

Solutions for your Nutritionally Challenged Dialysis Patients

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Posted on: 08/01/2007



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Hypoalbuminemia. Significant weight loss. Low body weight. An inability to consume adequate oral intake. Poor nutritional status. How many of these nutritional concerns do you face every day in your dialysis center?

You are not alone in the struggle for improving nutritional outcomes. As noted in the 2000 Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines of the National Kidney Foundation, protein calorie malnutrition is one of the strongest predictors of morbidity and mortality. It is estimated that 33 percent of end-stage renal disease (ESRD) patients exhibit some degree of protein calorie malnutrition and 10 percent are severely malnourished.¹ This means that almost half of the dialysis population is currently at risk or will, over the course of their lives on dialysis, develop some degree of malnutrition requiring more aggressive nutrition therapy.

Nutrition obstacles and unfortunate mortality rates have plagued the ESRD population throughout the years. Although diet counseling by a registered dietitian (RD) and oral nutritional supplements may be effective for some people, it may not be adequate for all nutritionally challenged dialysis patients. More aggressive therapies of repletion are often not considered but are certainly available in the outpatient setting. Solutions to these challenges, available as intra dialytic parenteral nutrition (IDPN) for hemodialysis patients and intra peritoneal nutrition (IPN) for peritoneal dialysis patients, deserve consideration when providing the best nutritional care for your dialysis patients.

What is IDPN?

IDPN is nutritional support therapy for people on hemodialysis who have a difficult time maintaining an adequate nutritional status. It is a parenteral solution containing up to three macronutrients: protein, carbohydrate and fat. These three-in-one solutions can be individualized for each patient based on weight, needs, medical history and enteral intake.

Protein is supplied as amino acids. Standard formulations are used which provide both essential and non-essential amino acids. Protein content ranges for each patient and is established with consideration of the K/DOQI recommendations of > 1.2 gm protein/kg.

Carbohydrate is supplied as dextrose within the IDPN solution. There are variations for the clearance and oxidation of dextrose (carbohydrate) in patients. Even though many renal patients tolerate IDPN formulas that contain dextrose levels above published glucose oxidation rates, the dextrose clearance range of 3-9 mg/kg/min should be considered when determining carbohydrate content of solutions.² Special attention should be paid to diabetic patients.

Lipids (1.1 – 2.9 kcal/mL) are the most calorically dense component of the IDPN solution. Recommendations of < 4 mg/kg/min, together with clinical diagnoses, should be used to determine the amount of fat emulsion in the IDPN. Fat emulsion administration > 4.0 mg/kg/min exceeds ability for clearance.³ Lipids are contraindicated for use in IDPN solutions if there are allergies to eggs and/or soy.

Micronutrients, e.g., vitamins and minerals, are typically not a routine additive; however, they may be considered for specific patient need. Dialysis patients are always encouraged to continue taking their ordered oral vitamin(s).

What is IPN?

IPN is nutritional support therapy for people on peritoneal dialysis. An IPN solution replaces a portion of the patient's daily dialysate regimen with a readily available protein source in the form of amino acids. IPN solutions can replace a continuous ambulatory peritoneal dialysis (CAPD) dwell, or can be used as last fill dwell or manual dwell for continuous cyclic peritoneal dialysis (CCPD) patients. As early studies have demonstrated, the dwell time for amino acid dialysates should be no longer than six hours.

The purpose of IDPN and IPN therapies is to improve overall nutritional status and well-being. Each patient is different and improvements may be seen in dry body weight amounts, energy levels, building of leaner muscle mass, strength, appetite levels, and the ability to fight off infection if given the nutrition they require.

How are they infused?

IDPN is infused through an existing dialysis access catheter or site, via the dialysis machine's venous chamber. No additional needle stick or line is necessary. The fluid volume of the nutritional solution is calculated into the total fluid removed by the dialysis treatment and the patient benefits from the infused protein, carbohydrate and lipid sources.

What to Consider when Choosing an IDPN/IPN Provider

Take the time to find the infusion company that works best for your dialysis center. You will want to be sure the company offers specialists in the field and the available resources to provide your dialysis center with the confidence and the support they need to provide these therapies.

