Is JQ getting 1850 kcal per day, or working towards it?
ND-2.1 Initiate EN	JQ will begin to regain the lost weight, returning to his body weight of 77 kg.	Weight gain or loss indicated by measurement.	Is JQ maintaining weight? Is he regaining some weight?

Outpatient Follow-Up

JQ has advanced to full oral feedings and has been discharged. He has scheduled a follow up with you in one month in the outpatient clinic.

1. During JQ's outpatient visit, identify which parameters would you monitor to assess his current nutritional status and indicate why. (Hint – use assessment, monitoring, and evaluation terms from IDNT.) (*Type text in box below*.)

I would ask about his food intake such as amount of food, types of food, meal/snack pattern, and food variety. This would help me know how much he is eating and his attitudes about food. I would ask about his alcohol intake and his supplement use. This would clue me into anything that I would need to be aware of while advising changes in his diet. I would weight him analyze his hematocrit or hemoglobin if possible. This will help me know whether he is regaining his original weight and whether or not he is still malnourished. I would look at his overall appearance, specifically looking for muscle and subcutaneous fat wasting, which would also help me assess for malnutrition. I would ask about his ability to swallow as well as his appetite to help me understand what types of foods he can eat and which ones he still avoids.

References for Case Study #1 (Use the format indicated in the Student Handbook)

1. The American Dietetic Association. *International Dietetics Nutrition Terminology (IDNT) Reference Manual 2E*. Chicago, IL: American Dietetic Association; 2009.

2. Nutrition Care Manual. Available at http://www.nutritioncaremanual.org/index.cfm. Accessed February 27, 2013.

3. Mahan LK, Escott-Stump S. *Krause's Food & Nutrition Therapy*. 12th ed. St Louis, MO. Elsevier Enc; 2008.

4. McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts p, Taylor B, Ochoa JB, Napolitano L, Cresci G, the A.S.P.E.N. Board of Directors and the American College of Critical Care Medicine. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient. *JPEN J Parenter Enteral Nutr* 2009;33:277-316.

5. Impact. Impact Nutritional Information. Available at http://www.impactinformation.com/products/tubefeed/nutritional.htm. Accessed February 27, 2013.

6. Williams P. Lecture notes. Advanced Dietetic Practices, Brigham Young University. Jan. 30, 2013.

7. Williams P. Lecture notes. Advanced Dietetic Practices, Brigham Young University. Feb. 6, 2013.

Case #2 Trauma TPN and the Metabolic Effects of Injury

Hospital Admission

JJ is a 23-year old male admitted to the hospital unconscious after being trampled by a bull in a local rodeo contest. In addition to multiple fractures, an exploratory laparoscopy identified massive internal injuries to the GI system.

Physician's Orders

Dietitian to consult for TPN and make recommendations

The dietitian was able to obtain the following information from the medical record and observation.

- Previous medical history unremarkable with minor injuries in the past resulting from other rodeo accidents.
- Large framed, approximately 6'1" tall and weighed 210# on the bed scale.
- Family members live out of state and have not been able to visit JJ yet.

Admit labs

Alb	2.1 g/dl	Hct	31%	Prealbumin	7.0 mg/dl
Trigs	170 mg/dl	Hgb	10 g/dl	CRP	21.4 mg/dl
Gluc	200 mg/dl	Na	133 mmol/L		

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Section 1. Nutrition Assessment

Food/Nutrition Related History (AKA Dietary)

1. Do you need a diet history on this patient? Why or why not?

It would always be good to have a diet history, but in this case I can assume that he was eating normally before his accident and I wouldn't necessarily need a diet history. In accidents, we can assume that patients were fairly well nourished beforehand.

2. How can you make a judgment regarding his dietary intake prior to admission?

Because of his weight and build, I can assume that he was probably well nourished. Because he is 23 years old I will assume that he didn't have any major health complications and ate a normal diet.

Anthropometric Measurements

1. List JQ's

Ht	1.85 m
Wt (lb and Kg)	210 lb and 95 kg
IBW (lb and Kg)	175 lb and 79.5 kg
%IBW	119%
BMI	27.7

2. How accurate are JJ's current anthropometrics?

The weight might be accurate, unless he lost a lot of blood or he was given a lot of fluids during his surgery. His height may also be accurate. However, if the broken bones he has are in his legs, we may not have an accurate height.

