NUT 116BL
Due: February 23, 2024 @ 9pm **Name: Xiaotong Fei_____**

Case Study 2: Critical Illness, Burns, and Nutrition Support
(25 pts: Worksheet Questions [9 pts] & ADIME Note [16 pts])

INSTRUCTIONS
- Review the pt's medical record on EHRgo: https://web21.ehrgo.com/rd/?courseActivityId=122332. EHRGo includes hospitalization details up to day 2 only. You will find information needed for days 10 and 21 below.
- Reference the textbook, pocket guide, lectures, FMI text, and Mosby's 2024 Nursing Drug Reference posted on Canvas as needed.
- Use the appropriate IDNT diagnostic codes.
- Submit your work on Gradescope in PDF format.

Case Study
You are an RD, CNSC in your hospital burn unit. A patient, Mr. B, was admitted with burns. You must fulfill the consult for his nutrition assessment and are responsible for follow-up nutrition care.

I. Understanding the Diagnosis and Pathophysiology

1. Burns are often described as one of the most metabolically stressful injuries. Discuss the effects of a burn on metabolism and how this will affect nutritional requirements. (0.5 pt)
A burn injury significantly increases the metabolic rate of the pt such that the pt's energy expenditure is increased as well.
Protein needs are increased as well since the burn catabolizes too many of the body tissues: 1.5-2.0 g protein/kg.
As the tissues are damaged, fluid is lost significantly in pt with burn injuries. Thus, fluid resuscitation is needed within 24 hours of first burn injury.

2. What is the primary goal of fluid resuscitation? Explain the Parkland formula. What common intravenous fluid is used in burn patients for fluid resuscitation? What are the components of this solution? (1 pt)
The primary goal of fluid resuscitation is to maintain hemodynamic and organ functions before the use of EN (3).
The parkland formula is a formula that used to calculate the amount of IV fluid needed for the burn injury of the pt.
Lactated Ringer's solution is the common intravenous fluid.
The components of Lactated Ringer's solution are electrolytes, such as Na+, K+, Ca2+, and Cl-.

II. Understanding the Nutrition Therapy

3. Using evidence-based guidelines, describe potential benefits of early enteral nutrition in burn patients and common criteria used to assess readiness for enteral nutrition initiation in burn patients. (0.5 pt)

Potential benefits of early enteral nutrition in burn pts are: help maintain the function of the gut, prevent further protein and fluid loss, help remain the production of immunocytes.

Common criteria:
Hemodynamic insatiability is one factor that can be taken into consideration when initiating EN (1).
Also use pt's anthropometric and biochemical data to access: to decide if the pt needs long-term or short-term EN and to see if his/her GI function is normal – decide whether to use standard formula or specialized formula. (from NUT 116B slides on critical illness).
Also, it is important to check if the GI still functions: does this pt have malabsorption or intestinal obstruction? Or severe GI bleeding, or severe short bowel syndrome. If the pt has GI problems, EN needs to be reconsidered.
4. What are the specialized nutrient recommendations for the enteral nutrition formula administered to burn and trauma patients per ASPEN/SCCM guidelines? What additional micronutrients are supplemented in burn therapy and at what dosages? (0.5 pt)
1. no use of EN when hemodynamic instability is present. MAP < 60 mmHg and increased lactate levels (1). If the hemodynamic is subtle, very slow rate should be used (10-20 mL/h) and the pt needs careful monitoring (1).
2. Ideally, EN should be initiated within the fisrt 4-6 hrs of the burn injury. (1)

Additional micronutrients and dosages:
Zinc: 50-291ug/dL
Chloride: 100-106 mEq/L
Potassium: 3.5-5.0 mEq/L
Sodium: 136-145 mEq/L
Iron: 50-170 u/dL

III. Initial Nutrition Assessment

Using the EHRGo information, assess the patient's nutritional needs at the time of your initial consult.

