

Kathleen Villarino  
Clinical Rotation  
ADIME  
Nutrition Support Chart

## Case 30

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# Metabolic Stress and Trauma

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### Objectives:

After completing the case, the student will be able to:

1. Apply knowledge of the pathophysiology of trauma and metabolic stress in order to provide nutrition support for the critically ill patient.
2. Identify the basic components of indirect calorimetry.
3. State specific indications for the use of indirect calorimetry in critically ill patients.
4. Interpret the respiratory quotient (RQ).
5. Compare different predictive equations that are appropriate for use in the critically ill population and identify their indications.
6. Assess the benefits of utilizing enteral nutrition support in a patient on parenteral nutrition.
7. Understand the current research that interprets the role of polyunsaturated fats in the inflammatory process.
8. Determine and prioritize nutrition diagnoses and write a PES statement for a critically ill patient.

Juan Perez is a 29-year-old male admitted to the Trauma Intensive Care Unit with a gunshot wound to the upper abdomen. He experienced gastric, duodenal, and jejunal injuries, liver laceration, and a left pleural effusion.

ADMISSION DATABASE

Form containing admission data: BED # 5, DATE 7/1, TIME 0730, TRIAGE STATUS (ER ONLY) checked Red, PRIMARY PERSON TO CONTACT Name: N/A, Initial Vital Signs TEMP: 39, RESP: 22, SAO2: , HT: 5'10", WT: 225, B/P: 115/65, PULSE: 90, CHIEF COMPLAINT/HX OF PRESENT ILLNESS unresponsive, ALLERGIES unknown, PREVIOUS HOSPITALIZATIONS/SURGERIES unknown, Home Medications table, PATIENT/FAMILY HISTORY, RISK SCREENING, and FOR WOMEN Ages 12-52.

Additional comments:

\* M. Barber, RN
Signature/Title

**Client name:** Juan Perez

**DOB:** 3/22

**Age:** 29

**Sex:** Male

**Education:** High school diploma

**Occupation:** Convenience store clerk

**Hours of work:** Varies; primarily the night shift, 11 PM to 7 AM

**Household members:** Lives with his brother, his brother's wife, and their two children ages 2 and 4

**Ethnic background:** Hispanic

**Religious affiliation:** Catholic

**Referring physician:** Deborah Kuhls, MD

**Chief complaint:**

The patient was brought into the emergency room by a friend after he had been shot in the abdomen. He was vomiting blood, and complained of severe back and "stomach" pain. He was able to respond to a few questions initially but stated the pain "was too bad for me to think." He denied being allergic to any medications or having any chronic medical problems.

**Patient history:**

*Onset of disease:* Brought into the ER by a friend at 2 AM yesterday vomiting blood, and with obvious bleeding wounds from abdominal area.

*PMH:* Unremarkable

*Meds:* None

*Smoker:* Yes

*Family Hx:* What CAD Who? Unknown

**Physical exam:**

*General appearance:* Mildly obese 29-year-old Hispanic male on mechanical ventilation

*Vitals:* Temp 102.6°F, BP 115/65 mm Hg, HR 135 bpm/normal, RR 20 bpm

*Heart:* Noncontributory

*HEENT:* NG tube in place for decompression

*Rectal:* Not done

*Neurologic:* Sedated

*Extremities:* 4+ bilateral pedal edema noted

*Skin:* Warm, moist

*Chest/lungs:* Lungs clear to auscultation and percussion

*Peripheral vascular:* Pulses full—no bruits

*Abdomen:* Abdominal distension, wound VAC in place, three tubes draining peritoneal fluid, hypoactive BS present in all regions. Liver percusses approx 8 cm at the midclavicular line, one fingerbreadth below the right costal margin.

**Nutrition Hx:**

*General:* Weight obtained from patient's brother who stated that patient usually weighs about 225 lb height 5'10", and has not lost or gained a significant amount of weight recently. He denies that his

brother follows any special diet. Reports that his brother usually drinks “several beers” every night, more on the weekend.

**Dx:**

Abdominal GSW

**Tx plan:**

He was immediately taken to surgery where he underwent an exploratory damage-control laparotomy, gastric repair, control of liver hemorrhage, and resection of proximal jejunum, leaving his GI tract in discontinuity.