Biochemical Data, Medical Tests and Procedures

1. List abnormal lab values if significant explain possible causes for each. If labs are not significant for cause, put a NA in the possible causes box.

Lab and Value	Possible Causes
Alb 2.1 g/dl	Acute stress[1]

Trigs 170 mg/dl	It may be related to shock, but may indicate that his triglycerides are always high and needs a change in diet.
Gluc 200 mg/dl	Shock, possible warning signal to watch for diabetes.
Hct 31%	Loss of blood
Hgb 10 g/dl	Loss of blood
Na 133 mmol/L	stress
Prealbumin7.0 mg/dl	stress
CRP 21.4 mg/dl	Acute injury, immune response

2. Are these lab values accurate tools to use to determine JJ's nutritional status? Explain

No. Right now he is in metabolic stress and his body is in shock. This will throw all of the blood levels off for the nutrients we want to look at.[1] We will just need to wait and watch his values come into a more normal range before we take nutritional measures to adjust these levels.

Nutrition-Focused Physical Findings (AKA Clinical)

1. What clinical signs would you look for to help complete your nutritional assessment?

Overall appearance[2]: does he look like he was well nourished before his accident?
Digestive system[2]: is it possible to do a tube feed?
Skin[2]: is there a site that we can place a parenteral feeding tube?

2. What clinical signs are typical in trauma patients?

Shock[1]: rapid pulse, nausea, cold skin. He will also have inflammation, particularly around his broken bones and stomach area. Edema is also common among trauma patients.[3]

Comparative Standards

1. Determine JJ's needs for energy, protein, and fluid. (*Type needs in chart below.)* Indicate wt used for calculations, formula used (e.e. HBE, Penn, Kcal/Kg, etc.) write out name of formula **and** equation as appropriate, and any activity/stress factors.

	Needs	**Equation Used**	**Stress Factors**
Energy (Kcals)	2500 kcal	Penn State	1.25
Protein (g/d)	144-163 g	1.5-1.7 g/kg	
Fluid (ml/d)	2500	1 ml per 1 kg	
Weight Used (lb)	210 lb		

Use the box below to show your calculations

Energy: RMR =((9.99 X 95) + (6.25 X 185) – (4.92 X 23) + 5) x 1.25 = 2496 kcal Protein: 1.5-1.7 (95) = 144-163 g

2. Justify the following:

- Formula used for energy needs and any activity/stress factors used.
- Protein need calculation
- Weight used

Remember to cite sources used for justification; sources should be listed at end of case. (*Type text in box below*.)

For the energy needed I used the Mifflin-St Jeor equation. There is some controversy about what equation to use, but one of the best was Mifflin-St Jeor equation with a factor of 1.25. I compared that with several others and it seemed to be a middle ground.[3] Protein requirements are also highly debated for trauma patients. Recommendations ranged from 1.5 to 2.0 g/kg. The 2.0 g/kg calculation seemed high to me for this patient, so I used a range of 1.5 to 1.7 g/kg. We will watch his wound healing rate to assess the need for additional protein.[3] I used the body weight found on the medical record. I assume that this will be accurate until I learn differently. Protocol for patients is to get their weight as soon as possible so that added fluids do not compromise the weight.[3] He is described as having a large frame, so it is not unreasonable that he weighs 210 pounds.

Document Nutrition Assessment

From your assessment of this patient, **complete the following table**.

- Enter a one or more assessment terms for each assessment category along with terminology number. The term used should be at least in the second level, but can be third or fourth level as appropriate for the case. For example
    - First level Food and Nutrient Intake (1)
        - Second level Energy Intake (1.1.)
            - Third level Food intake (1.2.2)
                - Fourth level Amount of food (FH-1.2.2.1).
    - See pages 73-75 of IDNT.
- Write a brief assessment statement for each term chosen.
    - Hint: Sample nutrition assessment documentation statements can be found in the IDNT (pg 87-198.)
- *Note:* only enter information if it applies to this case**.** Add additional rows as needed.