5. Which of the following statements best describes the patient's nutrition screening risk level? (0.25 pt)
   a. Minimal risk: no weight loss prior to admission, no specialized nutrition therapy over the first week of hospitalization required.
   b. Moderate risk: no weight loss prior to admission, limited alertness duration likely >72 hr, trophic feeds at 10-20 mL/hr recommended to be started within 48 hr of admission and continued through first week of hospitalization.
   c. High risk: no weight loss prior to admission, high injury severity, enteral feeds recommended to be started within 48 hr of admission, enteral nutrition support recommended to provide >80% of goal energy and protein needs.
   d. High risk: no weight loss prior to admission, high injury severity, trophic feeds recommended to be started within 48 hr of admission, parenteral nutrition support recommended to provide >80% of goal energy and protein needs.

6. Calculate Mr. B's energy needs at the time of the initial nutrition consult on Day 2 of hospitalization using the following methods. Select which method you would use to estimate needs and provide rationale for your choice. Specify inputs for your calculations. Do not round intermediates. (1.5 pt)

Method	Calculations	Final Answer (kcal range)
i. Shortcut per ASPEN Critical Care Guidelines (25-30 kcal/kg BW)	Calculation on last pages.	1933-2319 kcal

ii. Shortcut for burns (35-40 kcal/kg BW)	Calculation on last pages.	2706-3092 kcal
iii. TEE using MSJ with appropriate AF and IF	Calculation on last pages.	2570-3141 kcal
iv. TEE using Currreri formula	Calculation on last pages.	2820-3446 kcal
Selection and rationale: I chose the Curreri formula since this equation is specially invented for patients with burn injuries. And this patient is just on Day 2 in hospital, so Curreri equation is perfect for him when his burn injury is at peak. (from Pocket Guide)		

7. What are Mr. B's estimated protein and fluid needs at the time of the nutrition consult on Day 2 of hospitalization? Show your works and provide a goal range for your final answers. (0.5 pt)

	Calculations	Final Answer (pro range)
Protein	Calculation on last pages.	116-155 g protein
Fluid	Calculation on last pages.	2820-3446 mL fluid

8. List and explain three things you could monitor to determine adequacy of your recommendations for energy and protein intake for this patient. (0.75 pt)

1. Wound healing status
2. daily calorie counts
3. Anthropometric values such as weight

9. Based on the patient's needs, consider the enteral formula to recommend. Describe two desirable characteristics of the type of formula you would select and recommend. Give one example of an appropriate enteral formula meeting these characteristics available on the UCDMC formulary. (0.5 pt)

1. higher content of protein. 2. High energy. – Promote [Whole protein, fiber-free]

10. The patient is on IV famotidine. Why is IV famotidine used instead of the alternative cimetidine liquid, which can be added to the feeding tube? (0.5 pt)

Cimetidine liquid may precipitate under room temperature (2). In that case, medication can be clogged and they cannot be 100% effective on patient.

11. Based on your chart review and knowledge of critical illness and burns, what information would you want to obtain from Mr. B when you visit him to be able to complete your nutrition assessment? What information would you want to obtain from other members of the interdisciplinary care team? (0.5 pt)
Ask Mr. B: if he has appetite, if he wants PO, his pain level, if he feels hungry.
Ask interdisciplinary care team: the pt's lab values like serum protein, electrolytes level, weight assessment, if the pt can move and eat by himself.

IV. Ongoing Assessment, Diagnosis, Intervention, Monitoring, and Evaluation

It is now Day 10 post-injury, and you have the following additional information available:

- Some wounds are still open (new estimate: 15% TBSAB). Skin graft surgery is scheduled this week.
- Diet order during the past week has been changed by the MD to Jevity 1.2 @ 60 mL/hr x 24 hrs, plus PO intake as tolerated.
- You have conducted Calorie Counts for the past 3 days. The patient is consuming 100 kcal/d PO, in addition to TF. Nursing I/Os indicate that the full TF volume is being delivered each day.
- The patient tells you it is difficult for him to eat due to pain and that he doesn't have much appetite. He refuses to try eating for now.
- Current BW: 70 kg, no significant edema
- Current labs: prealbumin 8 mg/dL, UUN 23 g/24 hr

12. Reassess Mr. B's estimated energy, protein, and fluid needs based on current information on Day 10. Show your work. (0.75 pt)

	Calculations	Final Answer (range)
Energy	Calculations on last pages	2115-2585 kcal
Protein	Calculations on last pages	105-140 g protein
Fluid	Calculations on last pages	2115-2585 mL fluid