**Hospital course:**

After surgery, the patient was transferred to the Trauma Intensive Care Unit and maintained on mechanical ventilation. He returned to surgery on hospital day 2 to remove packs, and to reestablish bowel continuity. An abdominal vacuum-assisted closure (VAC) device was placed. Three Jackson-Pratt drains were left in place. On hospital day 3, the patient was taken back to surgery where an anastomotic leak was detected. A gastrojejunostomy tube was inserted through the patient’s stomach, with the jejunal limb shortened in order to provide antegrade intraluminal drainage, as well as a retrograde jejunostomy tube for drainage. On hospital day 7, the patient was again taken to surgery for an abdominal washout, insertion of a distally placed J-tube for feeding, and a VAC change. The patient subsequently returned to the OR for multiple washouts and reapplication of a wound VAC. Nutrition consult was ordered by the trauma surgeon after this initial surgery on hospital day 1.

As per the clinical RD’s recommendations, total parenteral nutrition (TPN) was initiated on hospital day 2 with dextrose 300 g and amino acids 170 g per day. Lipid emulsions were not recommended at this time. Although the patient was determined to have good nutritional status prior to his admission, he was now assessed to be at high nutritional risk due to the need for mechanical ventilation, large wounds, fluid and electrolyte losses, altered GI function, and the need for parenteral nutrition support. Energy needs were determined based on the patient’s usual weight, rather than the current weight of 110 kg, due to the significant amount of generalized anasarca noted. The patient’s medications included morphine, lorazepam, propofol @ 35 mL/hr, esomeprazole, meropenem, and vancomycin. A metabolic cart measurement was obtained on hospital day 4, which revealed the following: REE 3657 RQ 0.76. Blood glucose levels ranged from 107–185, and patient was placed on the insulin drip protocol. Dextrose was increased in the TPN to 350 g, and amino acids were increased to 180 g. On hospital day 10, the propofol was discontinued, and a second metabolic cart was obtained (REE 3765 RQ 0.70). At this point, IV lipids were added (250 mL three times per week). Blood glucose levels ranged from 110–145. Triglyceride levels were less than 400 mg/dL. Enteral nutrition support (Crucial with 1.5 calories per mL and 94 g of protein per liter) was initiated on hospital day 11 utilizing the jejunostomy tube at 10 mL/hr. On hospital day 12, the enteral nutrition formula was advanced to 15 mL/hr, and on hospital day 13, it was advanced to 20 mL/hr, at which point it was noted that enteral formula was draining from the anastomotic leak, and the enteral feeds were decreased to 15 mL/hr where they remained for the duration of his ICU stay.

# UH UNIVERSITY HOSPITAL

NAME: Juan Perez  
 AGE: 29  
 PHYSICIAN: Deborah Kuhls, MD

DOB: 3/22  
 SEX: M

\*\*\*\*\*CHEMISTRY\*\*\*\*\*

DAY:	4	10		
DATE:	7/5	7/11		
TIME:	0600	0545		
LOCATION:	TICU	TICU		
	NORMAL		UNITS	
Albumin	3.5-5	1.4 L	1.9 L	g/dL
Total protein	6-8	5.2 L	5.1 L	g/dL
Prealbumin	16-35	3.0 L	5.0 L	mg/dL
Transferrin	250-380 (women) 215-365 (men)	190 L	160 L	mg/dL
Sodium	136-145	146 H	140	mEq/L
Potassium	3.5-5.5	4.0	3.7	mEq/L
Chloride	95-105	99	99	mEq/L
PO <sub>4</sub>	2.3-4.7	2.2 L	2.4	mg/dL
Magnesium	1.8-3	1.9	1.5 L	mg/dL
Osmolality	285-295	317 H	305 H	mmol/kg/H <sub>2</sub> O
Total CO <sub>2</sub>	23-30	25	26	mEq/L
Glucose	70-110	164 H	140 H	mg/dL
BUN	8-18	23 H	25 H	mg/dL
Creatinine	0.6-1.2	1.4 H	1.6 H	mg/dL
Uric acid	2.8-8.8 (women) 4.0-9.0 (men)	8.9		mg/dL
Calcium	9-11	7.1		mg/dL
Bilirubin	≤ 0.3	.04		mg/dL
Ammonia (NH <sub>3</sub> )	9-33	10		μmol/L
ALT	4-36	435 H		U/L
AST	0-35	190 H		U/L
Alk phos	30-120	540 H		U/L
CPK	30-135 (women) 55-170 (men)	167 H		U/L
C-reactive protein	< 1.0	245 H	220 H	mg/dL
LDH	208-378	750 H		U/L
CHOL	120-199	180		mg/dL
HDL-C	> 55 (women) > 45 (men)	40 L		mg/dL
VLDL	7-32	110 H		mg/dL
LDL	< 130	140 H		mg/dL
LDL/HDL ratio	< 3.22 (women) < 3.55 (men)			
Apo A	101-199 (women) 94-178 (men)			mg/dL
Apo B	60-126 (women) 63-133 (men)			mg/dL
TG	35-135 (women) 40-160 (men)	274 H	265 H	mg/dL
T <sub>4</sub>	4-12			mcg/dL
T <sub>3</sub>	75-98			mcg/dL
HbA <sub>1c</sub>	3.9-5.2	7 H		%



