

**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). This should be your first source; use other sources only if needed.
- IDNT Manual
- Any textbooks from NDFS courses
- ADA Evidence Analysis Library (online) and noted journal articles
- Class Lecture Notes from any NDFS course
- ASPEN nutrition support guidelines
- 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, paleness, 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:

Glucose	98 mg/dl (70-110 mg/dl)	Albumin	3.0 g/dl (3.6-5.0 g/dl)
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### 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

Labs from the hospital after surgery include

Hgb	11 g/dl (13.5-17.5 g/dl)	Prealbumin	20 mg/dl (19-43 mg/dl)
Hct	32% (40% to 54%)	Glucose	105 mg/dl (70-110 gm/dl)
Albumin	2.7 g/dl (3.6-5.0 g/dl)	Calcium	7.6 mg/dl (8.7-10.2 mg/dl)

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.

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## **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.

JQ's nutritional needs are not being met. JQ was diagnosed with *dysphagia* 2° to esophageal squamous cell CA, and malnutrition. 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. Before surgery 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.

### **Anthropometric Measurements**

1. List JQ's

<b>Ht (in &amp; cm)</b>	70" 177.8 cm
<b>Wt (lb &amp; kg)</b>	151 lb 68.6 kg
<b>Usual Wt (lb &amp; kg)</b>	170 lb 77.3 kg
<b>%IBW</b>	IBW: 166 lb, 91 %IBW
<b>BMI</b>	21.7

2. Evaluate JQ's current wt and any significant wt changes.

$$\% \text{ Weight change} = \frac{\text{weight change}}{\text{usual weight}} \times 100$$

Weight change is a percentage of weight lost from baseline. (Krause 166)

1 week > 1-2% weight change, 1 month > 5% weight change, 3 months > 7.5% weight change, 6 months > 10% weight change.

$(170 - 151) = 19/170 = 11.2\%$  wt change in 3 months > 7.5%, significant wt change.

## Biochemical Data, Medical Tests and Procedures

1. List abnormal lab values and explain possible causes for each. The causes should be related to the case, not just any cause. e.g. what is causing JQs abnormal levels.

Lab and Value	Possible Causes
Hgb 11 g/dl (13.5-17.5 g/dl)	<ul style="list-style-type: none"> <li>• Anemia: state associated with reduced RBC numbers.</li> <li>• Dietary deficiency: with certain vitamin or mineral deficiencies (e.g. iron), the RBC number or size is decreased. Therefore Hgb is decreased. (Pagana 302)</li> </ul>
Hct 32% (40% to 54%)	<ul style="list-style-type: none"> <li>• Anemia: state associated with reduced RBC numbers. Since Hct is an indirect reflection of RBC numbers, Hct will be reduced.</li> <li>• Dietary deficiency: with certain vitamin or mineral deficiencies (e.g. iron), the RBC number or size is decreased. Therefore Hct is decreased. (Pagana 298)</li> </ul>
Alb 2.7 g/dl (3.6-5.0 g/dl)	<ul style="list-style-type: none"> <li>• Malnutrition: lack of a.a. available for building proteins contributes to this observation.</li> <li>• JQ's underlying inflammatory state may be the cause of hypoalbuminemia. Diseases associated with inflammation, necrosis, infarction, or burns cause an increase in acute-phase reactant proteins. (Pagana 446)</li> </ul>
Calcium 7.6 mg/dl (8.7-10.2 mg/dl)	<ul style="list-style-type: none"> <li>• Hypoalbuminemia, malabsorption: less calcium is available to the blood. (Pagana 151)</li> <li>• JQ drank water with his meals as large amounts of milk gave him gas and cramping.</li> </ul>

2. What other lab tests would help in your nutritional assessment and why?

BUN:creatinine ratio to determine hydration status.

Specific biochemical and nutrient issues will be dependent on the extent of resection and the type of reconstruction that is performed. These issues may include malabsorption, iron-deficiency anemia or megaloblastic anemia. To confirm micronutrient deficiencies and determine appropriate dietary supplement use:

- MCV, MCH
- Total iron-binding capacity
- Ferritin
- Transferrin
- Vitamin B-12
- Folate

Home > Nutrition Care > Gastrointestinal Disease > Upper GI Tract > Esophageal Surgery > Laboratory

**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.

The upper GI revealed an esophageal lesion which when biopsied, was positive for squamous cell carcinoma. A chest x-ray was negative. Radiographic studies indicated the carcinoma was quite extensive and radical surgery was necessary.

**Client History**

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

JQ is male, married, 69 years old, retired. JQ has a long-standing history of smoking (1 pack per day) and moderate social drinking. JQ reported he had difficulty swallowing, lethargy, paleness, and unintentional weight loss. JQ had an upper GI series done. As a result, JQ was diagnosed with esophageal squamous cell CA, dysphagia 2° to esophageal squamous cell CA, anemia, malnutrition. JQ requires nutrition support.

**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
<b>Energy (Kcals)</b>	2230-2675 kcals/day	25-30 kcal/kg	1.3
<b>Protein (g/d)</b>	82 g/day	1.2 g/kg	
<b>Fluid (ml/d)</b>	2230-2675 ml/day	1 ml/kcal	
<b>Weight Used (lb and Kg)</b>	151 lb 68.6 kg		

*Use the box below to show your calculations*

Energy  
 $(68.6 \text{ kg}) \times (25 \text{ to } 30 \text{ kcals/kg}) \times (1.3) = 2230\text{-}2675 \text{ kcals/day}$

Protein  
 $68.8 \text{ kg} \times 1.2 = 82 \text{ g/day}$

Fluid  
 $1 \text{ mL/kcal of intake} = \text{mL fluid required daily} \rightarrow 2230\text{-}2675 \text{ ml/day}$

2. Justify the following:

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

Equation used for energy needs and any activity/stress factors used.

- When estimating energy needs for weight maintenance of underweight older adults, the RD should prescribe an energy intake of 25-30 kcal/kg/day or higher energy levels for weight gain. Research reports that applying physical activity levels ranging from 1.25 to 1.5 with measured RMR in older adults who are chronically or acutely ill and/or underweight results in these mean total daily energy estimates.

Home > Resources > Equations > Equations

Protein need calculation

- Albumin 2.5 to 3.0 g/dl moderate depletion; protein recommendations = 1.2 g/kg.

Weight used

- In general, goals promote reduction or elimination of the signs and symptoms of the identified nutrition diagnoses and resolution or improvement in the identified nutrition diagnoses. I used current weight when calculating energy and nutrient needs because that is the minimum to maintain weight and prevent further weight loss.

Home > Resources > Nutrition Support > Enteral Nutrition > Fluid

Fluid

- Fluid equations commonly used in adult populations – Adolph Method: 1 mL/kcal of intake = mL fluid required daily. Other methods: weight (kg) x 25-35 mL = mL fluid required daily. Adult > 65 years = 25 mL/kg body weight.

Home > Resources > Water and Fluid > Fluid Requirements > Methods for Estimating Fluid Requirements

- When a patient is receiving enteral feeding, additional water is typically needed to meet hydration needs (as long as the patient is not fluid restricted). To prevent the feeding tube from clogging, a 20- to 30-mL water flush every 4 hours in continuous feeding or before and after intermittent feedings is recommended. A 20- to 30-mL water flush is also suggested after gastric residual volumes are checked.

Home > Resources > Nutrition Support > Enteral Nutrition > Nutrition Prescription

## 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 77-81 of IDNT 4<sup>th</sup> edition for a quick look. In-depth pages 83-221.
- Write a brief assessment statement for each term chosen. You can combine terms into one state if it seems logical. For example anthropometrics would logically go together in one statement. Others may as well.
  - Example: Ht: XX (in/cm); wt: XX (lbs/kg); BMI XX, usual wt XX. Weight loss XX% mild loss.
- *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	Energy intake (FH-1.1.1)	JQ was NPO for surgery. He tolerated the surgery fairly well, but would not be able to take an oral po for several weeks.
	Food intolerance (FH-2.1.2.6)	Lactose intolerant
Anthropometric Measurements	Weight change (AD-1.1.4)	11.2% wt change in 3 months > 7.5%, significant wt change
Biochemical Data, Medical Tests, and Procedures	Protein profile (BD-1.11.1)	Low albumin 2.7 g/dl
	Electrolyte profile (BD-1.2.9)	Low serum calcium 7.6 mg/dl
	Nutritional anemia profile (BD-1.10)	Low Hgb 11 g/dl, Hct 32%
Nutrition-Focused Physical Findings	Overall appearance (PD-1.1.1)	The upper GI revealed an esophageal lesion. JQ was diagnosed with esophageal squamous cell CA, dysphagia 2° to esophageal squamous cell CA, anemia, malnutrition.
Client History	Patient/client chief nutrition complaint (CH-2.1.1)	JQ reported difficulty swallowing, lethargy, paleness, and unintentional weight loss.
	Living situation (CH-3.1.2)	JQ has a long-standing history of smoking (1 pack per day) and moderate social drinking.

**Section 2. Nutrition Diagnosis**

**Determine Nutrition Diagnosis/Problem**

1. Use the IDNT book to list problems (nutrition diagnosis) JQ has. Add rows if necessary.

Diagnosis term number	Diagnosis Term	Domain (Intake, Clinical, Behavioral/Environmental)
NI-1.2	Inadequate energy intake	Intake
NI-2.1	Inadequate oral intake	Intake
NI-5.2	Malnutrition	Intake
NI-5.7.1	Inadequate protein intake	Intake
NC-1.1	Swallowing difficulty	Clinical
NC-2.1	Impaired nutrient utilization	Clinical
NC-3.2	Unintended weight loss	Clinical

**Write a Nutrition Diagnosis PES Statement**

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

Diagnosis Term/ Problem		Etiology		Signs and/or Symptoms
Malnutrition	<i>Related to</i>	Inadequate nutritional intake	<i>As evidenced by</i>	11.2% weight loss in 3 months, and low albumin 2.7 g/dl.
Swallowing difficulty	<i>Related to</i>	Esophageal squamous cell CA	<i>As evidenced by</i>	Inadequate energy intake and inadequate protein intake.

**Section 3. Nutrition Intervention**

**Analyze Potential Nutrition Interventions**

1. Is TPN appropriate for JQ? Explain.

No – TPN for esophageal surgery should be reserved for the following cases: prolonged status as npo, unable to obtain enteral access, intolerance to enteral feedings prevents meeting patient’s nutrition needs.

Home > Nutrition Care > Gastrointestinal Disease > Upper GI Tract > Esophageal Surgery > Nutrition Support

2. Is PPN appropriate? Explain.

No – PPN is an appropriate nutrition intervention for patients/clients with altered gastrointestinal function who are unable to tolerate oral or enteral nutrition. PN has associated risks related to metabolic and infectious complications, and should not be used unless indicated.

Home > Resources > Nutrition Support > Parenteral Nutrition



3. Is enteral feeding appropriate? Explain.

Yes – if EN is not contraindicated (eg by hemodynamic instability, bowel obstruction, high output fistula, or severe ileus) then the RD should recommend EN over PN for the critically ill patient. Research shows less septic morbidity, fewer infectious complications, and significant cost savings in critically ill patients who received EN versus PN.

Home > Resources > Nutrition Support > Indications and Contraindications

For patients undergoing an esophagectomy, it is standard procedure to place a jejunostomy feeding tube at the time of surgery. EN support should be started immediately postoperatively and continue until the patient is able to meet nutrition needs by an oral meal plan.

Home > Nutrition Care > Gastrointestinal Disease > Upper GI Tract > Esophageal Surgery > Nutrition Support

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

Formula Name	Justification for Use
Jevity 1.2 Cal (Abbott)	<ul style="list-style-type: none"> <li>• High-protein, fiber-fortified formula that provides complete balanced nutrition for long- and short-term tube feeding.</li> <li>• For supplemental or sole-source nutrition.</li> <li>• Concentrated calories and high in protein to help tube-fed patients gain and maintain healthy weight.</li> <li>• Meets or exceeds 100% RDIs.</li> <li>• Includes scFOS, prebiotics that stimulate the growth of beneficial bacteria in the colon.</li> <li>• Suitable for lactose intolerance.</li> </ul>
Boost Plus (Nestlé)	<ul style="list-style-type: none"> <li>• Nutritional applications: inadequate oral intake, increased protein and energy needs, malnutrition.</li> <li>• Contains 26 vitamins and minerals per serving.</li> <li>• Suitable for lactose intolerance.</li> </ul>

5. Calculate the following information to meet JQ's current nutritional needs, which you determined in the comparative standards section above. TF must closely meet JQ's estimated energy and protein needs for credit.

