

**Artificial Nutrition Support for Adults
through the Continuum of Care Part 2-
Parenteral Nutrition Webinar 11/14/24
Elizabeth Wall, MS, RDN-AP, CNSC**



Questions & Answers

Calories, Protein, Fluids

1. When assessing an obese patient do you use actual weight, adjusted BW or IBW?
Whether to adjust body weight or not really depends on the equation you choose to use. For example, for critically ill patients ASPEN & SCCM recommend 11-14 kcal/kg actual weight for BMI 30-50, and 22-25 kcal/kg ideal weight for BMI >50.

2. Can you clarify, keep amino acids less than 1.5g/kg/d or greater than?
For parenteral nutrition, amino acids ≤ 1.5 g/kg/d unless major burns, very large wounds, and/or dialysis.

3. With preventing fluid overload, what exactly are we looking for in amounts of IV infusions with medications, etc.? Is there a max amount of daily fluids from all infusions?

No, there isn't a maximum or minimum IV fluid requirement. Really you want to be sure the IV fluids plus medications are providing enough volume for the kidneys to produce at least 1L urine/24 hr and not much more than 2L urine/d (unless using diuretics). Patients are heterogeneous with fluid needs based on weight, fluid losses/excretions, and hemodynamic stability.

Generally, for maintenance purposes, most people who are NPO need 1.5-2.5L/d. It becomes complicated when the pt gets into a vicious cycle where the more fluid input, then higher the losses, then more fluid input, and on and on. The jejunum is leaky and when IVFs are infused at very high rates the hydrostatic pressure in the capillaries causes fluid to leak into the bowel which makes it appear that the patient has more GI losses, but actually it is very high rates of IVF infusions. We see this happen when there are nursing orders to replace GI losses with $\frac{1}{2}$ or 1 mL IVF per 1 mL GI fluid loss. Over days the GI losses and IVF input escalate; in this case if you cut back to a physiologic IVF rate (20-40 mL/kg dry wt/d) then the GI losses actually decrease and the patient feels better.

To summarize, in general, the fluid rate will be based on weight, hemodynamic vital signs and urine output, rarely >125 mL/hr.

4. Do you recommend meeting protein needs over meeting calorie needs or vice versa with PN patients?

For patients with wounds or protein losses, as in dialysis, then I definitely prioritize protein over calories. If your PN supply is limited to a few pre-mixed solutions, you can tweak the lipid volume to make up calories.

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Lipids

5. With SMOF lipid we were told that there was a risk of shellfish contamination and therefore no SMOF if pt has a shellfish allergy. What is your practice?
The manufacturer (on the package insert) does not list shellfish as a potential allergen, therefore we only hold for fish (not shellfish) allergy. Fish and shellfish are distinctly different allergens without known cross-reactivity.
6. I have understood that commercially manufactured lipids i.e., soybean oil, omega 3 oils from fish have been processed to remove the allergens i.e., soy and fish.
I have had patients react to ILEs, allergic reaction is listed as a potential risk on the package insert, and there are case reports in the literature, so it is probably prudent to screen for the allergens before infusing ILE and avoid in those with known egg, soy, fish (with fish oil-containing lipids) allergies.

Tests

7. Is there an upper limit for AST and ALT?
The levels vary from laboratory to laboratory, but approximately: AST 8-37 U/L and ALT 8-35 U/L. Generally, they are considered elevated if the levels are 1.5 x above the upper limit of normal.
8. Is there a test you recommend to determine malabsorption?
It depends on the patient symptoms. Symptoms may give you a clue for which nutrient they are malabsorbing as well as the patient's underlying disease/illness. Generally, when we test for malabsorption in hospitalized patients we are targeting fat malabsorption. A quantitative 48 hour fecal fat test is the standard (100 g fat diet for 2 days prior to and during the stool collection) for fat malabsorption. In hospitalized patients it is relatively easy to complete as you can measure how much fat is ingested/infused and the collection is managed by the nurses.
9. At what level of bilirubin should we hold off giving Manganese/Cu?
Great question. Cholestasis is considered a total bilirubin >2.0, but I am unaware of guidelines for when to reduce or eliminate the copper or manganese. Our practice is to remove when the total bilirubin is ≥ 5.0 .