Assessment Category	Assessment term and number	Assessment Statement
Food/Nutrition-Related History	FH-1.1.1	Patient prescribed a TPN feeding.
Anthropometric Measurements	AD-1.1	Patient's height measured at 185 cm and weight measured at 95 kg, making his BMI 27.7, categorizing him as overweight.
Biochemical Data, Medical Tests, and Procedures	BD-1.6	Patient's C-reactive protein level is 21.4 mg/dl, which is above the expected range of 1.0-3.0 mg/L.
	BD-1.10	Patient's hemoglobin is 10 g/dl, which is below the expected range of 14-17 g/dl and his hematocrit is 31%, which is also below the expected range of 42-52%.
	BD-1.5	Patient's serum glucose is 200 mg/dl, which is outside the normal range of 70-110 mg/dl.
	BD-1.2	Patient's serum sodium level is below the normal level.
	BD-1.7	Patient's triglycerol level is 170 mg/dl, higher than the recommended level.
Nutrition-Focused Physical Findings	PD-1.1	Patient has several fractures and massive internal injuries to the GI system.
Client History	CH-1.1	Client is a 23 year old male.

Section 2. Nutrition Diagnosis

Determine Nutrition Diagnosis/Problem

1. List the problems JJ has in the Intake Domain (if any)

Diagnosis term number	Diagnosis Term
NI-2.1	Inadequate oral food/beverage intake

2. List the problems JJ has in the Clinical Domain (if any)

Diagnosis term number	Diagnosis Term
NC-1.4	Altered GI function

3. List the problems JJ has in the Behavioral-Environmental Domain (if any)

Diagnosis term number	Diagnosis Term

Write a Nutrition Diagnosis PES Statement

Write a Diagnosis Statement using PES format for two of JJ's problems:

Diagnosis Term/ Problem		Etiology		Signs and/or Symptoms
Altered GI function	*Related to*	Massive internal injuries to the GI system	*As evidenced by*	The doctor's notes describing the injury.
Inadequate oral food/beverage intake	*Related to*	Being unconscious after a serious injury	*As evidenced by*	Recommendation from the doctor for TPN feedings.

Section 3. Nutrition Intervention

Analyze Potential Nutrition Interventions

1. From your nutrition assessment do you think JJ is at nutrition risk? Explain.

I don't think that he is in immediate nutritional risk. While his albumin, prealbumin, and hematocrit are all low, this is probably a response to his severe wounds. I assume he was well nourished before his accident. However, it is recommended that he get nutrition support within the next 7 days.[4] I would watch his lab values and see when he is hemodynamically stable.[1] In 5-7 days after admit, I would begin the nutrition support.[4]

2. What will be the main challenges in providing nutrition support?

His GI tract is not functioning, so we will need to use parental nutrition.[4]
His blood glucose and blood lipids are high, so giving him more fat and carbohydrates may not be helpful.[1]
Krause states that the first step is to get the patient hemodynamically stable through fluid and electrolyte management, then begin nutrition support.[1]

3. Is enteral feeding appropriate? Explain.

I don't think that it is appropriate. The doctor ordered a TPN, so he must not think that JJ's GI tract can handle it. However, it would be helpful to wait the 5-7 days[4] recommended by Aspen to see if it would be appropriate within that time frame. We won't want to place a tube if it will be used for less than 2 weeks.

Complete the physician's order to consult for TPN.
The hospital has a standard TPN formula of 500 cc D50 and 500cc 8.5% AA (per 1000 cc) and the availability of both 10% and 20% lipids.

4. Calculate a TPN solution to meet JJ's current nutrition needs as calculated above. Fill in the following table with the TPN calculations

List energy, pro, fluid needs from above:

Total volume of standard solution (ml/24 hr)	2200 mL
Rate of standard solution (ml/hr)	92 ml/hr
Type of lipids used and frequency	1 10% lipid every other day
Carbohydrate grams and Kcals	550 g and 1870 kcal
Protein grams and Kcals	94 g and 374 kcal
Fat grams and Kcals	25 g and 275 kcal
Total Kcals	2519 kcal
Non-pro Kcals	2145 kcal
Non-pro Kcals (NPC):N ratio (Goal ~150:1)	143:1
% NPC Calories from lipid (Goal <30%)	13%
% NPC from CHO (goal 70-80%)	87%
Fat Load (goal ≤ 1 gm/kg)	.26
CHO Load (mg/kg/min)	4

Show calculations below.