**List energy, pro, fluid needs from above: 2230-2675 kcals and ml/day; 82 g protein**

	Formula #1	Formula #2
<b>Formula Name</b>	Jevity 1.2 Cal	Boost Plus
<b>Goal rate ml/hr</b>	83 ml/hr	99 ml/hr
<b>Total ml/day</b>	2000 ml/day	2370 ml/day
<b>Total Kcals</b>	2400 kcal	2400 kcal
<b>Non-Pro Kcal</b>	1956 kcal	2000 kcal
<b>Pro g and Kcals</b>	111 g, 444 kcal	100 g, 400 kcal

<b>CHO g and Kcals</b>	315 g, 1260 kcal	410 g, 1640 kcal
<b>Fat g and Kcals</b>	77 g, 696 kcal	40 g, 360 kcal
<b>Osmolality</b>	450 mOsm/kg H <sub>2</sub> O	625 mOsm/kg H <sub>2</sub> O
<b>Total Fluid</b>	2000 ml	2370 ml
<b>Free fluid (ml)</b>	1615 ml	2010 ml
<b>Additional fluid need (ml)</b>	230-675 ml (flush)	220-665 ml (flush)
<b>Comment on adequacy of your formula recommendation(s) in meeting estimated nutrient needs:</b> Both formulas exceed protein to meet 1.2 repletion needs, and provide 2400 kcal to help maintain/gain weight.		

6. Where the tube should be placed? Why?

Long-term enteral access is considered when enteral feedings are estimated to be required for more than 4 to 6 weeks. Long-term access for enteral feeding is typically obtained through creation of percutaneous gastric or intestinal access.

Home > Resources > Nutrition Support > Enteral Nutrition > Enteral Route

For patients undergoing an esophagectomy, it is standard procedure to place a jejunostomy feeding tube at the time of surgery.

Home > Nutrition Care > Gastrointestinal Disease > Upper GI Tract > Esophageal Surgery > Nutrition Support

JQ should be placed on a percutaneous jejunostomy (PEJ) feeding tube.

7. What tube lumen is appropriate?

Large-bore tubes are often used for medication delivery and suctioning in addition to enteral feeding delivery. These tubes are typically made from stiffer plastics that make them easier to place and manage.

Home > Resources > Nutrition Support > Enteral Nutrition > Enteral Route

Jevity 1.0 pump feeding is recommended; use an 8 Fr or larger tube. For gravity feeding use a 10 Fr or larger tube. (Abbott)

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

Medications are often delivered via the patient's feeding tube; delayed or extended release medication should not be opened or crushed, as this changes the drug's efficacy. But the general recommendation is to not use the tube for medication if at all possible, and if so, to use the liquid form. The RD should consult with the pharmacist especially when the feeding tube is the only access and medications may need to be co-administered. Flush with at least 5 mL water between medications and flush with 10 to 30 mL water before and after medication administration via the feeding tube; this amount can be adjusted if fluid volume is limited.

Home > Resources > Nutrition Support > Enteral Nutrition > Nutrition Prescription

9. How can you increase the fiber in a tube feeding? Evaluate the practice of adding Metamucil to a feeding tube.

The active ingredient in Metamucil is psyllium husk, a natural plant fiber that is a great source of soluble and insoluble fiber. However, this product should not be used in a feeding tube because Metamucil would thicken and clog the tubing. Typically to increase fiber in a tube feeding, choose a high-fiber formula.

10. 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

Problem	Possible Causes	Suggested Corrective Measures
<b>Nausea Vomiting</b> Home > Nutrition Care > Gastrointestinal Disease > Upper GI Tract > Nausea and Vomiting	Advanced cancer	
	Constipation	
	Electrolyte imbalance	
	Infection	
	Rapid weight loss in short period of time	*Nutrition intervention is dependent on severity of symptoms and factors contributing to n/v. Treat underlying causes with medication or treatment of underlying problem. If vomiting continues, TPN may be appropriate until GI tolerance is determined. Use antimetic agents.
<b>Diarrhea</b> Home > Resources > Nutrition Support > Enteral Nutrition > Gastrointestinal Complications	Medications (esp antibiotics, stool softeners, or sorbitol containing)	If medications suspected, the dosing schedule should be reviewed. Consider non-sorbitol-containing or antidiarrheal medication.
	Infections/bacterial overgrowth	If C. diff positive, antibiotics should be initiated to treat. EN regimen should not be changed.
	Enteral nutrition regimen	If enteral nutrition is suspected: alter infused volume, change from bolus to continuous infusion, try formula with guar gum fiber (insulin and fructo-oligosaccharides have been reported to increase stool frequency), try formula with lower osmolarity.
<b>Constipation</b> Home > Conditions > Constipation in older adults	Decreased fluid intake	In general, increase water intake so that urine is colorless and odorless.
	Inadequate fiber	Increase fiber to 25 g per day.
	Polypharmacy/medications	Promote osmotic laxatives.
	Electrolyte imbalance	Correct electrolyte imbalance.

**Determine Appropriate Nutrition Interventions**

1. Complete the following table
  - a. Fill in the nutrition prescription
  - b. Fill in at least two interventions. Make sure the interventions are different from each other. Formula solution (ND 2.1.1.) and Insert enteral feeding tube (ND 2.1.2) are the same ultimate intervention – starting a TF.
    - i. The intervention should be at least a second level term. Example:
      1. First level “Food and/or nutrient delivery” (ND)
        - a. Second level “ Meal and Snacks )(ND 1)
          - i. Third level Specific foods/beverages or groups (ND 1.3)
  - c. 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.
  - d. 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.

<b>Nutrition Prescription:</b>	Recommended Jevity 1.2 at 83 ml/hr to meet 2400 kcal, 83 g protein related to diagnoses dysphagia 2° to esophageal squamous cell CA, anemia, malnutrition.
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	<b>Intervention</b>	<b>Goal(s)/Expected Outcome</b>
<b>Intervention # 1</b>	Enteral nutrition composition ND-2.1.3	EN goal rate (Jevity 1.2 @ 83 ml/hr) obtained within 48 hours.
<b>Intervention # 2</b>	RC-1.3	Collaboration with Speech Pathologist regarding swallowing.

**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.

Gastric residual volumes, abdominal distention and discomfort, altered GI function e.g. diarrhea, stool output and consistency.
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2. What tools can the dietitian use to monitor the **nutritional adequacy** of the enteral feeding? Include recommended lab tests.

Weight trends, fluid intake and output, signs and symptoms of edema or dehydration, serum electrolytes, blood urea nitrogen, creatinine, as well as serum glucose, calcium, magnesium, and phosphorus. (Krause 314)
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3. Is JQ at risk for refeeding syndrome? Explain.

Yes. Refeeding syndrome is the reintroduction of carbohydrate into the diet in patients who have adapted to starvation by switching to fat-based metabolism. Most cases of refeeding syndrome are mild even when enteral feeding is rapidly initiated and advanced. Mild cases may result in decreases in serum electrolytes that respond quickly to standard repletion regimens. However, it does not interfere with initiation of enteral nutrition as long as electrolyte abnormalities are corrected.

Home > Nutrition Care > Critical Illness > Refeeding Syndrome

4. What indicators of refeeding syndrome will you watch for?

The sudden availability of CHO causes insulin secretion and increased requirement of thiamine and mineral cofactors. The result is hypophosphatemia, hypokalemia, and hypomagnesemia due to rapid uptake from the bloodstream into the cells; sodium and water retention leading to heart failure and edema; and thiamine deficiency leading to acidosis, hyperventilation, and neurological dysfunction.

Home > Nutrition Care > Critical Illness > Refeeding Syndrome

5. How can refeeding syndrome be avoided?

Early initiation of feeding is still possible, but starting rates may need to be lower and advancement slower. Also, it's important to monitor electrolyte replacement, greater attention to fluid and sodium balance.

Home > Nutrition Care > Critical Illness > Refeeding Syndrome

*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. How will you know when to d/c the TF?

It is effective to move from continuous feeding to a 12- and then an 8-hour formula administration cycle during the night; this reestablished hunger and satiety cues for oral intake during daytime. A transition from liquids to easy-to-digest foods may be necessary during a period of days. (Krause 321) After the patient is able to tolerate mechanical soft diet, advance to regular diet. If the patient is eating 50% po for 2-3 consecutive days, begin to taper TF. When the patient is eating ~75% po consistently, dc the TF.

7. During the transition period, what information would you monitor and why?

Information Monitored	Why
PO intake	% of oral diet consumed to determine how much to decrease TF
Weight trends	To determine if patient is able to maintain weight via oral feeds
Swallow studies	To determine if patient is able to advance to m/s, regular diet

8. List at least one potential nutrition related problem JQ might encounter during this transition phase and provide a realistic solution.

Problem: a common error is to stop the nutrition support as soon as the patient is cleared to swallow food by the speech language pathologist, only to find that the patient has no appetite or interest in eating food.

Home > Nutrition Care > Critical Illness > Oral Intake

Solution: continue nutrition support transition and administer an appetite stimulant.

9. Complete the following table for the two interventions and goals you indicated above. Define the following
- The **indicators** you will use to measure change. The indicators should measure progress towards goal. Example: If your goal is weight gain, possible indicators would be weight, BMI, skin-folds, calorie count.
  - The **criteria for evaluation** (be specific.) What criteria will you use to assess if the indicators show you are meeting goals? In the above example criteria would be weight increase, BMI between 18.5 and 24.9 Kg/m<sup>2</sup>, skin-folds within normal range, calorie intake XXXX/day.
  - Note: the IDNT manual has listed indicators and criteria in the Assessment, Monitoring, and Evaluation, and Diagnosis 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
Enteral nutrition composition ND-2.1.1	EN infusion provides 90% to 110% of estimated energy and protein needs. EN regimen maintains mineral status within normal limits.	Weight trends Serum protein status	1 week > 1-2% weight change, 1 month > 5% weight change, 3 months > 7.5% weight change Pab (19-43 mg/dl)
Enteral nutrition rate ND-2.1.3	EN goal rate (Jevity 1.2 @ 83 ml/hr) obtained within 48 hours.	Gastric residual volumes, abdominal distention and discomfort, stool output and consistency.	Fecal fat > 7g/24 hours Gastric residuals > 200 ml

## 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.)

To follow up with initial diagnoses of malnutrition and anemia:

- Weight change AD-1.1.4
- Prealbumin BD-1.11.2
- Nutritional anemia profile, Hgb BD-1.10.1 Hct BD-1.10.2

To follow up with transition from nutrition support to oral feedings.

- Amount of food FH-1.2.2.1
- Nutrition-related activities of daily living score FH-7.2.10

## References for Case Study #1

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## 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		



## **Section 1. Nutrition Assessment**

### **Food/Nutrition Related History (AKA Dietary)**

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

Food history is often not taken directly from the critically ill patient because of injuries or treatments that alter mental function or ability to communicate. Food history may be of secondary importance in critically ill patients in terms of whether to start nutrition support, because the decision is not based to the same degree on malnutrition—rather, it depends on the presence and severity of inflammatory response, length of time anticipated to resume adequate oral diet, and risk for complications.

Home > Nutrition Care > Critical Illness > Food/Nutrition-Related History

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

If a food history is conducted, it often is done with a family member rather than with the patient. In such cases, the history should focus simply on whether there has been a recent change in the total amount of food consumed and habitual information on meal frequency, avoidance of food groups, and use of supplements. You can also make a judgment based on appearance, general physical condition, and level of activity PTA.

Home > Nutrition Care > Critical Illness > Food/Nutrition-Related History

### **Anthropometric Measurements**

1. List JQ's

<b>Ht (in &amp; cm)</b>	73" 185 cm
<b>Wt (lb and Kg)</b>	210 lb 96 kg
<b>IBW (lb and Kg)</b>	106 for first 5', +6 for every " 184 lb 84 kg
<b>%IBW</b>	114 %IBW
<b>BMI</b>	27.7

2. How accurate are JJ's current anthropometrics?

JJ's weight and height were approximated.

Standard anthropometrics of height and weight are used in critically ill patients to determine energy and protein goals. As part of routine monitoring, loss of body weight is an important finding as it indicates loss of tissue mass. A body weight that does not change from preadmission weight can be misleading because water retention can mask the loss of body protein that tends to occur in critically ill patients despite nutrition support—due to inflammation-related skeletal muscle catabolism.