13. Calculate the energy, protein, and fluid provided by the current TF regimen. Show your work. (0.75 pt)

	Calculations	TF Provision
Energy	Calculations on last pages	1728 kcal/day
Protein	Calculations on last pages	81g protein
Fluid	Calculations on last pages	1162 mL water from formula

14. You calculated Mr. B's nitrogen balance at Day 10 using the formula and values given below.

N balance = $\frac{\text{g protein}}{}$ – (UUN + 4) = $\frac{\text{92 g protein}}{}$ – (23 g + 4) = -12.3 g N/d

6.25 6.25

What do the results of the nitrogen balance study above mean? Is the current TF order adequate to meet estimated protein needs? (0.5 pt)

The result is negative, which means the pt's protein is being catabolized and protein ingested is less than protein excreted. Thus, the patient's protein need is not met, and muscle loss may be induced. Based on the calculation on #13, the protein provided by TF is 81g, the nitrogen balance is still negative [-14.04 g N/d] based on 81g protein. Thus, current TF order does not meet estimated protein needs as well.

15. Write a thorough ADIME note for your Day 10 follow-up assessment of Mr. B. Upload separately to Gradescope. (16 pts)

Follow the pocket guide ADIME note guide and include all the relevant parameters. Be sure to evaluate his current anthropometrics (and any trends), current kcal, pro, and fluid needs, adequacy of the current diet order (including both TF and PO intake), medications, and current labs. What do the anthropometric and biochemical data reveal? Is the current diet order adequate and realistic for the patient? How would you recommend nutrition support initiation and advancement to meet the patient's needs? Write two PES statements that reflects your assessment and include it in your note. In the Plan section, make very specific nutrition and monitoring recommendations for this patient at this point in time and for a nutrition support prescription.

MLA

Doley, Jennifer. "Enteral Nutrition Overview." *National Center for Biotechnology Information*, U.S. National Library of Medicine, 24 May 2022, www.ncbi.nlm.nih.gov/pmc/.

Murray, Joseph. "US5808090A - Process for Preventing Precipitation in Cimetidine Injection Solutions." *Google Patents*, Google, patents.google.com/patent/US5808090A/en. Accessed 26 Feb. 2024.

McClave, Stephen. "Guidelines for the Provision and Assessment of Nutrition Support ..." *American Society for Parenteral and Enteral Nutrition*, 14 Jan. 2016, aspenjournals.onlinelibrary.wiley.com/doi/full/10.1177/0148607115621863.

Progress Report Overview

Student:	**Xiaotong Fei**
Activity:	William Barnes
Start Time:	02/24/2024 22:40:15
End Time:	02/26/2024 07:26:43
Total Time:	09:47:20

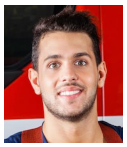
Actions

Note at 02/26/2024 07:25:36

William Barnes Documentation

Student: Xiaotong Fei
Activity Start: 02/24/2024 22:40:15
Activity Completion: 02/26/2024 07:26:43
Activity Completion: 09:47:20

Patient Data



Patient: William Barnes
Age/Sex: 32 yo M
Location: General Hospital

DOB: 10/15/1991
MR#: 62591
Admit Date: 02/24/2024

Notes

Note at 02/26/2024 02:00:18

ADIME Note

Basic Information

Date:
02/26/2024 02:00:18

Author:
Xiaotong Fei

Location:
General Hospital

Patient name:
William Barnes

Date:
Feb.26.2024

Assessment

Diagnosis:

Pt seen MD r/t 30% TBSA burn injury initially on Day 2. Pt has 15% TBSA burn injury on Day 10 and in need of feeding recommendation.

Age:
32 yo

Gender:

Male

Race:

White

Ethnicity:

Caucasion

Client History

Medical history:

Unable to obtain due to patient condition.

Medical diagnoses:

Unable to obtain due to patient condition.

Family history:

Parent are both alive. No further information gathered due to patient condition.

Social history:

According to pt's coworker, pt is an industrial chemist living alone.