NAME: Juan Perez  
 AGE: 29  
 PHYSICIAN: Deborah Kuhls, MD

DOB: 3/22  
 SEX: M

\*\*\*\*\*HEMATOLOGY\*\*\*\*\*

DAY:		4	
DATE:		7/5	
TIME:			
LOCATION:	NORMAL		UNITS
WBC	4.8-11.8	15.2 H	$\times 10^3/\text{mm}^3$
RBC	4.2-5.4 (women)	3.2 L	$\times 10^6/\text{mm}^3$
HGB	4.5-6.2 (men)	14	g/dL
HCT	12-15 (women)	35 L	%
MCV	14-17 (men)	82	$\mu\text{m}^3$
RETIC	37-47 (women)	0.9	%
MCH	40-54 (men)	27	pg
MCHC	80-96	33	g/dL
RDW	0.8-2.8	12	%
Plt Ct	26-32	180	$\times 10^3/\text{mm}^3$
Diff TYPE	31.5-36		
ESR	11.6-16.5		mm/hr
% GRANS	140-440		%
% LYM	0-25 (women)		%
SEGS	0-15 (men)		%
BANDS	34.6-79.2		%
LYMPHS	19.6-52.7		%
MONOS	50-62		%
EOS	3-6		%
Ferritin	24-44	45	mg/mL
ZPP	4-8		$\mu\text{mol}/\text{mol}$
Vitamin B <sub>12</sub>	0.5-4		ng/dL
Folate	20-120 (women)		$\mu\text{g}/\text{dL}$
Total T cells	20-300 (men)		$\text{mm}^3$
T-helper cells	30-80		$\text{mm}^3$
T-suppressor cells	24.4-100		$\text{mm}^3$
PT	5-25	9 L	sec

**UH** UNIVERSITY HOSPITAL

NAME: Juan Perez DOB: 3/22  
 AGE: 29 SEX: M  
 PHYSICIAN: Deborah Kuhls, MD

\*\*\*\*\*URINALYSIS\*\*\*\*\*

DAY: 4  
 DATE: 7/5  
 TIME: 0600  
 LOCATION: TICU

	NORMAL		UNITS
Coll meth			
Color		Random specimen	First morning
Appear		Pale yellow	Pale yellow
Sp grv	1.003-1.030	Cloudy	Clear
pH	5-7	1.045	
Prot	NEG	+1	mg/dL
Glu	NEG	+1	mg/dL
Ket	NEG	0	
Occ bld	NEG	0	
Ubil	NEG	0	
Nit	NEG	0	
Urobil	<1.1	0	
Leu bst	NEG	0	EU/dL
Prot chk	NEG	0	
WBCs	0-5	0	
RBCs	0-5	0	/HPF
EPIs	0	0	/HPF
Bact	0	5	/LPF
Mucus	0	5	
Crys	0	0	
Casts	0	0	
Yeast	0	2	/LPF