Home > Nutrition Care > Critical Illness > Anthropometric Measurements

**Biochemical Data, Medical Tests and Procedures**

1. List abnormal lab values explain possible causes for each. (Pagana)

Lab and Value	Possible Causes
Alb 2.1 g/dl (3.6-5.0 g/dl)	<ul style="list-style-type: none"> <li>• Diseases associated with inflammation, necrosis, infarction, or burns cause an increase in acute-phase reactant proteins.</li> </ul>
Pab 7.0 mg/dl (19-43 mg/dl)	<ul style="list-style-type: none"> <li>• Inflammation: prealbumin is a negative acute-phase reactant protein.</li> <li>• Malnutrition</li> </ul>
Hct 31%, Hgb 10 g/dl (40-54%) (13.5-17.5 g/dl)	<ul style="list-style-type: none"> <li>• Hemorrhage: with active bleeding, the number of RBCs decreases and the Hct, Hgb decreases.</li> </ul>
CRP 21.4 mg/dl (high > 3.0 mg/dl)	<ul style="list-style-type: none"> <li>• Tissue infarction or damage</li> <li>• Acute inflammatory reaction</li> </ul>
Glucose 200 mg/dl (70-110 mg/dl)	<ul style="list-style-type: none"> <li>• Acute stress response: severe stress stimulates catecholamine release. This in turn stimulates glucagon secretion, which causes hyperglycemia.</li> </ul> <p>*serial values are more useful than single values as trends can be detected.</p>
Na 133 mmol/L (135-155 mmol/L)	<ul style="list-style-type: none"> <li>• Peripheral edema: these conditions are associated with increased free water retention. Sodium is diluted.</li> </ul>

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

Lab values alone are not accurate tools to determine JJ’s nutritional status. Laboratory data in combination with clinical findings and patient history, are used to assess fluid status, renal function, adequacy of glucose control and the need for insulin, need for supplementation or restriction of electrolytes, and adjustment of bicarbonate precursors in TPN. There is no need to check serum proteins for the purpose of nutrition assessment, although they have been used as markers of the acute phase protein response/development of sepsis. For monitoring the adequacy of protein intake, the most useful test may be nitrogen balance.

Home > Nutrition Care > Critical Illness > Laboratory

**Nutrition-Focused Physical Findings (AKA Clinical)**

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

Observation of depleted muscle mass can be accompanied by an early measurement of serum creatinine, which has shown to have prognostic value. Early calculation of mid-arm circumference (within 48 hours of admission).

Home > Nutrition Care > Critical Illness > Nutrition-Focused Physical Findings

Vital signs and indirect calorimetry can be used in estimating metabolic rate and determining whether systemic inflammatory response is present.

Home > Nutrition Care > Critical Illness > Client History

2. What clinical signs are typical in trauma patients?

Extended bed rest and the catabolic effect of inflammatory response on skeletal muscle will generally cause tissue wasting. Fluid accumulation will tend to mask the extent of the tissue wasting and will tend to keep the body weight at its admission level or even higher.

Home > Nutrition Care > Critical Illness > Nutrition-Focused Physical Findings

Laboratory data should be monitored because a number of metabolic problems can be detected through blood chemistry. These changes include hyperglycemia, electrolyte status, renal function, hydration status, acid base status, and inflammatory state. Monitoring of ventilator parameters and oxygenation may help in deciding whether inflammation-modulating tube-feeding formulas should be used.

Home > Nutrition Care > Critical Illness > Suggested Monitoring Parameters and Recommendations

**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
<b>Energy (Kcals)</b>	2500 kcals	Mifflin-St Jeor	1.25
<b>Protein (g/d)</b>	144 g	1.5 g/kg, adjust according to nitrogen balance	
<b>Fluid (ml/d)</b>	2500 ml	PN should be formulated with nutrient density 1.0 kcal/ml	
<b>Weight Used (lb &amp; kg)</b>	210 lb 96 kg		

*Use the box below to show your calculations*

Energy  
**Men:**  $RMR = (9.99 \times \text{weight}) + (6.25 \times \text{height}) - (4.92 \times \text{age}) + 5$   
 $RMR = (9.99 \times 96) + (6.25 \times 185) - (4.92 \times 23) + 5$   
 $RMR = 959 + 1156 - 113 + 5 = 2007 \times 1.25 = 2508.75 \sim 2500 \text{ kcal}$

Protein  
 $96 \text{ kg} \times (1.5 \text{ g/kg}) = 144 \text{ g}$

2. Justify the following:
  - Equation 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.

Equation used for energy needs and any activity/stress factors used.

- The ADA evidence-based guideline for critical illness states that IC is the standard for determination of RMR in critically ill patients since RMR based on measurement is more accurate than estimation using predictive equations. However, we need to use a predictive equation and this case study did not provide an expired minute ventilation or temperature. Mifflin-St Jeor X 1.25

$$\text{Men: RMR} = (9.99 \times \text{weight}) + (6.25 \times \text{height}) - (4.92 \times \text{age}) + 5$$

Home > Nutrition Care > Critical Illness > Comparative Standards

Home > Resources > Equations

Protein need calculation

- There is general agreement that protein needs are elevated, but there is disagreement as to whether the increase is on the order of 1.5 or 2.0 g protein/kg body weight. Achievement of nitrogen balance was associated with decreased mortality and increased protein intake was associated with improved nitrogen balance.

Home > Nutrition Care > Critical Illness > Comparative Standards

Weight used

- Weight upon admission because fluid accumulation will tend to mask the extent of the tissue wasting and will tend to keep the body weight at its admission level or even higher. Also, actual body weight is a better predictor of energy expenditure than ideal body weight in obese individuals. (Krause 891)

Home > Nutrition Care > Critical Illness > Nutrition-Focused Physical Findings

## 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 77-81 of IDNT 4<sup>th</sup> edition for a quick look. In-depth pages 83-221.
- Write a brief assessment statement for each term chosen. You can combine terms into one state if it seems logical. For example anthropometrics would logically go together in one statement. Others may as well.
  - Example: Ht: XX (in/cm); wt: XX (lbs/kg); BMI XX, usual wt XX. Weight loss XX% mild loss.
- *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	Energy intake (FH-1.1.1)	*Critically ill patient in an overall catabolic state with increased energy/protein needs.
	Protein intake (FH-1.5.2)	
Anthropometric Measurements	Height (AD-1.1.1)	*Standard anthropometrics are used to determine energy and protein goals.
	Weight (AD-1.1.2)	
Biochemical Data, Medical Tests, and Procedures	Acid-base profile (BD-1.1)	Homeostasis
	Inflammatory profile (BD-1.6)	High CRP
Nutrition-Focused Physical Findings	Overall appearance (PD-1.1.1)	JJ is unconscious after being trampled by a bull in a local rodeo contest.
	Digestive System (PD-1.1.5)	Exploratory laparoscopy identified massive internal injuries to the GI system.
Client History	Unknown	

## Section 2. Nutrition Diagnosis

### Determine Nutrition Diagnosis/Problem

- Use the IDNT book to list problems (nutrition diagnosis) JQ has. Add rows if necessary.

Diagnosis term number	Diagnosis Term	Domain (Intake, Clinical, Behavioral/Environmental)
NI-1.1	Increased energy expenditure	Intake
NI-2.1	Inadequate oral intake	Intake
NC-1.4	Altered GI function	Clinical
NC-2.2	Altered nutrition-related laboratory values	Clinical
NB-2.3	Inability to manage self-care	Behavioral/Environmental

### 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
Increased energy expenditure	<i>Related to</i>	Multiple trauma	<i>As evidenced by</i>	Low albumin, prealbumin, and high CRP.
Altered GI function	<i>Related to</i>	Multiple trauma	<i>As evidenced</i>	Massive internal injuries to the GI system identified

			by	in exploratory laparoscopy.
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**Section 3. Nutrition Intervention**

**Analyze Potential Nutrition Interventions**

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

Yes - JJ is in an overall catabolic state during inflammatory reaction to multiple traumas.

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

- Fluid imbalance: PN should be formulated with concentrated base solutions that will yield a nutrient density similar to a 1.0 kcal/mL EN formula.
- Hyperglycemia: critically ill patients can become hyperglycemic for several reasons, including glucose intake from nutrition support and other sources; gluconeogenesis; insulin resistance; impaired glucose utilization related to severe inflammation. Tight glycemic control might not decrease mortality risk and in some cases increase risk.

3. Is enteral feeding appropriate? Explain.

No - exploratory laparoscopy identified massive internal injuries to the GI system.

*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. If you cannot determine a TPN that will adequately meet both energy and pro needs, discuss that in the last part of #5 below.

**List energy, pro, fluid needs from above:** 2500 kcal, 144 g protein, 2500 ml fluid

<b>Total volume of standard solution (ml/24 hr)</b>	3204 ml
<b>Rate of standard solution (ml/hr)</b>	134 ml/hr
<b>Type of lipids used and frequency</b>	10% qd
<b>Carbohydrate grams and Kcals</b>	404 g 1374 kcals
<b>Protein grams and Kcals</b>	144 g 576 kcals
<b>Fat grams and Kcals</b>	50 g 550 kcals
<b>Total Kcals</b>	2500 kcals
<b>Non-pro Kcals</b>	1924 kcals
<b>Non-pro Kcals (NPC):N ratio (Goal ~150:1)</b>	84:1

<b>% NPC Calories from lipid (Goal &lt;30%)</b>	28.6%
<b>% NPC from CHO (goal 70-80%)</b>	71.4%
<b>Fat Load (goal ≤ 1 gm/kg)</b>	.52
<b>CHO Load (mg/kg/min)</b>	3 mg/kg/min

Show calculations below.

<p><b>Protein</b>  <math>144 \text{ g} \times (0.085 \text{ g/ml}) = 1694 \text{ ml}</math>  <math>144 \text{ g} \times (4 \text{ kcal/g}) = 576 \text{ kcals}</math></p> <p><b>Lipids</b>  <math>10\% \text{ qd} = 550 \text{ kcals}, 50 \text{ g}, 500 \text{ ml}</math>  Fat Load: <math>50 \text{ g}/96 \text{ kg} = 0.52</math>  % NPC from lipid: <math>550 \text{ kcals}/1924 \text{ NPC} = 28.6\%</math></p> <p><b>CHO</b>  <math>550 \text{ kcals lipids} + 576 \text{ kcals protein} = 1126 \text{ kcals} \rightarrow 2500 \text{ kcals} - 1126 \text{ kcals} = 1374 \text{ kcals CHO}</math>  <math>1374 \text{ kcals}/(3.4 \text{ kcals/g}) = 404 \text{ g CHO}/(0.5 \text{ g/ml}) = 1010 \text{ ml}</math>  CHO Load: <math>404000 \text{ mg}/96 \text{ kg}/1440 \text{ min} = 3 \text{ mg/kg/min}</math>  % NPC from CHO: <math>1374 \text{ kcals}/1924 \text{ NPC} = 71.4\%</math></p> <p>NPC = <math>550 \text{ kcals lipids} + 1374 \text{ kcals CHO} = 1924 \text{ kcals}</math>  Nitrogen: <math>144 \text{ g protein}/6.25 = 23</math></p>
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5. Assess the above TPN recommendation for JJ's needs. Current TPN provides:

<b>% Protein needs</b>	100%
<b>% NPC needs</b>	100%
<b>% total Kcal needs</b>	100%
<b>% free fluid needs</b>	128%
<b>Appropriate NPC:N ratio? Explain.</b>	Yes, ideally the goal is ~150:1 but only the standard TPN formula available
<b>Appropriate fat load? Explain.</b>	Yes $0.52 < 1.0$ (if receive 20% qd, fat load would be 1.04 and less fluid, but % NPC from lipid would be 52%)
<b>Appropriate CHO load? Explain.</b>	Yes 3 mg/kg/min, when estimating carbohydrate requirements CHO load should be between 3-4 mg/kg/min or ~50-60% of total energy requirements.
<b>Is there something you can do to more closely meet pt needs when only standard TPN is available?</b>	The administration of other medical therapies requiring fluid administration, such as intravenous medication and blood products, necessitates careful monitoring. (Krause 317)  Administer a diuretic if patient is hemodynamically stable.

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

Advantages	Disadvantages
Easy to calculate, less expensive, less waste	Not individualized

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

Advantages	Disadvantages
Customized, flexibility	Change everyday, time

8. List the general complications of TPN.

PN has associated risks related to metabolic and infectious complications, including catheter-related blood stream infections, hepatobiliary disease, glucose abnormalities, and acid-base disorders.