Carb: 250 x 2.2 = 550 g CHO, 1870 kcal
Protein: 42.5 x 2.2 = 94 g PRO, 374 kcal
Fat: 550/2 = 275 kcal, 25 g
Non-protein cal: 2145/(94/6.25) = 143:1
% NPC lipid: 275/2145 = 13%
% NPC carb: 1870/2145 = 87%
Fat load: 25 g / 95 kg = .26
Carb load: 550 x 1000 / 95 / 1440 = 4

5. Assess the above TPN recommendation for JJ's needs. Current TPN provides:

% Protein needs	65%
% NPC needs	111%
% total Kcal needs	101%
% free fluid needs	88%
Appropriate NPC:N ratio? Explain.	No. While the number is close to 150:1, we really need less carbohydrate and more protein to help him get his protein needs and not overwhelm his blood sugar levels (which are already high).
Appropriate fat load? Explain.	Yes. It is less than 1, which is good. This fat load may help his triglycerides come back to normal.
Appropriate CHO load? Explain.	No. There are too many carbohydrates for him. While 4 mg/kg/min is under the recommended, his percent NPC from carbohydrates is too high. He needs a formula with less carbohydrate and more protein.
Is there something you can do to more closely meet pt needs when only standard TPN is available?	There is not much else I could do with this standard TPN. Perhaps if we had one with 10% protein or 12% protein it would be closer to his needs.

6. List the advantages and disadvantages of using standard TPN solutions.

Advantages	Disadvantages
Cheaper Less risk of contamination	Cannot meet the needs of patients as closely The fat is given separately as a bolus

7. List the advantages and disadvantages of using individualized TPN (3-in-one solutions).

Advantages	Disadvantages
Can meet the specific needs of patients more closely	More expensive More risk of contamination

8. List the general complications of TPN.

Pneumothorax	Infection and Sepsis
Hemothorax	Dehydration
Hydrothorax	Hyperosmolar, nonketotic,
Tension pneumothorax	Hyperglycemic coma
Subcutaneous emphysema	Hyperlipidemia
Brachial plexus injury	Arteriovenous fistula
Subclavian artery injury	Thoracic duct injury
Subclavian hemotoma	Hydromediastinum
Central vein thrombophlebitis	Air embolism
Hypomagnesemia	Catheter fragment embolism
Hypocalcemia	Catheter misplacement
Hypercalcemia	Cardiac perforation
Electrolyte imbalance	Endocarditis[1]

9. List the indications for use of TPN.

When the GI tract doesn't work, such as in short bowel syndrome. When EN is not feasible, and the patient has no protein-calorie malnutrition, after 7 days of hospitalization. When EN is not feasible upon admission and the patient has protein-calorie malnutrition.[4]

Determine Appropriate Nutrition Interventions

1. Complete the following table
    a. Fill in the nutrition prescription
    b. Fill in at least two interventions. Use the IDNT manual nutrition intervention terminology. Be sure that the interventions match your PES statements**.** That means the interventions should be directed at fixing the nutrition problem/diagnosis.

Nutrition Prescription:	Patient JJ to receive 92 ml/hr standard TPN solution (total 2200 mL/day) and 10% lipid every other day.

	Intervention	**Goal(s)/Expected Outcome**
Intervention # 1	RC-1.3 Collaboration/referral to other providers	Make a decision with the doctor whether he would be able to handle enteral nutrition.
Intervention # 2	ND-2.1 Initiate PN	Prevent muscle and fat wasting.

Section 4. Nutrition Monitoring and Evaluation

1. What lab values and/or other parameters should you use to monitor TPN and indicate how often you would check them.

Labs or other parameter	Frequency of checking
Weight	Daily
Serum electrolytes	Daily
Blood urea nitrogen	3/wk
Serum total calcium, inorganic P, Mg	3/wk
Serum glucose	Daily
Serum triglycerides	Weekly
Liver function enzymes	3/wk
Hemoglobin, hematocrit	Weekly
Platelets	Weekly
WBC count	As indicated
Clinical status	Daily
Catheter site	Daily
Temperature	Daily
I&O	Daily[1]

2. What complications could result if excessive carbohydrate is given in TPN?

High blood glucose would occur. He is already in hyperglycemia, and in most trauma patients, this continues to be a problem. This could lead to delayed healing and delayed getting off of a vent (if he is on a vent.) However, strict glucose control also seems to be contraindicated as there is a higher risk of mortality.[4]

3. What are your best monitors to check CHO tolerance?

Blood glucose levels may be the best monitor of carbohydrate tolerance. Strict glucose control is not the goal, but it would be helpful to keep blood glucose between 110 and 150.[4] However, if the patient's glucose consistently rises, too much glucose is being given.