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| <ul style="list-style-type: none"> • Professionals who know the therapy • Education for staff • Input and help with patient criteria and strength of referral • Advice with individualizing formula • Physical paper trail available to patient and staff • Guidelines for administration • Resources for the dialysis center staff (in services, provision of insulin as needed, storage space, pharmacy availability) | <ul style="list-style-type: none"> • On-call pharmacy 7 days a week, 24 hours per day • Joint Commission-Accredited pharmacy • Pharmacy meets state-specific laws for compounding, stability and shipping of product and pumps • History of providing the therapy • Frequent follow-up • Ongoing support to assure therapy is appropriate for patient |
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The hemodialysis process is in itself a depleting therapy with protein losses of 10–12 grams of free amino acids per dialysis treatment.⁴ In earlier studies, it has been shown that two-thirds of infused amino acids are retained from IDPN solutions.⁵

IPN is administered as a daily peritoneal dialysis exchange for either the CAPD patient or the CCPD patient. Daily losses of albumin and amino acids in the dialysate solutions are known to be substantial. Initial studies showed that 80-90 percent of the amino acids in the IPN solution are absorbed by the sixth hour of infusion.⁶ Further, the addition of amino acids reduces the elevated dextrose level in a patient's usual peritoneal therapy.

Making up the protein losses from dialysis treatments, in an already compromised patient, is only the initial benefit of advanced nutritional therapies such as IDPN and IPN.

Benefits of IDPN and IPN

There are a number of benefits associated with IDPN and IPN. There is no need for an addition access for IDPN. For IPN, the patient's typical dialysate formula is mimickal with a lessened amount of dextrose and an addition of protein. In addition, the fluid removal is solution-infused. The patient can also be assured that, despite poor oral intake, IDPN has the potential to add 150 or more grams of protein and 3,500 calories a week. Daily IPN has the potential to add between 70 and 200 grams of protein a week. These therapies can also decrease catabolism—replacing lost nutrients over time helps increase oral consumption via an improved appetite. Overall, the therapies increase a patient's health-related quality of life. Subjective responses to the increased quality include increased strength, more energy, a better appetite and a general feeling of well-being.

Each therapy is also associated with improved nutritional outcomes. For IDPN, one study by Cherry et al. researched the effects of IDPN on 24 patients in a large tertiary care institution that received IDPN three times a week up to 12 months. IDPN significantly increased dry body weights after six, nine and 12 months of therapy. IDPN significantly increased albumin levels after three, six and nine months. Patients with serum albumin concentrations of ≤ 3.4 g/L were 12 percent at baseline, 39 percent at six months, and 47 percent at nine months.⁷

Pupim et al., in a randomized crossover study, researched seven chronic hemodialysis (CHD) patients during two hemodialysis sessions with and without IDPN. Patients participated in both interventions with four weeks between each period. Albumin fractional synthetic rate was significantly higher when IDPN was infused (84 percent with IDPN versus 54 percent with control) and significantly improved whole-body protein synthesis. The results show that IDPN improves the hepatic synthesis of albumin as a part of improvements in the whole-body protein homeostasis.⁸

In addition, Ikizler et al. demonstrated that the provision of calories and amino acids during hemodialysis (HD) with IDPN reversed a net negative whole-body and forearm muscle protein balance. This cited study revealed that IDPN changed a catabolic state to a highly positive protein balance.⁹

For IPN, in an early study by Chertow, et al., a statistically significant increase in serum albumin concentration was observed over time with the use of an amino acid-based solution for CAPD patients.¹⁰ More recently, Kopple et al., in his 1995 study, had findings that indicated a dialysate containing amino acids may improve protein malnutrition in CAPD patients ingesting low protein intakes.¹¹ Correction of hypoalbuminemia by IDPN has been shown to reduce overall mortality rates in end-stage renal disease.^{12, 13}

Comparisons of Parenteral Therapies for the Dialysis Patient			
	TPN*	IDPN	IPN
Meets 100 percent of nutritional needs	Yes	No	No
Adjunctive therapy for dialysis patients	No	Yes	Yes
Risk of fluid overload	Yes	Managed	No
Requires additional access	Yes	No	No
Place of therapy administration	Hospital/ Home	Center	Home
Infection potential	Higher	Lower	Lower
Health-related quality of life	Mixed	Improved	Improved
<i>*Total Parenteral Nutrition</i>			

Benefits of parenteral nutrition therapies have been documented in various studies from 1975 to present day. Early studies were often smaller, non-randomized and lacked control groups. Current studies are improving research design by including larger numbers of patients, are prospective in nature and using randomization and control groups.