Home > Resources > Nutrition Support > Indications and Contraindications

9. List the indications for use of TPN. (e.g. when is TPN appropriate)

TPN is appropriate when EN and oral intake are not an option. For example:

- Severe short bowel syndrome
- Paralytic ileus
- Mesenteric ischemia
- Small bowel obstruction
- Unable to meet estimated energy needs after 7 to 10 days of EN

### Determine Appropriate Nutrition Interventions

10. Complete the following table

- a. Fill in the nutrition prescription
- b. Fill in at least two interventions. Make sure the interventions are different from each other. Formula solution (ND 2.1.1.) and Insert enteral feeding tube (ND 2.1.2) are the same ultimate intervention – starting a TF.
  - i. The intervention should be at least a second level term. Example:
    1. First level “Food and/or nutrient delivery” (ND)
      - a. Second level “ Meal and Snacks )(ND 1)
        - i. Third level Specific foods/beverages or groups (ND 1.3)
- c. 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.
- d. 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 visits.



<b>Nutrition Prescription:</b>	Infusion of standard TPN solution @ 134 ml/hr x 24 hrs to meet the patient's energy, protein, fluid, and/or micronutrient goals (IDNT).
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	<b>Intervention</b>	<b>Goal(s)/Expected Outcome</b>
<b>Intervention # 1</b>	TPN Composition (ND-2.2.1)	TPN will be advanced to goal rate and will provide 80% to 100% of the nutrition prescription for energy, protein, and micronutrients within 72 hours of initiation.
<b>Intervention # 2</b>	Site care (ND-2.2.6)	Keep TPN site clean to avoid associated risks related to metabolic and infectious complications.

#### **Section 4. Nutrition Monitoring and Evaluation**

1. What should you use to monitor TPN effectiveness and recommendation?

- Weight trends
- Monitor for signs of infection such as chills, fever, tachycardia, sudden hyperglycemia, or elevated white blood cell count.
- Monitor metabolic tolerance. Electrolytes, acid-base balance, glucose tolerance, renal function, and cardiopulmonary and hemodynamic stability (adequate blood pressure) can be affected by PN. (Krause 319)

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

Excessive administration can lead to hyperglycemia, hepatic abnormalities, or increased ventilatory drive. (Krause 316)

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

Laboratory values, specifically blood glucose and CHO load.

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

Linoleic acid alters prostaglandin metabolism, thereby producing both proinflammatory and immunosuppressive effects, particularly at high doses and at faster infusion rates. (Krause 316)

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

Serum lipid profile.

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

$N \text{ loss} = UUN + 4 \text{ g} = 36 \text{ g N} / (.16) = 225 \text{ g protein}$

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

$$\begin{aligned} & (\text{Protein intake}/6.25) - (\text{UUN} + 4 \text{ g}) = \\ & (144 \text{ g protein}/6.25) - (32 \text{ g} + 4 \text{ g}) = -13 \text{ g N} \end{aligned}$$

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

Increase protein intake by adding Procalamine or protein supplement.

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

Yes – indirect calorimetry is the gold standard for determining metabolic rate in any patient, including the critically ill patient. Oxygen consumption is an essential component in the determination of energy expenditure. Trauma patients have substantial increases in energy expenditure associated with the magnitude of injury. Oxygen consumption is an essential component in the determination of energy expenditure. (Krause 891)

Home > Nutrition Care > Critical Illness > Indirect calorimetry

10. What can indirect calorimetry tell you?

Indirect calorimetry measures the REE (oxygen consumption and carbon dioxide production), as well as calculates the respiratory quotient (RQ). The RQ indicates the fuel mixture being metabolized i.e. the RQ for CHO is 1. (Krause 23)

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

The transition from parenteral to oral feeding is ideally accomplished by monitoring oral intake while decreasing the PN to maintain a stable nutrient intake. Approximately 75% of nutrient needs should be met consistently by oral intake before the PN is discontinued. It takes several days for the GIT to regain function; during that time, the diet should be composed of easily digested foods. (Krause 321)

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

Approximately 75% of nutrient needs should be met consistently by oral intake. Monitor for altered GI function i.e. vomiting, diarrhea.

13. 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. Example: If your goal is weight gain, possible indicators would be weight, BMI, skin-folds, calorie count.
- b. The **criteria for evaluation** (be specific.) What criteria will you use to assess if the indicators show you are meeting goals? In the above example criteria would be weight increase, BMI between 18.5 and 24.9 Kg/m<sup>2</sup>, skin-folds within normal range, calories at XXXX kcal/day.
- c. Note: the IDNT manual has listed indicators and criteria in the Assessment, Monitoring,

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

<b>Intervention (Copy from above)</b>	<b>Goal/Expected Outcome (Copy form above)</b>	<b>Indicator(s)</b>	<b>Criteria for evaluation</b>
TPN Composition (ND-2.2.1)	TPN will be advanced to goal rate and will provide 80% to 100% of the nutrition prescription for energy, protein, and micronutrients within 72 hours of initiation.	Excessive PN infusion (NI-2.7) <ul style="list-style-type: none"> <li>• Triglycerides</li> <li>• Glucose, serum</li> <li>• Edema with excess fluid administration</li> </ul> Acid Base Balance (BD-1.1) <ul style="list-style-type: none"> <li>• pH, serum</li> </ul>	Increased fecal fat > 7g/24 hours  Gluc > 200 mg/dl)  Decreased plasma osmolality (270-280 mOsm/kg)  pH 7.35-7.45
Site care (ND-2.2.6)	Keep TPN site clean to avoid associated risks related to metabolic and infectious complications.	Infection near site of catheter	Tenderness, warmth, irritation, drainage, redness, swelling, or pain

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

Mahan LK, Escott-Stump S, et al. Krause’s Food Nutrition, & Diet Therapy. 13th ed. St. Louis, MO; Saunders Elsevier; 2012.

Nutrition Care Manual. Available at:<https://www.nutritioncaremanual.org/welcome>. Accessed January 29, 2014.

Pagana KD, Pagana TJ. Mosby’s Manual of Diagnostic and Laboratory Tests. 4th ed. St. Louis, MO; Mosby Elsevier; 2010:255-257.

Williams P. Lecture notes. Advanced Dietetics Practice, Brigham Young University, Jan. 22, 2014.

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**Clinical Worksheet #2**

**CLINICAL WORKSHEET #2**  
**Nutrition Support In:**  
**Extended Care Facilities, HIV Disease, and Thermal Injury**

**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.
3. To advance assessment and diagnosis skills.

**General Guidelines**

1. Complete two of the 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)
  - b. Name file LastName\_FirstName\_Worksheet\_2 For example if my name was John Doe the file would be names Doe\_John\_Worksheet\_2
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
- ASPEN nutrition support guidelines
- 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.
- Choose **TWO (2)** of the three case studies to complet

## Case #2: Thermal Injury and Enteral Feeding

A nineteen year old boy was admitted with 3rd degree (full thickness) burns over 30% of his body, including his hands and face, when a gas fireplace exploded in front of him.

He is 5'9" tall and usual weight is 163 lbs. No admit weight was taken. All medical information (labs, meds etc.) are unavailable as he was taken immediately to surgery and he has no known prior medical history. Post-surgery he was placed on mechanical ventilation.

The physician has ordered a nutrition consult with “nutrition support per dietitian” to start as soon as the patient is out of surgery.

### **Section 1: Nutrition Assessment**

*Complete a Nutrition Assessment using the information available. Use the IDNT book as a guide for indicators to assess and document. While the first worksheet prompted you on areas to assess, you are to now use your judgment in making a Nutrition Assessment. You will be scored on the appropriateness of assessment areas and your assessment of those areas.*

#### **Get the assessment started**

To help you get the assessment started completed the following few question.

1. Calculate approximately how much fluid this patient may need for both initial resuscitation and ongoing maintenance (basal + evaporative). Show your work.

		Equation used, Source, and/or justification
Initial Resuscitation	11730 ml/24 hours	Parkland formula <sup>1</sup> Home > Nutrition Care > Burns > Fluid Needs or Limits  Large volume (often more than 10 L) fluid resuscitation restores intravascular volume and oxygen delivery to tissue. Home > Nutrition Care > Burns > Background Information
Basal	119 ml/hr	$1500 \text{ ml} \times m^2 / 24 \text{ hr} = \text{ml/hr}$
Evaporative	105 ml/hr	$(25 + \% \text{ burn}) \times m^2 = \text{ml/hr}$
Total Maintenance	224 ml/hr	Basal + Evaporative

*Note:  $m^2 = TBSA = \sqrt{((wt \text{ (Kg)} \times ht \text{ (cm)})/3600)}$  The square root is for the entire equation; wt in kg, ht in cm*

Square root  $((74 \text{ kg} \times 175 \text{ cm})/3600) = \text{square root } 3.6 = 1.9$

Show your work for fluid calculations in the box below.<sup>2</sup> (Williams)

<p>Initial Resuscitation: resuscitation (4 ml x kg x % burn) + basal (1500 ml x m<sup>2</sup>) = ml/24 hours  (4 ml x 74 kg x 30) + (1500 ml x 1.9) = 11730 ml/24 hours</p> <p>Basal: 1500 ml x m<sup>2</sup> / 24 hr = ml/hr  1500 ml x 1.9 = 2850 ml/24 hr = 119 ml/hr</p> <p>Evaporative: (25 ml + % burn) x m<sup>2</sup> = ml/hr  (25 + 30) x 1.9 = 105 ml/hr</p>
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2. Describe how much fluid would be given in the first 24 hours (per 8 hr increments) with the initial resuscitation.

	Total ml	ml/hr
1 <sup>st</sup> 8 hours ½ of total	5865 ml/8 hr	733 ml/hr
2 <sup>nd</sup> 8 hours ¼ of total	2933 ml/8 hr	367 ml/hr
3 <sup>rd</sup> 8 hours ¼ of total	2933 ml/8 hr	367 ml/hr

3. Calculate comparative standards. Show equation calculations and justify equations, weights, and factors used to calculate comparative standards. e.g. did you use HBE, Kcals/Kg, or another equation and why. What weight did you use IBW, Actual Wt, etc. Cite sources as appropriate. (Add rows or columns as needed).

Nutrient	Needs	Equation used, Source and/or justification
Recommended body weight/body mass CS-5.1	BMI = kg/m <sup>2</sup> = 24.1 IBW = Men: 106 lbs for first 5 ft of ht and 6 lbs per inch over 5 feet. 106 + (6x9) = 160 IBW	Obtain usual weight for comparison. Calculate recommended body weight and body mass index. Home > Nutrition Care > Burns > Anthropometric measurements
Est energy needs CS-1.1	25 to 30 kcal/kg = 1850 to 2200 kcal	The dangers associated with overfeeding have led to lower estimates of energy needs. Recommended nutrient intake for burns that cover more than 20% of TBSA: 25 to 30 kcal/kg. Use pre-admit weight taken at admission and use for baseline measurement.  Home > Nutrition Care > Burns > Nutrition Prescription

		Indirect calorimetry may be useful in the measurement of actual energy expenditure because it also measure the energy requirement for metabolic stress.
Est protein needs CS-2.2	2.0 g/kg = 148 g protein	<p>Recommended nutrient intake for burns that cover more than 20% of TBSA: 1.5 to 2 g/kg. Home &gt; Nutrition Care &gt; Burns &gt; Nutrition Prescription</p> <p>Nitrogen balance measurements are used to evaluate adequacy of protein intake. Nitrogen losses though burned tissue are difficult to quantify but may be estimated based on the size of burn using the following formula: &gt;31% open wound = 0.12 g nitrogen/gk/day.</p> <p>Home &gt; Nutrition Care &gt; Burns &gt; Biochemical Data</p>

4. Type your Assessment in the box below. Use as much space as needed to complete. Consider the format – how will you make your assessment readable by others on the healthcare team? Be sure to include comparative standards and an overall nutrition risk statement. Comparative standards should indicate what weight was used. You can make tables if needed to display information for comparative standards, etc. Remember this is just assessment, not diagnosis or intervention.

<p><b>Anthropometrics</b> Ht: 5'9" tall, usual weight 163 lbs. No admit weight was taken. BMI 24.1, IBW 160 lbs.</p> <p><b>Biochemical</b> All medical information is unavailable as he was taken immediately to surgery and he has no known prior medical history.</p> <p><b>Clinical</b> 19-year-old male admitted with 3rd degree (full thickness) burns over 30% of his body, including his hands and face, when a gas fireplace exploded in front of him. Post-surgery he was placed on mechanical ventilation. Total initial resuscitation needs are 11730 ml/24 hours and total maintenance 224 ml/hour.</p> <p><b>Dietary</b> Estimated energy needs 1850 to 2200 kcal/day and estimated protein needs 148 g/d.</p>
---

The patient is at high-risk related to 30% body of his body, including hands and face, and increased energy and protein requirements for oxygen consumption, gluconeogenesis, and proteolysis.  
 Home > Nutrition Care > Burns > Background Information

**Section 2. Nutrition Diagnosis**

**Determine Nutrition Diagnosis/Problem**

1. List the problems DH has in the any of the diagnosis domains. Do NOT use fluid intake (3) as a diagnosis.

Diagnosis term number	Diagnosis Term	Domain (Intake, Clinical, Behavioral-Environmental)
(NI-2.1)	Inadequate oral intake	Intake
(NI-5.1)	Increased nutrient needs	Intake
(NC-2.1)	Impaired nutrient utilization	Clinical
(NB-2.6)	Self-feeding difficulty	Behavioral-Environmental

**Write a Nutrition Diagnosis PES Statement**

Write **Two** Diagnosis Statements using PES format for two of DH's problems. Be sure to use the appropriate format as indicated in the IDNT book.