Current medications:

SOL00057 Lactated Ringers (1000ML) 4mL/kg/hour
Aluminum Hydroxide 80 MG/ML / Magnesium Hydroxide 80 MG/ML / Simethicone 8 MG/ML Oral Suspension [Maalox Max] 4 ml q2h
Famotidine 0.4 MG/ML injectable solution 20 mg q12h

Nutrition-related medications:

Aluminum Hydroxide: high-protein meal decrease product's effect
Maalox Max: intake of citrates with this med induce toxicity, citrates are included in many soft drinks, citrus fruits, and juices.

Current supplements:

Unable to obtain due to patient condition.

Anthropometric history

Height:

178cm (70inch / 5'10'')

Weight at admission:

77.3kg (170lb)

Current Weight:

70kg (154lb)

BMI:

22.1 kg/m2

% Weight change:

9.4% weight loss in 10 days

IBW:

75.5kg (166lb)

% IBW:

92.7%

UBW:

unknown

% UBW:

unknown

Other:

none

Weight assessment:

Pt has a 9.4% wt loss since the weight at admission 10 days ago. The suspected factor for the severe weight loss is that the current diet order Jevity 1.2 @ 60 mL/hr x 24 hrs does not meet the burn injured pt's energy requirement.

Biochemical history, medical tests, labs, and procedures:

Glucose, Serum: 168 mg/dL H
Calcium, Serum: 8.3 mg/dL L
Sodium, Serum: 130 mmol/L L
ALT(SGPT): 33 U/L H
AST(SGOT): 42 U/L H
Albumin, Serum: 3.3 g/dL L

Nutrition Focused Physical Exam

Skin Assessment

☑ Wound

Edema
None

Feeding Ability

☑ Independent

Oral Motor

☑ Intact

Muscle and fat store assessment:

RD to return for NFPE when physically ready at next assessment.

If other, please explain:

There is no edema and pt has a 30% TBSA burn injury at admission and 15%TBSA burn injury at day 10 in hospital.

Food and Nutrition History

Current diet order:

Jevity 1.2 @ 60 mL/hr x 24 hrs

Assessment of usual intake:

Unable to obtain due to pt's condition.
N/A

Assessment of current intake:

Pt is currently on Jevity 1.2 @ 60 mL/hr x 24 hrs and consumes 100kcal/d PO due to calorie counts for the past 3 days. He also has 9.4% wt loss in 10 days with current diet order.

Supplements/herbals:

Unable to obtain due to pt's condition.
N/A

Food allergies and intolerances:

NKFA

Intake and digestive problems:

N/C

Assessment of Nutritional Status/Nutrition Risk

☑ No malnutrition noted

Nutrition Recommendations

kcal/day based on:

2115 kcal/d - 2585 kcal/d based on 70kg BW [25 kcal/kg x BW + 40 x 15% BSA]

g protein/day based on:

105g protein/d - 140g protein/d based on 70kg BW [1.5-2.0g protein/d : 1 kg BW]

mL fluid/day based on:

2115 mL fluid - 2585 mL fluid mL fluid based on [1 mL fluid : 1 kcal fed]

Other:

Pt doesn't have much appetite and refuses to consume PO due to his pain.

Nutrition assessment summary:

Pt currently on Jevity 1.2 @ 60 mL/hr x 24 hr with daily 100 kcal PO. He refused to eat PO since he feels too painful to move. Pt is in need of recommendation on his current diet order.

Diagnosis

Nutrition Diagnosis:

Inadequate energy intake (NI-1.2)
Inadequate protein intake (NI-5.6.1)

PES Statement:

Inadequate energy intake (NI-1.2) r/t pt's increased energy needs due to burn injury AEB pt's 9.4% weight loss in 10 days, calorie count for the past 3 days, and pt's reports losing appetite.

PES Statement:

Inadequate protein intake (NI-5.6.1) r/t pt's increased protein needs due to burn injury AEB calculated protein intake of 81g from Jevity 1.2 formula, N balance is -14.04 g N/d, pt's 9.4% weight loss in 10 days.

Nutrition Intervention

Nutrition prescription:

To prevent pt's further weight loss and to improve wound healing from his burn injury.