Recognizing Malnutrition in Your Dialysis Center

It has been estimated that more than 50 percent of dialysis patients are malnourished. Recognition of the

causes of malnutrition is a pivotal step in beginning to alleviate the problem.

Some Causes of Malnutrition:

- Dialysis procedure
- Self-selected diets of HD patients and the risk of developing protein calorie malnutrition (PCM).¹⁴
- Patients with ESRD treated with either HD or peritoneal dialysis (PD) have demonstrated altered patterns of food intake.¹⁵
- Anorexia, nausea and vomiting as the symptoms of uremia are not always controlled in dialysis patients, which in turn can lead to reductions in dietary protein and energy intakes.
- Co-morbidities and the depressive response of albumin from inflammatory processes.
- A disease or impairment that may affect the absorption of nutrients/or require additional nutrients to maintain weight and strength.
- Polypharmacy, multiple medications from multiple doctors with potential interactions and side effects, can contribute to diminished intake, poor appetite and inability to meet total nutritional needs
- Socioeconomic issues and diminished accessibility to food
- Psychosocial issues — Depression, anxiety, lack of family/social support

Malnutrition has serious consequences for ESRD patients and it should be treated aggressively. After failure of attempts to increase the protein and caloric intake of the patient through inclusion of high biologic value and high calorie food sources, the suggestions of various changes to meal patterns, habits, and amounts, as well as the use of various oral supplements.

It's time to start considering IDPN/IPN.

When considering IPDN or IPN for your renal patients, the patient's clinical profile must further be reviewed and the following questions asked.

Dietary recall is recommended to assess adequacy of protein/caloric support.

Q: Is the patient's intake below the recommended energy intake of 30-35 kcal/kg > 60 years and 35 kcal/kg for < 60 years?

Q: Has the oral or tube feeding been ineffective, not appropriate, or not tolerated?

Nutritional assessment should be performed to evaluate lab work and dry weight history.

Q: : Is the patient's serum albumin < 3.4 gm/dL for greater than three months?

Q: Is the patient's actual body weight < 90 percent of ideal body weight or has the patient experienced a 10 percent weight loss over the last three months?

Evaluate the patient's history and physical, as well as their medication list.

Q: Are there medical condition(s) promoting poor intake?

Q: Are there situations or symptoms affecting the volume of intake?

Q: Have medications been attempted or been effective?

When reviewed as a total clinical picture, a combination of several questions can easily become specific criteria for a referral for IDPN/IPN. As outlined in the 2000 K/DOQI Guidelines for Nutrition Support, if IDPN or IPN, when used in conjunction with existing oral intake, can meet the protein and energy requirements of the patient, the parenteral therapy should be considered.¹⁶ Recognition of nutritional compromise can

present through various avenues on the patient's care plan. The nurse is usually aware of day-to-day symptoms during treatment, whereas the dietitian may have a better overview of objective parameters including weight and albumin history. By adding the patient's specific insurance and financial piece, the social worker adds necessary detail. When put together, a clear recommendation for IDPN/IPN emerges and can be presented to the physician. The patient's criteria together with his/her need for further therapy to meet nutritional goals, makes for a strong and confident referral. This kind of team approach is the most effective means of promoting appropriate care and leads to the same cohesiveness when it is time to deliver the IDPN/IPN therapy.

Reimbursement/Insurance Coverage

Many commercial insurers, PPOs, HMOs and Medical Assistance programs provide coverage for IDPN/IPN based on guidelines established by each payer. More recently, certain Medicare Part D plans have provided coverage for patients with medical need and a functioning gastrointestinal (GI) tract. Medicare B coverage continues to require "permanent" dysfunction of digestive tract.

Reimbursement pre-certification for these therapies is a necessary step in the process of any referral. This practice allows the provider of these services the opportunity to determine the coverage criteria and the patients out-of-pocket expenses (if any) before therapy is initiated. The patient's costs should be known up front so that the patient is able to make an informed decision about pursuing therapy. The best practice in this area is to work with a pharmacy/infusion company that takes the time to gather and provide this specific information to the patient as well as to the dialysis staff. **RBT**

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