Inadequate oral intake (NI-2.1) related to impaired self-feeding as evidenced by burns over 30% of body, including hands and face.

Increased nutrient needs (NI-5.1) related to catecholamine-mediated stress as evidenced by burns over 30% of body.

**Section 3: Nutrition Intervention:**

**Analyze Potential Nutrition Interventions**

1. What type of nutrition support is appropriate for this patient? Explain.

Individuals with larger burns or who are unable to consume sufficient energy and protein, meeting less than 75% of goal energy and protein intake for more than 3 days, should receive nocturnal feedings as a supplement to oral intake or, if oral intake is negligible, enteral nutrition to meet 100% of nutritional goals. Generally, feedings are initiated at 20 mL/hour to 40 mL/hour and increased to goal rate over 24 to 48 hours. Individuals on prolonged ventilation should receive a dysphagia evaluation before initiation of oral feedings.

Home > Nutrition Care > Burns > Nutrition Intervention

Burns to the hands or face often make oral intake difficult and may preclude self-feeding. Patients with more than 20% of TBSA or inhalation injuries requiring ventilator support should receive EN.

Home > Nutrition Care > Burns > Enteral Nutrition



Assume you decided upon an enteral feeding:

- To avoid complications, where would you want the tube to be placed? Why?

According to the Academy of Nutrition and Dietetics Evidence Analysis Library, if a critically ill adult patient is mechanically ventilated and requires EN, the RD should recommend small bowel feeding tube placement. Small bowel EN versus gastric EN reduces ventilator-associated pneumonia (VAP).

Home > Resources > Nutrition Support > Enteral Nutrition > Enteral Route

- Identify 2 possible formula brand names that would be appropriate for this patient and justify reason for appropriateness.

	Formula #1	Formula #2
Formula Name <sup>3</sup>	Promote	Oxepa
Justify reasons for choosing this formula (Abbott)	PROMOTE is a complete, balanced, very high-protein formula. Its use is for supplemental or sole-source nutrition. PROMOTE meets or exceeds 100% of the RDI for 24 essential nutrients.	OXEPA is clinically shown to modulate the inflammatory response in clinically ill, mechanically ventilated patients, especially those with SIRS or ARDS. OXEPA is sole-source nutrition.

- Choose one of the above formulas and calculate a feeding regime that would best meet this patient's needs.

List your estimated nutrient needs from above: 1850 to 2200 kcal/day and 148 g protein/d	
Formula Name	Promote
Final goal rate Total	2368 ml/24 hr
Final rate ml/hr	99 ml/hr
Kcals Total	2368 kcal
Kcals/Kg	32 kcal/kg
Protein Total g	148 g
Pro g/Kg	2 g/kg
Carb Total g	308 g
Carb Load mg/kg/min	2.9
Fat g	62 g
% Total Kcal from fat	23.4%
Free Fluid	1987 ml

- Do you think this patient needs supplements of any vitamins or minerals? Explain.

Recommended nutrient intake for burns that cover more than 20% of TBSA: daily multiple vitamin, 500 mg/d vitamin C, 10,000 IU/d vitamin A.

In addition to increased energy and protein needs, burn patients need increased levels of vitamin and minerals—particularly those related to wound healing. Enteral formulas for critically ill patients generally meet or exceed recommended vitamin needs and supplements may not be needed.

**Determine Appropriate Nutrition Interventions**

6. Complete the following table
  - a. Fill in the nutrition prescription (i.e. nutrition order, etc.)
  - 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 etiology of the nutrition problem/diagnosis.
  - c. Do NOT use IV fluid as an intervention.

<b>Nutrition Prescription:</b>	Promote @ 99 cc/hr x 24 hr. Use small bowel EN to reduce ventilator-associated pneumonia.	
	<b>Intervention</b>	<b>Goal(s)/Expected Outcome</b>
<b>Intervention # 1</b>	Composition (ND-2.1.1)	Promote contains high protein and 100% RDIs for vitamins and minerals.
<b>Intervention # 2</b>	Rate (ND-2.1.3)	Initiate at 20 mL/hour to 40 mL/hour and increase to goal rate over 24 to 48 hours.

**Section 4. Nutrition Monitoring and Evaluation**

1. Initially post burn and as time goes on, what changes would you expect to see in the patient’s weight and albumin levels?

Initially post burn the patient’s weight would be higher than normal due to loss of fluid into interstitium that results extensive edema with decreased cardiac output. The patient’s albumin levels would be decreased as a result of increased inflammatory proteins and hydration status. As time goes on, you would expect to see weight slowly return to usual weight and albumin levels return to normal after healing of burn site.

2. Do the changes above reflect the patient’s nutritional status? Why?

Diagnostic tests are affected by hydration, clinical condition, inflammation, and hypermetabolism. Alb, PAB, and transferrin are not useful in assessing the protein intake of patients with burns.

The patient should be weighed at least twice a week in conjunction with scheduled hydrotherapy or dressing changes. Weight change reflects hydration status. Fluid status, excisions, and dressings make weights a poor indicator of nutritional status. Poor wound healing or a 10% weight loss below the patient’s admission weight is cause for concern and in most cases justifies reevaluation of nutrition care plan.

3. What will be your best long-term monitors (indicators) to assess if your nutrition care is appropriate?

It is suggested to monitor electrolytes, phosphorus, magnesium, glucose, BUN/creatinine, UUN, EN tolerance, weight trends. Also, monitor healing of burn sites, protein intake, and nitrogen balance.  
Home > Nutrition Care > Burns > Suggested Monitoring Parameters and Recommendations

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

Intervention (Copy from above)	Goal/Expected Outcome (Copy form above)	Indicator(s)	Criteria for evaluation
Composition (ND-2.1.1)	Promote contains high protein and 100% RDIs for vitamins and minerals.	Vitamin/mineral abnormalities Nitrogen balance	Electrolyte imbalance, phosphorus, magnesium  Estimated losses >31% open wound = 0.12 g nitrogen/gk/day
Rate (ND-2.1.3)	Initiate at 20 mL/hour to 40 mL/hour and increase to goal rate over 24 to 48 hours.	Weight loss EN complications	10% weight loss below the patient's admission weight justifies reevaluation of nutrition care plan.  Complications of diarrhea, tolerance

### References

- Nutrition Care Manual. Available at: <https://www.nutritioncaremanual.org/welcome>. Accessed March 11, 2014.
- Williams P. Burn resuscitation equations. Advanced Dietetics Practice, Brigham Young University, Mar, 2014.
- Abbott Nutrition: For Healthcare Professionals. Available at: <http://abbottnutrition.com/brands/products/jevity-1-cal>. Accessed March 11, 2014.

**Case #3: HIV Disease and TPN**

26-year-old male with AIDS is admitted to the hospital on 2/4 with Pneumocystis Carinii Pneumonia, oral Candidiasis and chronic, excessive diarrhea.

The following TPN was ordered by his physician:  
 D50 AA8.5% (equal parts) @ 125 cc/hr with 500 cc of 20% lipids daily.

You are completing the assessment on 2/8. From an interview with the patient and reviewing the medical records, you were able to obtain the following information:

Labs	Date: 2/4 (Before TPN)	Date: 2/8 (Post TPN)
T <sub>4</sub>	50 nmol/L	-----
Albumin	2.4 g/dl	2.1 g/dl <b>L</b>
Na <sup>+</sup>	121 mEq/L	134 mEq/L
K <sup>+</sup>	3.0 mEq/L	2.4 mEq/L <b>L</b>
BUN	8 mg/dl	8 mg/dl <b>WNL</b> 7-20
Creat	1.9 mg/dl	1.4 mg/dl <b>H</b> .4-1.2
Glucose	155 mg/dl	275 mg/dl <b>H</b> 70-109
Phos	2.3 mEq/L	0.6 mEq/L
Mg	2.0 mEq/L	0.9 mEq/L <b>L</b> 1.3-2.1
Ca	4.0 mEq/L (2.0 mmol/L)	3.2 mEq/L (1.6 mmol/L)

Height: 5'11" Weight: 135 lb, usual wt 170 lb (8 months ago)

Currently unable to tolerate much po except for Jell-O, applesauce, cream of wheat cereal, and occasional Ensure and fruit smoothies.

**Section 1: Nutrition Assessment**

*Complete a Nutrition Assessment using the information available. Use the IDNT book as a guide for indicators to assess and document. While the first worksheet prompted you on areas to assess, you are to now use your judgment in making a Nutrition Assessment. You will be scored on the appropriateness of assessment areas and your assessment of those areas.*

**Get the assessment started**

To help you get the assessment started completed the following few question.

1. Calculate the TPN order.

Total Calories (Kcals)	4062 kcal
NPC Calories (Kcals)	3550 kcal
Protein (g)	128 g
Protein (g/Kg)	2.1 g/kg
CHO Load	8.5
Fat Load	1.6
% Cal Carb	62.8%
% Cal Pro	12.6%
% Cal Fat	24.6%

Show your calculations below

<p>125 cc/hr x 24 hr = 3000 cc  1500 cc D50, 1500 cc AA8.5%, 500 cc 20% lipids</p> <p>1500 ml x 0.085 g/ml = 128 g protein x 4 kcal/g = 512 kcal protein  128 g protein /61 kg = 2.1 g/kg  1500 ml x 0.5 g/ml = 750 g CHO x 3.4 kcal/g dextrose = 2550 kcal CHO  20% lipids 1000 kcals /10 kcal/g = 100 g lipid</p> <p>CHO load: 750000 mg/61 kg/1440 min = 8.5  Fat load: 100 g lipid/61 kg = 1.6 &gt; 1.0</p>
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2. The TPN was started on 2/5. You are assessing the patient on 2/8. Explain the changes in the lab values from 2/4 (before TPN) to 2/8 (after 3 days of TPN).

<p>The patient is receiving 3500 ml of standard TPN. The patient's albumin decreased from 2.4 to 2.1 mg/dl related to hydration status. Also, 62.8% of total calories come from CHO. Refeeding syndrome is the reintroduction of carbohydrate into the diet in patients who have adapted to starvation by switching to fat-based metabolism. Most cases of refeeding syndrome are mild even when enteral feeding is rapidly initiated and advanced. Mild cases may result in decreases in serum electrolytes that respond quickly to standard repletion regimens. However, it does not interfere with initiation of enteral nutrition as long as electrolyte abnormalities are corrected.</p> <p>The sudden availability of CHO causes insulin secretion and increased requirement of thiamine and mineral cofactors. The result is hypophosphatemia, hypokalemia, and hypomagnesemia due to rapid uptake from the bloodstream into the cells; sodium and water retention leading to heart failure and edema; and thiamine deficiency leading to acidosis, hyperventilation, and neurological dysfunction.<sup>1</sup></p> <p>Home &gt; Nutrition Care &gt; Critical Illness &gt; Refeeding Syndrome</p>
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3. What nutrition complications might you see from medications for AIDS and medications for opportunistic infections?

<p>HIV infection and opportunistic infections may affect many organ systems, leading to compromised nutritional status. As patients with HIV are living longer and exposure to long-term use of active antiretroviral therapy (HAART) increases, complications such as insulin resistance, diabetes,</p>
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cardiovascular disease, renal disease, cancers, neurologic disease, and bone density losses are becoming more common.

Home > Nutrition Care > HIV/AIDS > Disease Process

- Calculate comparative standards. Show equation calculations and justify equations, weights, and factors used to calculate comparative standards. e.g. did you use HBE, Kcals/Kg, or another equation and why. What weight did you use IBW, Actual Wt, etc. Cite sources as appropriate. (Add row or columns as needed).