Food and nutrition delivery:

Diet rx:
Continue current formula [Jevity 1.2] with modification on volume and rate (ND-2.1.4) (ND-2.1.3)
Kcal: 2362 kcal/day + additional 100 kcal PO/day
Pro: 109 gm protein/day
Fluid: 1588 mL fluids/day with 127 mL free water flush q4hrs
Full Diet Rx: Patient requires: Jevity 1.2 at a goal rate of 82 mL/hr x 24 hrs. At goal, TF provides: 1968 mL formula, 2362 kcal/day, 109 gm protein/day, and 1588 mL fluids/day. Initiate tube feedings at 42 mL/hr advance by 20 mL q6hrs. Patient requires additional 762 mL free water flushes to meet fluid targets. Consider 127 mL free water q4hrs.

Rec'd change tube feed to Jevity 1.2 at 82 mL/hr x 24 hrs to increase the energy intake. (ND-1.2.2.1)
Rec'd increased fluid to restore electrolyte balance by providing additional free water flushes,127 mL free water q4hrs, aside from the formula. (ND-1.2.8.1)
Rec'd increase protein content in Jevity 1.2 (ND-1.2.3.2)

Nutrition education:

Discussed and rec'd increasing volume and rate of Jevity 1.2 to meet pt's increased kcal needs. (E-1.1)
Discussed and rec'd increasing protein in Jevity 1.2 to meet pt's increased protein needs. (E-1.1)

Nutrition counseling:

Strategies: Provide motivational interviewing on helping pt be more positive on his recovery progress (C-2.1). Provide goal setting strategy to encourage him gradually eat PO (C-2.2).
Goals:
Start PO by having a snack every 3 days/wk.
Report pain level to health care team once per day to assess pt's recovery.
Compliance: Expect poor compliance r/t pt has no family members in hospital staying with him and has no strong support system; and pt reports too painful to eat PO.

Coordination of care:

Refer pt to a SLP r/t pt reports pain with eating. Potential swallowing difficulties involved.

Monitoring and Evaluation

Food and nutrient intake:

Monitor energy and protein intake (FH-1.1.1.1) (FH-1.5.3.2.11) by health care team recording Jevity 1.2 formula measured volume multiple times per day (FH-1.3.1.1.4).
Monitor pt's compliance to his goal of consuming 3 snacks per week by pt recording himself 3 days/wk (FH-1.2).

Anthropometric measurements

Monitor weight (AD-1.1.2.1) 1x/wk.

Biochemical data:

Monitor serum calcium (BD-1.2.9) 1x/mon.
Monitor sodium (BD-1.2.5) 1x/mon.
Monitor BUN (BD-1.2.1) 1x/mon.

Nutrition focused physical findings:

F/U in hospital in 10 days.

Signature/credential/date:

Xiaotong Fei, Clinical Nutrition student, Feb.26.2024

170 lb = $\frac{170\ lb}{2.2\ lb/kg}$ = 77.27 kg
= 77.3 kg

5'10" = (5 ft × 12 inch/ft + 10 inch) × 2.54 cm/inch
= 177.8 cm ≈ 178 cm

WKST

6.

i. 25 - 30 kcal/kg BW × 77.3 kg = 1932.5 - 2319 kcal
= 1933 - 2319 kcal
mid: 2126 kcal

ii. 35 - 40 kcal/kg BW × 77.3 kg = 2705.5 - 3092 kcal
= 2706 - 3092 kcal
mid: 2899 kcal

iii. (10 × 77.3 kg) + (6.25 × 178 cm) - (5 × 32 yr) + 5
= 773 kg + 1112.5 cm - 160 yr + 5
= 1730.5 kcal × 1.1 [AF] × 1.5 (IF)
= 2855.325 kcal ≈ 2855 kcal

2855 ± (10% × 2855 kcal) = 2569.5 - 3140.5 kcal
≈ 2570 - 3141 kcal

iv. 25 kcal/kg × 77.3 kg + 40 × 30 BSA
= 1932.5 kcal + 1200
= 3132.5 kcal ≈ 3133 kcal → mid point