Allergies

10. Is there a problem with PN in the presence of a sulfite allergy?
There are sulfite-free PN preparations. This could be the trigger with the micronutrient additives. For patients with sulfite allergy, have the clinical or compounding pharmacist check all of the package inserts for the PN to ensure the pharmacy is using the sulfite-free additives.

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11. Can you share your experience in ordering a test PN to avoid possible allergy?
For patients with a known allergy to egg, soy, or fish (if using a mixed oil emulsion), we try not to give lipid emulsions. Essential fatty acid deficiency takes ~2 weeks without fat intake. If the patient is completely NPO more than 2-3 weeks, and the allergic reaction is not anaphylaxis, then we will give a test dose of lipid under direct observation of a physician or physician extender and have epinephrine at the bedside. If the allergy is considered life-threatening, but the patient needs the PN ingredient, then we move them to the ICU for the test dose. For outpatients who develop reactions after hospital discharge, we have sent them to the allergy clinic with each of the PN additives and the allergist does skin tests.
12. Can TPN formulas feasibly include primarily olive oil instead of soybean oil for optimal nutrition and minimizing allergy risk?
There is a lipid emulsion on the market in the U.S. that is 80% olive oil, 20% soybean oil. Unfortunately, if the allergy is egg, all intravenous lipid emulsion contain the same concentration of egg phospholipid.

Home PN

13. Why do my home PN patients eat a lot of food? The providers know the person eats, but still orders PN?
Some home PN patients have malabsorption so they can eat but cannot assimilate sufficient nutrients from the foods/beverages; we call this pleasure eating. We encourage all of our home PN pts to eat at least a little (as long as they are not obstructed or have a fistula we are working to close) because it helps to maintain the gut mucosa and stimulates hepatobiliary secretions and gallbladder contractility, all of which helps reduce the risk of parenteral nutrition associated liver disease.

Miscellaneous

14. I see you work with patients with SBS - do you use glutamine much? If so, what is difference b/c glutamine and L-glutamine - and where can they get this if using at home after?
We do not use glutamine as there isn't sufficient data to support efficacy. GLP-2 analogues are most helpful for mucosal hypertrophy, improved absorption, and PN weaning.
15. Refeeding with 150 gm of dextrose provided prior to administration of TPN?
150 g dextrose for a 50 kg malnourished pt could cause electrolyte shifts. The case-study patient might have refeed if she had not received such a high dextrose load prior to the PN starting, but since she received the dextrose with electrolyte replacements before the PN, then she really did not refeed.

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16. Do you add insulin to TPN while in the hospital?

Yes. We find that insulin in the PN is much more effective than subcutaneous insulin.

17. Do you have to ramp up when cycling? We usually just ramp down.

You really only need to ramp down to prevent rebound hypoglycemia.

18. Define "increase slowly" What does this look like in practice?

Generally, start with approximately 30-50% energy and as long as the electrolytes and glucose stay within normal limits, then you can increase by about 33% each day. If however, you need to give insulin or electrolyte replacements, then do not advance again until the labs are stable. It can take 2-5 days to ramp the PN to goal (2 days for well-nourished patients, about 5 days for those who are malnourished and need electrolyte replacements).

In my experience, with the pre-mixed PN solutions available at my institution, I will start at 42 mL/hr (provides 100 or 150 g dextrose in 24 hr based on the solution's concentration/what we have available). If the patient requires K⁺, Mg⁺⁺, Phos replacement, then keep the same rate until electrolytes are stable. Once the patient does not need riders for electrolyte levels to be within the normal range (not the middle of normal range – our physicians always replete until the electrolytes are mid-range, but for PN purposes you really only need electrolytes within ranges), then you can increase by about 20 mL/hr (~33%) each day. If your patient does not refeed/electrolyte shifts, then generally you can go from the starting 42 mL/hr and increase up to 1L/d (42 mL/hr → 83 mL/hr) or to the goal if that is less than a 2L rate.