Nutrient	Needs	Equation used, Source and/or justification
Calories	25-30 kcal/kg 1925-2310 kcal	The RD should use clinical judgment to calculate the energy needs of HIV-infected patients to maintain healthy body weight. Although research reports increased resting energy expenditure, total energy expenditure may be similar to that of healthy control subjects.  Home > Resources > Equations
Protein	1.2-1.5 g/kg 92-116 g	2.1-2.4 g/dl albumin severe depletion. <sup>2</sup> (Fullmer)
Weight used	Usual weight of 170 lb 77 kg to estimate needs for weight gain	Improvements in BMI are related to improvements in total lymphocyte counts. A high viral load is associated with changes seen in chronic inflammatory conditions and immune cell destruction. Also, low CD4 counts are associated with opportunistic infection, which are often initiators of weight loss episodes.  Home > Nutrition Care > HIV/AIDS > Biochemical and Nutrient Issue

- Type your Assessment in the box below. Use as much space as needed to complete. Consider the format – how will you make your assessment readable by others on the healthcare team? Be sure to include comparative standards and an overall nutrition risk statement. Comparative standards should indicate what weight was used. You can make tables if needed to display information for comparative standards, etc. Remember this is just assessment, not diagnosis or intervention.

Anthropometry

Height: 5'11" Weight: 135 lb, usual wt 170 lb (8 months ago)

BMI: 18.8, IBW: 172, 78.5 %IBW, 25.9% significant weight change x 8 mo

**Biochemical**

Nutrition related labs were drawn 2/4 and 2/8. Alb decreased from 2.4 to 2.1 g/dl. K+ decreased from 3.0 to 2.4 mEq/L. Creat decreased from 1.9 to 1.4 mg/dl. Glucose increased from 155 to 275 mg/dl. Phos decreased from 2.3 to 0.6 mEq/L. Mg decreased from 2.0 to 0.9 mEq/L.

**Clinical**

26-year-old male with AIDS is admitted to the hospital on 2/4 with Pneumocystis Carinii Pneumonia, oral Candidiasis and chronic, excessive diarrhea.

**Dietary**

The following TPN was ordered by his physician: D50 AA8.5% (equal parts) @ 125 cc/hr with 500 cc of 20% lipids daily. Currently unable to tolerate much po except for Jell-O, applesauce, cream of wheat cereal, and occasional Ensure and fruit smoothies. Calculated estimated energy needs 1925-2310 kcal, 92-116 g protein to meet requirements for weight gain.

The patient is at high-risk related to significant weight loss, presence of an opportunistic infection Pneumocystis Carinii Pneumonia, and altered nutrition-related lab values.

**Section 2. Nutrition Diagnosis**

**Determine Nutrition Diagnosis/Problem**

- 1. List the problems DH has in the any of the diagnosis domains

Diagnosis term number	Diagnosis Term	Domain (Intake, Clinical, Behavioral-Environmental)
ND-2.1	Inadequate oral intake	Intake
NC-1.4	Altered GI function	Clinical
NC-2.2	Altered nutrition-related lab values	Clinical
NC-3.2	Unintentional weight loss	Clinical

**Write a Nutrition Diagnosis PES Statement**

Write **Two** Diagnosis Statements using PES format for two of DH’s problems. Be sure to use the appropriate format as indicated in the IDNT book.

Unintentional weight loss (NC-3.2) related to cytokines involved in the inflammatory response causing anorexia, pain caused by oral candidiasis, and gastrointestinal distress as evidenced by significant weight loss 25.9% x 8 months.

Altered nutrition-related lab values (NC-2.2) related to current nutrition support prescription as evidenced by decreased lab values drawn 2/4 and 2/8.

### **Section 3: Nutrition Intervention:**

#### **Analyze Potential Nutrition Interventions**

1. Is the current nutrition support order appropriate? Explain. Include any complications that could result from the current TPN prescription and what labs or data you would use to assess and monitor these complications.

Compared to malnourished HIV patients, overweight or obese patients have improved survival, however, weight loss and wasting remain common in HIV-infected patients.

Home > Nutrition Care > HIV/AIDS > Overview

The reduction in food intake and weight loss may be related to cytokines involved in the inflammatory response causing anorexia, pain caused by oral candidiasis, nausea related to medications, gastrointestinal distress, or even psychosocial and economic issues.

Home > Nutrition Care > HIV/AIDS > Biochemical and Nutrient Issue

Although sufficient calories and protein are necessary for weight gain, the current nutrition support order is not appropriate. The patient is receiving 3500 ml TPN that provides 4062 kcal, 62.8% kcal from CHO, with inappropriate CHO load of 8.5 and fat load of 1.6. In order to monitor complications with refeeding syndrome, it's important to assess electrolyte profile, glucose, phosphorus, magnesium, and acid base profile.

2. What type of nutrition support is appropriate for this patient? Explain.

Enteral and parenteral nutrition support remains viable options for the person with HIV-infection. If all possible, the gut should maintain routine stimulation with water and some food to prevent gastrointestinal problems and the potential for bacterial translocation.

Home > Nutrition Care > HIV/AIDS > Nutrition Support

The patient has oral Candidiasis and chronic, excessive diarrhea. Currently unable to tolerate much po except for Jell-O, applesauce, cream of wheat cereal, and occasional Ensure and fruit smoothies. Parenteral support is appropriate for this patient for reasons listed above.

3. Should vitamin/mineral supplementation be considered? Explain.

Micronutrient status and supplementation research shows appropriate supplementation may improve micronutrient status in HIV-infected patients.

Home > Nutrition Care > HIV/AIDS > Biochemical and Nutrient Issue

Additional micronutrient supplementation may be able to normalize values without causing toxicities. It has been suggested that supplementation to improve antioxidant capacity in chronic HIV infection may reduce long-term cellular damage. The role of antioxidant supplementation and functional foods should be further explored.

Home > Nutrition Care > HIV/AIDS > Nutrition Therapy Efficacy



4. Assume TPN is chosen by the team as the best method of nutrition support at this time. Calculate a TPN order to meet the patient's needs. The standard TPN at this hospital is available as D30 or D50 and AA8.5% or Aa10% equal parts. Lipids are available as 10% or 20% bottles given separately.

List your estimated nutrient needs from above: 1925-2310 kcal, 92-116 g protein	
List weight Used: 77 kg usual weight	
TPN Recommendation: (i.e. what you want ordered for TPN) <i>Tip: calculate all the items below then fill in this section.</i>	
735 ml D50, 1176 ml AA8.5% TPN solution @ 100 ml/hr with 500 ml 10% lipids qd	
Volume and type dextrose	735 ml D50
Volume and type AA	1176 ml AA8.5%
Total Volume	2411 ml
Rate (ml/hr)	100 ml/hr
Lipid type and amount	10% lipids qd
Total Kcals	2200 kcal
CHO g and Kcals	368 g, 1250 kcal
CHO Load	4.2
Pro g and Kcals	100 g 400 kcal
Protein g/Kg	1.6 g/kg
Fat g and Kcals	50 g 550 kcal
Fat load	0.82

Show your calculations below

<p>100 g protein/ (.085 g/ml) = 1176 ml          100 g x 4kcal/g = 400 kcal          100 g/61 kg = 1.6</p> <p>10% lipids 550 kcal 50 g 500 ml</p> <p>400 kcal protein + 550 kcal lipids = 950 kcal → 2200 total kcal – 950 kcal = 1250 kcal CHO          1250 kcal CHO/ (3.4 kcal/g) = 368 g CHO/ (0.5 g/ml) = 735 ml</p> <p>CHO load: 368000 mg/61 kg/1440 min = 4.2          Fat load: 50 g/61 kg = 0.82</p>
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#### Determine Appropriate Nutrition Interventions

5. Complete the following table
- Fill in the nutrition prescription (i.e. nutrition order, TPN order, etc.)
  - 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 etiology of the nutrition problem/diagnosis. *Tip: think of these interventions as what you would recommend the doctor order for nutrition support.*

<b>Nutrition Prescription:</b>	735 ml D50, 1176 ml AA8.5% TPN solution @ 100 ml/hr with 500 ml 10% lipids qd.
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	<b>Intervention</b>	<b>Goal(s)/Expected Outcome</b>
<b>Intervention # 1</b>	Concentration (ND-2.1.2) Multivitamin/mineral supplement (ND-3.2.1)	Correct altered nutrition-related lab values to WNL.
<b>Intervention # 2</b>	Site care (ND-2.1.8)	Prevent catheter infection in the case of immunocompromise in human immunodeficiency.

#### **Section 4. Nutrition Monitoring and Evaluation**

1. 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 toward 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 and its etiology.

<b>Intervention (Copy from above)</b>	<b>Goal/Expected Outcome (Copy form above)</b>	<b>Indicator(s)</b>	<b>Criteria for evaluation</b>
Concentration (ND-2.1.2) Multivitamin/mineral supplement (ND-3.2.1)	Correct altered nutrition-related lab values to WNL.	Refeeding syndrome	Mg 1.3-2.1 mEq/l K+ 3.5-5.0 mEq/l Glucose 70-109 mg/dl
Site care (ND-2.1.8)	Prevent catheter infection in the case of immunocompromise in human immunodeficiency.	Signs of infection	Tenderness Warmth Redness Swelling

#### **References**

1. Nutrition Care Manual. Available at: <https://www.nutritioncaremanual.org/welcome>. Accessed March 11, 2014.
2. Fullmer S. Lecture notes. Clinical Nutrition I, Brigham Young University, Nov. 16, 2010.

## **PRE-WORKSHEET FOR CLINICAL WORKSHEET #3**

### **Purpose(s)**

1. To prepare information for use in the nutrition assessment, diagnosis, and intervention, monitoring and evaluation for a case patient.
2. To utilize resources to find evidenced-based information.

### **General Guidelines**

1. Complete information in the pre-worksheet
2. Worksheets must be completed electronically
3. Upload the pre-worksheet in Learning Suite in the assignment section.
  - a. The worksheets must be uploaded as a Word document (.doc or .docx)
  - b. Name file LastName\_FirstName\_PreWorksheet\_3 For example if my name was John Doe the file would be names Doe\_John\_Worksheet\_3
4. The pre-worksheet grade will be combined with the case-study grade for a total of 25 points.

### **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
- ASPEN nutrition support guidelines
- Websites for formula companies (e.g. Nestle, Mead Johnson, Abbot)
- Course Readings
- ICD-9 codes may be found at
  - <http://www.cms.gov/medicare-coverage-database/staticpages/icd-9-code-lookup.aspx> OR
  - <http://icd9cm.chrisendres.com/>

### **Citations**

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

You are the dietitian in a hospital with responsibilities to cover the maternity and pediatric floors. You see both inpatients and outpatients in the women’s and children specialty areas. To prepare for potential patients you want to create a set of “standards” with information about pregnancy, pediatrics, infants, etc. This way when you need to assess a patient you have information quickly and easily accessible. To create your “standards” complete the information for the pre-worksheet below.

**Billing and Coding**

1. List the three CPT codes that can be used to bill MNT? (1)

CPT Code #	Description
<b>97802</b>	Medical nutrition therapy; initial assessment and intervention, individual, face-to-face with the patient, each 15-minute unit.
<b>97803</b>	Re-assessment and intervention, individual, face-to-face with the patient, each 15-minute unit.
<b>97804</b>	MNT group [2 or more individual(s)], each 30-minute unit. You will bill for the number of units that you are face-to-face with the patient.

2. List ICD-9 or ICD-10 codes for the following conditions? (1)

Condition	ICD-9 Code #	Description
Gestational Diabetes	V12.21  648.00 through 648.04 648.80	PERSONAL HISTORY (previous, not current) OF GESTATIONAL DIABETES  DM of mother complicating pregnancy And various other descriptions. All ok. For example 648.01 DM of mother with delivery 648.02 DM of with with delivery with postpartum complication, etc  Abnormal Glucose Tolerance (gestational diabetes)
Pre-Eclampsia and/or Eclampsia	642.40  642.70 642.60	MILD OR UNSPECIFIED PRE-ECLAMPSIA UNSPECIFIED AS TO EPISODE OF CARE
Hyperemesis (vomiting) during pregnancy	643.20 to 643.91 all ok	
Phenylketonuria (PKU)	270.1	PHENYLKETONURIA (PKU)

Cystic Fibrosis	277.00 to 277.09 all ok	CYSTIC FIBROSIS WITHOUT MECONIUM ILEUS
Patent Ductus Arteriosus	747.0	PATENT DUCTUS ARTERIOSUS
Low birth weight - Not diagnosis of disease, but supplementary diagnosis (thus always V codes)	V21.30 to V21.35 all ok	UNSPECIFIED LOW BIRTH WEIGHT STATUS

## Pregnancy

### 1. List conditions that can complicate pregnancy? (2)

Obstetric history: LBW, macrosomia, stillbirth, abortion, fetal abnormalities, high parity, multipara

Induced by the pregnancy: anemia, iron deficient, folic acid, PIH, gestational diabetes

Preexisting disease conditions: hypertension, type 1, 2 diabetes, heart disease, pulmonary disease, renal disease, AIDs

Personal health: smoking, poor diet, malnutrition, obesity, underweight

Anemia

N/V

Hyperemesis

PIH

Eclampsia

HELLP syndrome

GD

Diabetes

PKU

Thyroid, inadequate weight gain, folate deficiency

### 2. List ways of managing nausea, vomiting, and hyperemesis during pregnancy. (3)

Those experiencing nausea and vomiting in pregnancy or hyperemesis gravidarum may tolerate foods with the following characteristics: cold, warm, spicy, sour, creamy, crunchy, soft, wet, salty, and chocolate.