Name: Juan Perez  
Physician: Deborah Kuhls, MD

PATIENT CARE SUMMARY SHEET

Date: 7-5		Room: 5							Wt Yesterday: 107 kg							Today: 109 kg								
Temp °F	NIGHTS							DAYS							EVENINGS									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
105																								
104																								
103																								
102																								
101																								
100																								
99																								
98																								
97																								
96																								
Pulse	95					90										85								
Respiration-On Vent																								
BP																								
Blood Glucose	175					166										160								
Appetite/Assist																								
INTAKE																								
Oral																								
IV TPN	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
TF Formula/Flush																								
Shift Total																								
OUTPUT																								
Cath	25					40										60								
Void.																								
Emesis																								
BM																								
Drains (JP)	110	40	50	65	60	30	90	80	25	95	75	70	80	75	70	65	60	60	90	70	75	85	90	85
Shift Total																								
Gain	3640							3890							4050									
Loss	3750							3650							3775									
Signatures	<i>S. Williams, RT</i>							<i>K. Suga, RN</i>							<i>E. Shewmake, RN</i>									

## Nutrition Support Chart Notes

### Assessment

The patient is a 29-year-old male in the ICU with a gunshot wound.

#### *Anthropometric Data*

Ht: 5'10"

CBW: 225 lbs

BMI: 32.3 (Class I Obesity)

IBW:  $106 + 6(10) = 166$  lbs /  $2.2 = 75.5$  kg

Energy needs:  $22$  kcal/kg body wt =  $22 \times 75.5 = 1661$  kcals

#### *Pertinent Lab Values:*

Blood glucose levels 107-185 mg/dL (day 4), 110-145 mg/dL (day 10)

Triglycerides <400 mg/dL

#### *Medical History:*

1. Patient reported having a family history of CAD but was unable to provide more information. Patient is a smoker as per brother.

2. Patient has undergone exploratory damage-control laparotomy, gastric repair, control of liver hemorrhage, and proximal jejunum resection during his hospital stay.

#### *Medications:*

1. None before admission to ER.

2. Morphine (via IV), lorazepam, propofol (35 mL/hr), esomeprazole, meropenem, and vancomycin.

#### *Diet History:*

No wt change as per brother.

Regular diet. Several beers daily, more on the weekend.

### Diagnosis

Inadequate protein energy intake related to altered GI function secondary to gunshot wound and gastric resection and resection of proximal jejunum as evidenced by post-op NPO status.

### Intervention

1. Initiation of total parenteral nutrition containing 300 g of dextrose and 170 g of amino acids per day.

### Monitoring & Evaluation

1. Continue to monitor energy needs and increase TPN components and dosage to appropriate types and levels as needed.

2. Monitor blood glucose and triglyceride levels.

3. Monitor patient's condition to see if he can transition to enteral feeding.

## Questions:

1. Intern's comments about nutritional intervention(s) for this patient. How receptive was / were the patient and family to nutrition intervention? What were the factors that influenced this the most? Patient/family factors? Institutional/environmental factors?

N/A

2. Was the nutrition intervention successful? Why/Why not?

N/A

## Glossary of unfamiliar terms:

**Pleural effusion** – build-up of excess fluid between the thin membranes that line the lungs and the inside of the chest cavity (pleura).

**Vacuum-assisted closure** - use of vacuum-assisted drainage to remove blood or serous fluid from a wound or operation site.

**Jackson Pratt drain** - A Jackson-Pratt (JP) drain is a type of drain that is placed in an incision during surgery. The drain is made up of a hollow tube that is connected to an egg-shaped bulb. The hollow tube begins inside the incision and exits the body. Attached to the end of the tube outside of the body is the collection bulb. The JP drain helps drain excess blood and fluid from under the skin and the incision site.

**Anastomotic** – surgical connection between two structures.

**Anasarca** – another term for edema

**Meropenem** – is an antibiotic injection used to treat skin and abdominal (stomach area) infections caused by bacteria and meningitis (infection of the membranes that surround the brain and spinal cord).

## Applies to:

**CRDN 1.6** Incorporate critical-thinking skills in overall practice.

**CRDN 2.1** Practice in compliance with current federal regulations and state statutes and rules, as applicable and in accordance with accreditation standards and the Scope of Nutrition and Dietetics Practice and Code of Ethics for the Profession of Nutrition and Dietetics.

**CRDN 2.2** Demonstrate professional writing skills in preparing professional communications.

**CRDN 2.11** Show cultural competence/ sensitivity in interactions with clients, colleagues and staff.

**CRDN 3.1** Perform the Nutrition Care Process and use standardized nutrition language for individuals, groups and populations of differing ages and health status, in a variety of settings.

**CRDN 3.3** Demonstrate effective communications skills for clinical and customer services in a variety of formats and settings.

**CRDN 4.10** Analyze risk in nutrition and dietetics practice.