

PICU Nutrition Case Study 1

3 month old female, admitted for routine Ladd's procedure for malrotation and G-tube placement. Post op required transfer to the PICU due to shock, on return to OR for abdominal exploration found to have 360 degree midgut volvulus with diffuse bowel necrosis. S/p multiple resections and hemicolectomy with 80 cm small bowel remaining and distal jejeunal end ostomy. Currently intubated.

Pertinent patient information:

Admit Weight: 5.25 kg

Current Weight (day 3): 6.1 kg

NFPE Findings: Appropriate fat store throughout, chest is full, ribs do not show. Tight generalized edema. Normal hair, skin, nails.

Total Fluid Goal: 80% Maintenance including drips

Current Fluid Order: D5 0.9%NS+ 20 mEq/L KCl @ 21 ml/hr

Labs: Na: 149 (H), K: 4.8, Chloride: 115 (H), Carbon Dioxide: 21.5 (L), Glucose: 130 (H), Arterial Base Deficit: -6.1, Ca: 8.8, Albumin 2.9, Phos: 4.2, Mg: 2.0

Current drips: Epinephrine 0.25 ml/hr, Vecuronium: 0.52 ml/hr, Dexmedetomidine 1.3 ml/hr, Fentanyl 0.42 ml/hr, CVP 2 ml/hr. **Total: 4.5 ml/hr**

1. Plan to start TPN- what is your Nutrition Prescription?
 - a. Calories- **400-460 kcal (77-88 kcal/kg), REE x 1.4-1.6**
 - b. Protein- **>2.5 g/kg (ASPEN Critical Care Guidelines)**
 - c. Fluid- **525 mL (100 mL/kg)**
 - d. What weight are basing your calculations on? **5.25 kg admit weight**
2. Determine volume of fluid available for TPN.
 $525 \text{ mL} \times 0.8 \text{ (80\% maintenance)} = 420 \text{ mL total fluid} / 24 \text{ hours} = 17.5 \text{ mL/hr}$
 $17.5 \text{ mL/hr} - 4.5 \text{ mL/hr (drips)} = \mathbf{13 \text{ mL/hr} \times 24 \text{ hours (312 mL)}}$
3. Which type of lipid will you use? Calculate volume from lipids.
Goal 3.0 g/kg/day **SMOF** lipid - suspected long term TPN need, short gut
 $3.0 \text{ g/kg} \times 5.25 \text{ kg} = 15.75 \text{ g} \times 5 \text{ mL/g} = 78.7 \text{ mL}$
 $78.7 \text{ mL lipids} / 24 \text{ hours} = \mathbf{3.3 \text{ mL/hr}}$
4. Calculate amount of fluid available for PN (minus volume from lipids)
 $13 \text{ mL/hr} - 3.3 \text{ mL/hr lipids} = 9.7 \text{ mL/hr}$, we can round to 10 mL/hr
 $\mathbf{10 \text{ mL/hr} \times 24 \text{ hours} = 240 \text{ mL}}$
5. Goal Amino Acid 3.0 g/kg, goal GIR = 8 mg/kg/min. Calculate %Dextrose.
 $8 \text{ mg/kg/min} \times 5.25 \text{ kg} \times 1.44 \text{ (1440 minutes/1000 mg/g dextrose)} = 61 \text{ g dextrose}$
 $61 \text{ g dextrose} / 240 \text{ mL PN volume} \times 100 = \mathbf{D25\%}$

6. Determine Micronutrients in PN

Sodium: **3.5** mEq/kg ($77 \text{ mEq/L} \times 0.24 \text{ L} / 5.25 \text{ kg}$)

Potassium: **0.9** mEq/kg ($20 \text{ mEq/L} \times 0.24 \text{ L} / 5.25 \text{ kg}$)

Calcium: **1.5** mEq/kg

Phos: **0.8** mEq/kg

Mg: **0.5** mEq/kg

7. Patient ready for extubation, weaning off all medication drips. Will liberalize TPN fluid goal to 100% maintenance fluid need.

a. What will new TPN rate be?

$$525 \text{ mL} / 24 \text{ hours} = 21.9 \text{ mL/hr} - 3.3 \text{ mL/hr lipids} = \mathbf{18.5 \text{ mL/hr} \times 24 \text{ hours (444 mL)}}$$

b. Which TPN components will need to be adjusted based on volume change?

Dextrose- $61 \text{ g dextrose} / 444 \text{ mL} \times 100 = \text{D14\%}$

Sodium- $77 \text{ mEq/L} \times .444 \text{ L} = 34 \text{ mEq} / 5.25 \text{ kg} = 6.5 \text{ mEq/kg}$