Nutrition Care > Reproduction > Obstetrics > Hyperemesis Gravidarum > Nutrition Intervention

Also, in order to manage nausea and vomiting it's important to make sure she is gaining the

appropriate weight; separate liquids and solids to decrease volume of foods; control odors; and eat when she feels good.

For Hyperemesis Gravidarum, management may include IV fluids, TF, TPN only in severe cases. Complex carbohydrate and yogurt may be soothing.

N/V

- High CHO foods
- Small frequent meals
- Separate liquid and solid
- Select foods that are well tolerated
- Avoid odors and food that trigger N

Severe hyperemesis

- IV fluids and electrolytes
- EN PN

### 3. List possible nutrition factors that may reduce the risk of Pregnancy Induced Hypertension (PIH) (3)

Hypertension in pregnancy can be caused by pregnancy-induced hypertension (PIH) or hypertension present before pregnancy. Varying degrees of hypertension include: preeclampsia, severe preeclampsia, eclampsia, chronic HTN, HELLP.

Nutrition Care > Reproduction > Obstetrics > Preeclampsia & Eclampsia > Overview

Preeclampsia appears to develop in two stages. In the first stage there is a reduction in perfusion of the placenta and other organs caused by vasoconstriction. The second stage is the presence of maternal syndrome. It is thought that reduced placental perfusion causes the production of free radicals that create an environment of oxidative stress. This environment along with altered blood lipids led researchers to believe that a diet high in antioxidants may decrease the risk of preeclampsia.

Nutrition Care > Reproduction > Obstetrics > Preeclampsia & Eclampsia > Disease Process

Key Nutrients (to limit and to increase):

- A modest intake of 2g to 3g Na
- 1000-2000 mg/d calcium: calcium deficient increases risk by 20%
- Fatty acids: the current data are inconclusive regarding n-3 supplementation
- Magnesium and DASH meal plan: fruits vegetables, nuts, dry beans and peas, lean meats
- Vitamins A, C, E: antioxidants but not enough evidence to suggest reduces risk; vit A should not be supplemented in its vit A form as it can be teratogenic when intake exceeds RDA
- Energy and protein: increase risk with eating patterns inadequate in total energy and/or protein. Biochemical issues include: elevated lipid panel, blood pressures, low serum calcium as related to low albumin, proteinuria

Nutrition Care > Reproduction > Obstetrics > Preeclampsia & Eclampsia > Biochemical and Nutrient Issue

Folate 600 mcg/day

> 5 servings veggies/day

4. When should pregnant women be screened for gestational diabetes? Why does screening take place at this time? (3)

Previously GDM was diagnosed as any degree of glucose intolerance with onset of recognition during pregnancy. It is now recommended that women found to have diabetes at their first prenatal visit receive a diagnosis of over, not gestational diabetes. The majority of the cases of GDM will be diagnosed during the second or third trimester of pregnancy because of the increase in insulin-antagonist hormone levels and resulting insulin resistance that occurs at that time.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Overview

Pregnant women not known to have diabetes should be tested for GDM at 24 to 28 weeks of gestation.

Hormones (hPL, cortisol, estrogen, progesterone) during the 1<sup>st</sup> trimester lead to decreased glucose production and stimulation on insulin which results in lower BG during 1<sup>st</sup> trimester

Hormones during 2 and 3 lead to increased hepatic glucose production and increased insulin resistance. Thus can get false negative

5. What is the test is used for screening for gestational diabetes? (3)

A 75-g-2-h oral glucose tolerance test (OGTT).

6. How is the test administered? (3)

A 75-g-2-h oral glucose tolerance test (OGTT) with plasma glucose measurement fasting and at 1 and 2 h. The OGTT should be performed in the morning after an overnight fast of at least 8 h.

However, the American College of Obstetricians continues to recommend that all pregnant women be screened for GDM, whether by patient history, clinical risk factors, or a 50-g, 1-h glucose challenge test at 24-28 weeks of gestation. The diagnosis of GDM is made based on the result of the 100-g, 3-h oral glucose tolerance test. NIH is planning a consensus development, and RDs will likely see women with GDM with both recommendations.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Criteria for Screening and Diagnosis of GDM

In the morning, after an overnight or 8 hr fast, 75 g CHO give, blood test over 2 hours

7. What are the diagnostic criteria for this test? (3)

The diagnosis of GDM is made when any of the following glucose values are exceeded:

- Fasting > or equal to 92 mg/dL
- 1 h > or equal to 180 mg/dL
- 2 h > or equal to 153 mg/dL

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Criteria for Screening and Diagnosis of GDM

8. What are risk factors for developing gestational diabetes?

Risk factors: overweight/obese, physically inactive, 1<sup>st</sup> degree relative with diabetes, race (black, Latino, native American, Asian American, Pacific Islanders), HDL cholesterol lower than 35. (2)

Risk factors for developing GDM in subsequent pregnancies include ethnicity, short time between pregnancies, and insulin use in the index pregnancy, obesity, waist circumference, and weight gain during pregnancies.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Disease Process

- BMI > 25
- Physically inactive
- First degree relative with DM
- High risk race
- Previous baby weighing > 9 lbs
- Previous dx GDM
- PCOS
- HTN
- HDL <35

9. List at least two ways (equations) to calculate energy needs for a pregnant women. (3)

	Equation	Source (e.g. Nutrition care manual, etc.)
Equation #1	Gestational Diabetes ~70% DRI	Nutrition Care > Resources > Equations > Gestational Diabetes
Equation #2	30 kcal/kg if desirable weight 100% to 120% 24 kcal/kg if above desirable weight > 120% 36 kcal/kg if below desirable weight < 90%	Nutrition Care > Reproduction > Obstetrics General Guidance > Comparative Standards
Equation #3	HBEE or other appropriate equation + 2 <sup>nd</sup> trimester additional 340 kcal 3 <sup>rd</sup> trimester additional 452 kcal	Nutrition Care > Reproduction > Obstetrics General Guidance > Comparative Standards

The energy level of the meal plan should be individualized based on the following:

- Assessment
- Prepregnancy body mass index
- Physical activity level
- Pregnancy weight gain to date

The 2002 Dietary Reference Intakes (Institute of Medicine, 2002) make the following recommendations for energy requirements during pregnancy:

- First trimester: No extra energy required



- Second and third trimester: Total energy expenditure (TEE) of woman in nonpregnancy state + 8 kcal multiplied by weeks of gestation for additional TEE during pregnancy + 180 kcal per day for energy deposition during pregnancy.

For example, if a woman is consuming 2,000 kcal before pregnancy and in the 30th week of pregnancy, the energy requirements would be:  $2,000 + 240 (8 \times 30) + 180 = 2,420$  kcal per day.

Underweight: 35 kcal/kg  
 Normal weight: 30  
 Overweight 25

10. List one way to calculate protein needs for pregnant women. (3)

	Equation	Source (e.g. Nutrition care manual, etc.)
Protein needs #1	The RDA during pregnancy is 1.1 g/kg per day in 2 <sup>nd</sup> and 3 <sup>rd</sup> trimester or an additional 25 g protein per day .8 g/kg per day 1 <sup>st</sup> trimester  Nondiabetic pregnancy is 71 g, or 10% to 35% protein	Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Nutrition Prescription  Nutrition Care > Reproduction > General Guidance > Comparative Standards

11. List specific recommendations for carbohydrate intake and gestational diabetes. (3)

<p>What is the minimum CHO intake?          Based on the DRI, a minimum of 175 g carbohydrate per day is encouraged to provide glucose for the fetal brain and to prevent ketosis.</p> <p>What are general guide for CHO at breakfast?          Because of higher circulating hormone levels during the early morning hours, the most difficult blood glucose levels to manage are post-breakfast. Consensus is to restrict carbohydrate at breakfast to 10 to 30 g.</p> <p>What percent of calories should come from CHO for gestational diabetes?          Total carbohydrate should be less than 45% to 65% of energy intake to prevent hyperglycemia.</p> <p>Nutrition Care &gt; Diabetes Mellitus &gt; Gestational Diabetes &gt; Nutrition Prescription</p>
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12. What is the appropriate weight gain for pregnancy according to pre-pregnancy BMI? Fill in the table below to answer. (Hint: check the IOM pregnancy weight gain brief on Learning Suite). (4)

Pre-pregnancy BMI kg/m <sup>2</sup>	Total Weight gain range lbs	Average Rates of Weight Gain (lbs per week) in 2nd and 3rd Trimester
Underweight <18.5	28-40 lb	1 lb (1-1.3)
Normal weight 18.5-24.9	25-35 lb	1 lb (0.8-1)
Overweight 25.0-29.9	15-25 lb	0.6 lb (0.5-0.7)
Obese ≥30.0	11-20 lb	0.5 lb (0.4-0.6)

13. Locate pregnancy weight gain charts; have charts available for case studies in class. (Hint look in NDFS 405 materials or on Learning Suite)

14. Describe any consequences with excess wt gain during pregnancy. (5)

The women with excessive weight gain had a greater risk of adverse infant outcomes, including hypoglycemia, large-for-gestational age, seizures, and polycythemia.

The greater the degree of maternal obesity, the higher the risk of developing metabolic disorders such as GDM and pre-eclampsia. Infants born to obese mothers have a higher prevalence of congenital anomalies than do offspring of normal-weight women.

**Increase risk GDM, preeclampsia, cesarean deliver; less likely to breast feed, macrosomia**

15. What are general recommendations for exercise during pregnancy? (3)

Unless contraindicated, 30 minutes of moderate-intensity physical activity per day at least three days per week are recommended (fair).

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Nutrition Prescription

**Active prior- continue**

**Not active: start with 5 min/day increase 5 min up to 30 min**

16. Can blood sugars be controlled with oral hypoglycemic agents in gestational diabetes? Explain (3)

It's important to note that 80-90% of women with GDM can be managed with MNT alone. Besides MNT, women with GDM need to learn and apply self-monitoring of blood glucose, when and how to test for ketones, how to implement an appropriate physical activity plan, and how to correctly use medications, if required, and how to treat hypoglycemia.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Overview

Research supports the use of insulin, insulin analogs, metformin, and glyburide during pregnancy. Glyburide, a second-generation sulfonylurea, does not cross the human placenta and in some women with GDM has been shown to provide glucose control equivalent to insulin.  
Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Pharmacotherapy

Many oral hypoglycemia agents are teratogenic (cause birth defects) so generally not used Glyburide after first 11 weeks of pregnancy,. Other sulfo not recommended. Metformin is only acceptable if it has been used prior to pregnancy in a woman with polycystic ovary syndrome

### 17. What are the indicators for the initiation of insulin therapy in gestational diabetes? (3)

The purpose of nutrition monitoring and evaluation of nutrition interventions for women with GDM is to determine if glycemic goals have been achieved with MNT or if medications need to be added to the management plan. Medication therapy should be initiated if blood glucose goals are not consistently met with MNT.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Outcomes

Pharmacological therapy (insulin and glyburide) is recommended if optimal blood glucose levels are not maintained with MNT.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Nutrition Prescription

Facilitate acceptance of medications when two or more glucose values are greater than the target goals within 1 week, or if unable to achieve blood glucose goals without ketones, adequate weight gain, and normal nutrition.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Goal Setting

The following are glucose goals for GDM:

- Preprandial < or equal to 95 mg/dL
- 1-h postprandial < or equal to 140 mg/dL
- 2-h postprandial < or equal to 120 mg/dL

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Glycemic Recommendations for GDM

### 18. Are women with gestational diabetes at risk for developing diabetes later in life? If yes, how can this risk be reduced? (3)

Yes, although most women return to normal glucose tolerance shortly after delivery. Glycemic status should be reevaluated postpartum. A 75 g oral glucose tolerance test or A1C test should be done 6 to 12 weeks postpartum, using nonpregnant diagnostic criteria. If this test is normal, screening for prediabetes and diabetes should be repeated in one year, and at a minimum, every year thereafter. The entire family should be encouraged to have a healthy eating pattern and active lifestyle to reduce the risk of type 2 diabetes.

