Parenteral Nutrition

Parenteral nutrition (PN), also referred to as total parenteral nutrition (TPN) or intravenous hyperalimentation (IVH), is provided when the gastrointestinal tract is nonfunctional because of an interruption in its continuity or because its absorptive capacity is impaired. Parenteral nutrition is administered intravenously such as through a central venous catheter into the superior vena cava.

Parenteral feedings are solutions of dextrose, water, fat, proteins, electrolytes, vitamins, and trace elements; they provide all needed calories. Because TPN solutions are hypertonic (highly concentrated in comparison to the solute concentration of blood), they are injected only into high-flow central veins, where they are diluted by the client’s blood.

TPN is a means of achieving an anabolic state in clients who are unable to maintain a normal nitrogen balance. Such clients may include those with severe malnutrition, severe burns, bowel disease disorders (e.g., ulcerative colitis or enteric fistula), acute renal failure, hepatic failure, metastatic cancer, or major surgeries where nothing may be taken by mouth for more than 5 days.

TPN is not risk-free. Infection control is of utmost importance during TPN therapy. The nurse must always observe surgical aseptic technique when changing solutions, tubing, dressings, and filters. Clients are at increased risk of fluid, electrolyte, and glucose imbalances and require frequent evaluation and modification of the TPN mixture.

TPN solutions are 10% to 50% dextrose in water, plus a mixture of amino acids and special additives such as vitamins (e.g., B complex, C, D, K), minerals (e.g., potassium, sodium, chloride, calcium, phosphate, magnesium), and trace elements (e.g., cobalt, zinc, manganese). Additives are modified to each client’s nutritional needs. Fat emulsions may be given to provide essential fatty acids to correct and/or prevent essential fatty acid deficiency or to supplement the calories for clients who, for example, have high calorie needs or cannot tolerate glucose as the only calorie source. Note that 1,000 mL of 5% glucose or dextrose contains 50 grams of sugar. Thus, a liter of this solution provides less than 200 calories!

Because TPN solutions are high in glucose, infusions are started gradually to prevent hyperglycemia. The client needs to adapt to TPN therapy by increasing insulin output from the pancreas. For example, an adult client may be given 1 liter (40 mL/hr) of TPN solution the first day; if the infusion is tolerated, the amount may be increased to 2 liters (80 mL/hr) for 24 to 48 hours, and then to 3 liters (120 mL/hr) within 3 to 5 days. Glucose levels are monitored during the infusion.

When TPN therapy is to be discontinued, the TPN infusion rates are decreased slowly to prevent hyperinsulinemia and hypoglycemia. Weaning a client from TPN may take up to 48 hours but can occur in 6 hours as long as the client receives adequate carbohydrates either orally or intravenously.

Enteral or parenteral feedings may be continued beyond hospital care in the client’s home or may be initiated in the home.

Evaluating

The goals established in the planning phase are evaluated according to specific desired outcomes, also established in that phase (see Identifying Nursing Diagnoses, Outcomes, and Interventions on page 1260).

If the outcomes are not achieved, the nurse should explore the reasons. The nurse might consider the following questions:

- Was the cause of the problem correctly identified?
- Was the family included in the teaching plan? Are family members supportive?
- Is the client experiencing symptoms that cause loss of appetite (e.g., pain, nausea, fatigue)?
- Were the outcomes unrealistic for this person?
- Were the client’s food preferences considered?
- Is anything interfering with digestion or absorption of nutrients (e.g., diarrhea)?