3133 kcal ± 10% = 2819.7 - 3446 kcal
= 2820 - 3446 kcal

#7. protein: 1.5 - 2.0 g protein/kg × 77.3 kg

= 115.95 - 154.6 g protein

≈ 116 - 155 g protein

fluid: 1 mL fluid / kcal fed × 1751 - 2140 kcal

= 1751 - 2140 mL fluid

#12. Energy: 25 kcal/kg × 70 kg + 40 × 15 %BSA

= 1750 kcal + 600

= 2350 kcal → mid point

2350 kcal ± (10% × 2350 kcal) = 2115 - 2585 kcal

protein: 1.5 - 2.0 g protein/kg × 70 kg

= 105 - 140 g protein

fluid: 2115 - 2585 kcal × 1 mL fluid/kcal fed

= 2115 - 2585 mL fluid

#13. Jevity 1.2 @ 60 mL/hr × 24 hrs

100 kcal/d PO

60 mL/hr × 24 hrs/day = 1440 mL formula/d

energy: 1440 mL formula/d × $\frac{1.2 \text{ kcal}}{1 \text{ mL formula}}$ = 1728 kcal/day

protein: 1440 mL × $\frac{1 \text{ L}}{1000 \text{ mL formula}}$ = 1.44 L × $\frac{56.5 \text{ gm Pro}}{1 \text{ L}}$

= 81.36 gm Protein

≈ 81 g protein

$\frac{1440 \text{ mL formula}}{\text{day}} \times \frac{80.7\% H_2O}{100 \text{ formula}}$

= 1162.08 mL water from formula

fluid: ≈ 1162 mL water from formula

14. N balance = $\frac{81\text{g protein}}{6.25} - (23\text{g} + 4)$

$= 12.96 - 27$

$= -14.04\ \text{g N/d}$

BMI: $\frac{\text{kg}}{\text{m}^2} = \frac{70\text{ kg}}{1.78\text{ m}^2} = \frac{70\text{ kg}}{3.1684\text{ m}^2} = 22.1\ \text{kg/m}^2$

% wt change: $\frac{77.3\text{kg} - 70\text{ kg}}{77.3\text{kg}} \times 100\%$

$= 9.44372\%$

$\approx 9.4\%$

IBW: 106 lbs + 6 lbs × 10 inch = 166 lbs

$\frac{166\text{ lbs}}{2.2\text{ lb/kg}} = 75.45\text{ kg} \approx 75.5\text{ kg}$

% IBW: $\frac{70\text{ kg}}{75.5\text{ kg}} \times 100\% = 92.7\%$

Food and Nutrient delievery:

Modify ? of Enteral nutrition.

energy needs: 2350 kcal → mid point. [2115 – 2585 kcal]

protein needs: 140 g → high end [105 – 140 g protein]

fluid needs: 2350 mL → mid point [2115 - 2585 mL]

$\frac{2350\text{ kcal}}{\text{day}} \times \frac{1\text{mL of Jevity 1.2}}{1.2\text{ kcal}} = 1958.33 \approx 1958\ \text{mL/day}$

$\frac{1958\text{ mL Jevity 1.2}}{\text{per day}} \times \frac{1\text{ day}}{24\text{ hr}} = 81.58\ \text{mL/hr} \approx 82\ \text{mL/hr}$

$\frac{82\text{ mL of Jevity 1.2}}{1\text{ hr}} \times \frac{24\text{ hrs}}{1\text{ day}} =$ total volume 1968 mL formula

$\frac{1968\text{ mL formula}}{\text{day}} \times \frac{1.2\text{ kcal}}{1\text{mL formula}} = 2361.6\text{ kcal} \approx [2362\text{ kcal}]$ within range

2362 kcal/day + 100 kcal PO/day = 2462 kcal/day

also within range

$$\frac{1968 \text{ mL formula}}{\text{day}} \times \frac{1 \text{ L}}{1000 \text{ mL formula}} = 1.968 \text{ L} \times \frac{55.5 \text{ gm Pro}}{1 \text{ L}}$$

$$= 109.224 \text{ gm Pro}$$

$$\approx 109 \text{ gm Pro}$$

protein needs within range

$$\frac{1968 \text{ mL formula}}{\text{day}} \times \frac{80.7\% \ H_2O}{100 \text{ formula}}$$

$$= 1588.176 \approx 1588 \text{ mL } H_2O$$

water from fomula

2350 mL water/day required − 1588 mL water from formula

= 762 mL

762 mL / 6 flushes = 127 mL/flush × 6 per day

127 mL q 4

50% of 82 mL is about 42 mL

75%: 42 mL + 20 mL = 62 mL

100%: 62 mL + 20 mL = 82 mL