Nutrition Care > Diabetes Mellitus > Gestational Diabetes > Outcomes

Breastfeeding

Maintaining a BMI within normal wt range  
Follow good eat habits  
Keep active  
Consistent check up to monitor changes

## Pediatrics

1. Locate pediatric weight gain charts for children 2-20; **have charts available for case studies in class**. Know how to use and interpret charts. (Hint look in Pediatric NCM)
2. Locate the energy needs equations for children. Find both the 2005 DRIs and the 1989 RDA energy equations; **have equations available for case studies in class**.
3. Locate the protein needs equations for children. Find both the 2005 DRIs and the 1989 RDA protein equations; **have equations available for case studies in class**.
4. What are the equations for calculating fluid needs in children? (2)

▶ Fluid

- ▶ 1-10 Kg = 100 ml/kg/day
- ▶ 10-20 Kg = 1000 ml + 50 ml/kg for each Kg above 10 Kg
- ▶ >20 Kg = 1500 ml + 20 ml/Kg for each Kg above 20 Kg

5. In PKU how much protein should come from medical foods formula? (3)

Foods high in protein (dairy foods, meat, fish, poultry, eggs, legumes, and nuts) are also high in phe and are excluded from the diet. Semisynthetic formulas and medical foods without phenylalanine provide adequate protein and tyrosine. Adequate intake of formulas and medical foods is critical. Medical foods are the primary source of daily energy, protein, vitamin, and minerals.

Phenylalanine prescriptions are based on estimated tolerance for ingested phenylalanine, which is influenced by residual phenylalanine hydroxylase activity, age, sex, growth in weight and height, and blood phe level.

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Nutrition Intervention

0-4 yrs 90% of pro  
5-14 yrs 80-90% pro  
15+ yrs 75-90% of pro

6. List any adjustments to protein needs for PKU. (3)

The amount of total protein recommended for the treatment of phenylketonuria (PKU) during infancy and childhood is greater than the amount suggested for persons without PKU. Typically the amount recommended is 25% to 30% above the DRI for age.

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Comparative Standards  
**Protein needs in PKU increase, and 20-35% more than DRI**

7. What is the blood Phe goal for PKU? What adjustments to Phe intake should be made if Phe blood levels are not within range. (3)

Compare calculated phenylalanine intake with blood phenylalanine levels and adjust phenylalanine intake to bring phenylalanine levels into the treatment range of <6 mg/dL. The amount of phenylalanine an individual can safely ingest depends on individual tolerance (enzyme activity).

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Comparative Standards

Nutrition therapy should reduce blood phe levels to between 120 mcmmol/L and 360 mcmmol/L and maintain tyrosine levels within the normal range.

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Nutrition Therapy Efficacy

Deficiencies of specific amino acids have significant clinical effects in addition to their impact on growth. If growth and development are to proceed appropriately, do the following:

- Limit/restrict the “affected” nutrients (nutrients for which metabolic pathways are affected by this disorder)
- Supplement compromised components
- Provide protein supplement that excluded the offending amino acid in order to achieve total protein needs, which are typically 25-30% greater for DRIs for age

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Nutrition Assessment

Meal plans for patients with PKU are modified in sources of protein and energy, restricted in phenylalanine, and supplemented with tyrosine. Adjustments are required to accommodate changing needs during growth.

Nutrition Care > PNCM > Inborn Errors of Metabolism > Phenylketonuria/PKU > Nutrition Intervention

**Phe blood level 2-6 mg/dl**

**Adjustments:**

**Phe not detected – add 50 mg Phe**

**Phe <2 mg/dl add 15 mg Phe**

**Phe >6 and <10 – subtract 15**

**>10 subtract 30 mg Phe**

8. List the name of two formulas appropriate for a child (5-12 years old) with PKU. (6)

<b>Nutrient per 100 gm formula</b>	<b>Formula 1</b>	<b>Formula 2</b>
Formula Name	Phenex-2 (Mead Johnson)	Phenol-Free 2
Calories	410 kcal/100 g powder	410 kcal
Protein	30 g protein/100 g powder	22 g

9. How many mg of Phe in 1 g of protein?

50 mg Phe in 1 g protein

10. What are the general nutrition interventions for children with Cystic Fibrosis? (3)

- 110% to 200% DRI for energy and protein based on growth, lung disease, malabsorption, and other coexisting complications of CF
- Fat intake of 30% to 40% of energy as tolerated
- Increased vitamin intake per Cystic Fibrosis Foundation
- Increased salt intake per CFF
- Optimal calcium and vit D intake
- Schedule 3 meals and 3 snacks/day
- Pancreatic enzyme supplementation
- Nutrition education

Nutrition Care > PNCM > Pulmonary Diseases > Cystic Fibrosis > Nutrition Intervention

High cal  
High protein  
Fat-soluble vitamins  
Zn  
Pancreatic enzymes

11. How do you calculate catch-energy needs for a child with Failure to Thrive? (2)

Catch up growth kcals =  

$$[(\text{calories for weight for age}) \times (\text{ideal weight for age})] / (\text{actual wt})$$
 Can use 1989 formula

12. What are general nutrition interventions for Failure to Thrive? (3)

The provision of adequate nutrients and energy for appropriate weight gain and linear growth in infants, toddlers, and preschoolers who are failing to thrive may require dietary alterations and behavioral modifications. Nutrition interventions for children with FTE may include: energy modified diet, protein modified diet, fat modified diet, schedule of food/fluids, medical food supplements, multivitamin/mineral, limit distractions at meal time.

Nutrition Care > PNCM > Failure to Thrive > Nutrition Intervention

Overall intervention - enough calories - scheduled meal or snacks every 3 hours, power

pack (oil concentrated energy), concentrate formula, general good nutrition, MVI with min

13. List 1 or 2 possible interventions for each of the following common problems in pediatric oncology patients. (2)

Mucositis: bland foods, pureed foods (custard, ice cream, pudding, gravy)

Dry Mouth: lemon flavored candies sugar free candy, mints stimulate mucosal glands; moist foods

Taste Changes: metallic taste - decrease meat, or put something sweet with meat e.g. ham and pineapple, honey barbecue; change flavor with spices, herbs, extracts, try tart or spicy foods

N/V: remove odors from room, really fatty foods cause n/v to be worse, small frequent meals, eat when feel well, limit acidic foods/juices

## Infants

1. What causes the initial weight gain in premature infants? (2)

It's normal for babies to lose weight in the first few days of life. Most of this loss is water weight. Most premature infants should start gaining weight within a few days of birth. Premature babies have not been in the womb long enough to store up the nutrients they need and must usually take supplements. Babies who are given breast milk often supplement fortifiers into their feedings. This supplement contains the extra protein, calories, iron, calcium, and vitamins that premature babies need. Glycogen stores increase with feeding.

Fluid retention. The kidneys and heart are immature, so preterm infants are prone to disorders of fluid and electrolyte balance.

Normal term – weight drops

2. What is the expected growth velocity for premature infants? (2)

<b>Premature Infants</b>	
<b>Growth Velocity</b>	
<b>Weight</b>	<b>Growth velocity goal</b>
<b>&lt;2500 g</b>	<b>15-20 g/kg/d</b>
<b>2500-3500 g</b>	<b>10 g/kg/d</b>
<b>&gt;3500 gm</b>	<b>7 g/kg/d</b>
<b>overall</b>	<b>25-35 g/d</b>

NCM

3. Why is the dextrose given initially to premature infants? (3)

Premature infants tend to be hypoglycemic. Preterm infants: 6 g/kg/d to 8 g/kg/d. Infants with hypoglycemia may require more dextrose initially to maintain euglycemia, although maximum dose recommendations are generally 25 g/kg/d. Dextrose is usually the greatest contributor to osmolarity in parenteral nutrient solutions.



Glycogen reserves are small and are rapidly depleted. The ELBW infant will have trouble maintain blood glc levels.

4. List access types and typical dextrose concentrations for parenteral nutrition in premature infants. (3)

- IV line: limit dextrose concentration to no more than 12.5 g/dL in peripheral IVs
- Peripherally inserted central venous catheter: 20 g/dL to 30 g/dL
- Central venous catheters: maximum dextrose recommended is 20 g/dL to 30 g/dL
- Umbilical artery catheter (UAC) and umbilical venous catheter (UVC): dextrose of more than 12.5 g/dL may be used, but may increase risk of glucosuria and dehydration

5. List at least one multi-vitamin (MVI) dosing option for an infant weighing < 2500 g. (2)

Full dose is 5 ml

< 2.5 kg: 2 ml/kg/d (40% dose)

Tri-Vi-Sol and Poly-Vi-Sol common names

Option 1: 30% dose of standard MVI for 0.5 to 1 kg

Option 2: 2 ml/kg/day (40% dose) standard MVI

6. List the benefits of using breast milk in premature infants. (3)

Human milk is the gold standard for infant feeding and is preferred for nearly all high-risk newborns. Benefits of using human milk include improved developmental outcomes and decreased incidence of NEC and late-onset sepsis.

Home > Preterm Infants > PNCM > Human Milk > Breastfeeding Considerations

Growth factors,

Ezymes that improve digestions and absorption

Amino acid composition is desirable for the infant

Antiinfective factors

7. For a pre-mature infant, are there any nutrients that breast milk may be inadequate in?(3)

Most infants who receive care in NICU have altered nutrition. All infants born before they have completed term gestation prematurely lose their intrauterine supply of nutrients, amniotic fluid, and their temperature-controlled environment. Their GI tracts must take on the roles of digestions and absorption before they are physiologically ready to do so. Human milk and formula do not necessary match the nutrients provided by the placenta and amniotic fluid. These nutrients may need to be delivered enterally or parenterally.

Although human milk is preferred to infant formula, for preterm infants, it is inadequate in protein; many vitamins; and most minerals, including calcium, phosphorus, zinc, and iron. Fortifying human milk can minimize these nutrient deficiencies.

Nutrition Care > PNCM > Preterm Infants > Human Milk > Fortifiers

Breast milk low in protein phosphorus calcium sodium.

May be inadequate in protein, sodium, calcium, phosphorus, and vitamin D needs of all preterm infants.

8. List the calorie and protein content of human milk. Indicate any differences between full-term and per-term milk. (3)

Human milk: 20 kcal/oz, 1 g pro/100 ml full term; 1.4 g pro/100 ml pre-term

175 ml/kg human milk without fortification: 122 kcal/kg, 1.6 g/kg

Nutrition Care > PNCM > Preterm Infants > Discharge/Follow-Up > Breastfeeding and Human Milk

Human milk from mothers of preterm infants is known to contain greater amounts of protein and sodium than human milk from mothers of term infants.

Nutrition Care > PNCM > Preterm Infants > Human Milk > Composition

Human milk:

20 kcal/oz; 0.67 kcal/ml

1 g pro/100 ml full term; 1.4 g pro/100 ml preterm

9. List the calorie and protein content of one packet of human milk fortifier. List mixing instructions to make 22 kcal/oz breast milk AND 24 kcal/oz breast milk. (3)

1 pkt to 50 mL: 119 kcal/kg, 2.2 g/kg

1 pkt to 25 mL : 120 kcal/kg, 2.9 g/kg

Nutrition Care > PNCM > Preterm Infants > Discharge/Follow-Up > Breastfeeding and Human Milk

The addition of HMF to expressed human milk increases the osmolality. Tolerance may be improved by starting with 1 packet of HMF mixed with 50 mL of expressed human milk (22 kcal/oz) and progressing to 1 packet to 25 mL (24 kcal/oz) as tolerated. When the supply of expressed human milk is inadequate or if the baby does not tolerate the addition of HMF, a nutrient dense, 30 kcal/oz preterm formula can be mixed in a 1:1 or other ratio.

Nutrition Care > PNCM > Preterm Infants > Human Milk > Fortifiers

0.9 g packet = 3.5 kcals and 0.25 g pro

22 kcal/oz mix 1 packet to 50 ml BM

24 kcal/oz mix 1 packet to 25 ml BM

10. List potential complications of enteral feeds in premature infants (3)

Hypocaloric feedings: challenge to provide optimal feedings to support proportional growth for infants. Formula safety issues: powdered formulas are not commercially sterile and should not be used in NICU.

Nutrition Care > PNCM > Preterm Infants > Nutrition Support > Enteral Nutrition

Poor nipple, poor gastrointestinal motility, necrotizing enterocolitis, aspiration

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