4. What complications could result if excessive fat is given in TPN?

JJ is already at risk of increased triglycerides. His triglyceride level is high and metabolic stress increases the movement of lipids in the blood.[1] Also, fatty acids modulate the immune response.[1] We want him to be able to fight off the infections and be able to recover.

5. What are your best monitors to check for lipid tolerance?

Blood triglycerol levels and CRP.[1]

6. If the UUN was 32 gm/24 hr, how many grams of protein are being lost in one day? (hint 1 gm N= 6.25 g pro OR protein is 16% N)? Show work

Protein lost in one day = (UUN (g) + 3-5 g) x 6.25[1]

(32 + 5 g) x 6.25 = **231 g PRO per day**

7. Using the UUN above calculate the N balance. Show work

Nitrogen balance = protein intake (N) – protein loss(N)[1]
(94 x .16) g – (231 x .16) g = 15 g – 37 **= -22 g/day**

8. How would you modify your nutrition support (in general) based on the N balance calculated above?

I would increase the protein to account for all of the protein that he is losing. He will need to build new cells and new tissues. If he continues with this nitrogen balance for long, he will end up with a lot of muscle wasting.

9. Would indirect calorimetry be of benefit in assessing this patient?

Yes. Indirect calorimetry is the gold standard for finding the REE.[3] It would be good to know if the calculations made based on his weight (which may be inflated from fluid retention) are accurate.

10. What can indirect calorimetry tell you?

Indirect calorimetry would tell me how much energy he is using in a resting state. It would help me know if his calorie and protein recommendations are accurate, based on his weight. It would also help me know what the major macronutrient he was burning: carbohydrate, fat, or protein. I would still need to adjust the REE given to determine the energy needed to build new tissues.

11. How would you (the dietitian) modify the TPN as JJ is advanced to po feedings?

I would closely monitor the oral intake and slowly decrease the TPN feeding depending on how many calories he ate by mouth. Once JJ was eating 75% of his nutrient needs orally, I would take him off TPN, but continue to monitor him to make sure that he is eating adequate nutrition.[1]

12. How would you monitor tolerance to his oral feedings?

If he was eating well and feeling good, I anticipate that his GI tract is doing well. I would also monitor any signs of bloating, diarrhea, constipation, or GI discomfort to assess tolerance.

13. When would you recommend fully discontinuing a TPN feeding once an oral diet was established?

When he was consistently eating 75% of his nutrient needs orally.[1]

14. Complete the following table for the two interventions and goals you indicated above. Define the following
    a. The **indicators** you will use to measure change. The indicators should measure progress towards goal.
    b. The **criteria for evaluation** (be specific)
    c. Note: the IDNT manual has listed indicators and criteria in the Assessment,

monitoring, and evaluation section. Remember your interventions are aimed at resolving a nutrition problem/diagnosis.

Intervention (Copy from above)	Goal/Expected Outcome (Copy form above)	Indicator(s)	Criteria for evaluation
RC-1.3 Collaboration/referral to other providers	Make a decision with the doctor whether he would be able to handle enteral nutrition.	Talk with doctor to determine whether or not JJ can handle enteral nutrition within 7 days.	Can JJ handle enteral nutrition within 7 days?
ND-2.1 Initiate PN	Prevent muscle and fat wasting.	Anthropometrics: weight maintenance. Extremities, muscles and bones: is he visibly losing muscle?	Maintaining weight. Maintaining muscle mass.

References for Case Study #2 (Use the format indicated in the Student Handbook)

1. Mahan LK, Escott-Stump S. *Krause's Food & Nutrition Therapy*. 12th ed. St Louis, MO. Elsevier Enc; 2008.

2. The American Dietetic Association. *International Dietetics Nutrition Terminology (IDNT) Reference Manual 2E*. Chicago, IL: American Dietetic Association; 2009.

3. Nutrition Care Manual. Available at http://www.nutritioncaremanual.org/index.cfm. Accessed February 27, 2013.

4. McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts p, Taylor B, Ochoa JB, Napolitano L, Cresci G, the A.S.P.E.N. Board of Directors and the American College of Critical Care Medicine. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient. *JPEN J Parenter Enteral Nutr* 2009;33:277-316.