Clinical Policy Title: Parenteral nutrition therapy

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Related policies:

CCP.1052 Nutritional support

Policy contains:

- Dialysis.
- Renal failure.
- Hyperemesis gravidarum.
- Enteral nutrition.
- Pancreatitis.
- Small bowel obstruction.
- Short bowel syndrome.

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Coverage policy

I. AmeriHealth Caritas considers the use of parenteral nutrition therapy to be medically necessary when there is a severe pathology of the alimentary tract that does not allow absorption of sufficient nutrients to maintain weight and strength commensurate with the beneficiary's general condition (Centers for Medicare & Medicaid Services, 2017a).

Parenteral nutrition therapy is covered in any of the following situations:

A. The member has had a massive small bowel resection within the past three months, leaving less than or equal to 5 feet of small bowel beyond the ligament of Treitz.
B. The member has short bowel syndrome that is sufficiently serious such that with net gastrointestinal fluid and electrolyte malabsorption on an oral intake of 2.5 – 3 liters/day, the member's enteral loss exceeds 50 percent of the enteral intake and urinary output is under 1 liter daily.
C. Bowel rest is required and the member is receiving 20 – 35 cal/kg/day intravenously to treat symptomatic pancreatitis with or without pancreatic pseudocyst, serious worsening of

regional enteritis, or a proximal enterocutaneous fistula where tube feeding distal to the fistula is not feasible.

D. The member has a diagnosis of complete mechanical small bowel obstruction and surgery is not feasible.
E. The member is significantly malnourished (i.e., has experienced 10 percent weight loss over three months or less), has serum albumin no more than 3.4 gm/dL, and has very severe fat malabsorption (fecal fat over 50 percent of oral/enteral intake on a diet of a minimum of 50 gm of fat/day on a standard fecal fat test over 72 hours).
F. The member is seriously malnourished (i.e., has 10 percent weight loss over three months or less, and serum albumin no more than 3.4 gm/dL), in addition to a serious motility dysfunction of the small intestine and/or stomach that does not respond to prokinetic medication and is demonstrated by either one of the following studies performed when the beneficiary is not acutely ill and is not on any medication that would decrease bowel motility:
    i. Scintigraphically: A solid meal gastric emptying study that finds that the isotope fails to reach the right colon within six hours post-ingestion.
    ii. Radiographically: Radiopaque or barium pellets do not reach the right colon within six hours post-administration.

    Lack of response to prokinetic medication is defined as experiencing daily symptoms of nausea and vomiting while taking maximal doses.

    For criteria A through F listed above, the conditions are deemed to be severe enough that the member would not be able to maintain weight and strength on solely oral or tube feeding.

    Beneficiaries who do not meet criteria A through F must meet criteria i and ii (modification of diet and pharmacologic intervention) in addition to both criteria G and H below:

G. The member is malnourished (10 percent weight loss over three months or less, and serum albumin no more than 3.4 gm/dL).

H. An illness and clinical condition have been diagnosed that have not responded to changing the manner of delivery of appropriate nutrients (e.g., changing the manner of tube feeding).

The Centers for Medicare & Medicaid Services list several examples of moderate abnormalities that would require a failed attempt of tubal feeding before Medicaid coverage of parenteral nutrition would be allowed. These include specific measures and criteria for diagnoses of malabsorption, gastroparesis, small bowel motility disturbance, small bowel resection, short bowel syndrome, exacerbation of regional enteritis or enterocutaneous fistula, and partial mechanical small bowel obstruction. Please see local coverage policy article 52515.

II. AmeriHealth Caritas considers the use of intradialytic parenteral nutrition therapy to be medically necessary under the following conditions (Centers for Medicare & Medicaid Services, 2017a):

- The intestine is nonfunctioning, and such impairment is of long and indefinite duration.
- There is a clinical diagnosis of a disorder of the intestine and/or the exocrine glands of the intestine, supported by objective evidence. This disorder either does not allow sufficient absorption of nutrients or is a motility disorder of the stomach or intestine that impairs movement of nutrients through the gastrointestinal system.
- Clear and precise documentation must verify that the member has an impaired gastrointestinal tract and that absorption is insufficient to maintain adequate strength and weight.
- Documentation must show that enteral introduction of nutrition (via either the mouth or tube feeding) is not sufficient to maintain the member and that due to a severe abnormality of the gastrointestinal tract, the member must receive nutrition intravenously.
- Intravenous infusion of nutrition must be critical to the nutritional stability of the member and not supplemental due to either deficiencies caused by dialysis or to a deficient diet.
- There must be documented clear evidence of physical signs, symptoms, and test results demonstrating severe abnormality of the gastrointestinal tract.

III. AmeriHealth Caritas considers the use of peripheral parenteral nutrition to be medically necessary under the following conditions (National Institute for Health and Care Excellence, 2017; Worthington, 2017):

- No central venous access is available.
- It is anticipated that the need for parenteral nutrition will be 10 to 14 days or less.

Limitations:

I. Parenteral nutrition is not considered medically necessary for members with a functioning gastrointestinal tract whose need for parenteral nutrition is due solely to any of the following, without meeting one or more of the conditions in the previous section (Centers for Medicare & Medicaid Services, 2017a):

- A physical disorder impairing food intake, such as the dyspnea of severe pulmonary or cardiac disease.
- A psychological disorder impairing food intake, such as depression.
- A side effect of a medication.
- A swallowing disorder.
- A temporary defect in gastric emptying, such as a metabolic or electrolyte disorder.
- Disorders of the metabolism inducing anorexia, such as cancer.
- Renal failure and/or dialysis.

II. Intradialytic parenteral nutrition (delivered during a member's dialysis sessions) may be allowed by under the following conditions (Centers for Medicare & Medicaid Services, 2017a):
    - The member suffers from an impaired gastrointestinal tract and there is insufficient absorption of nutrients to maintain adequate strength and weight.
    - Records should document that the member cannot be maintained on oral or enteral feedings and that due to severe pathology of the alimentary tract, intravenous infusion with nutrients is necessary.
    - Infusions must be vital to the nutritional stability of the beneficiary and not supplemental to a deficient diet or deficiencies caused by dialysis. Physical signs, symptoms, and test results indicating severe pathology of the alimentary tract must be clearly evident in any documentation submitted.
    - Maintenance of weight and strength commensurate with the beneficiary's overall health status must require intravenous nutrition and must not be possible by modifying the nutrient composition of the enteral diet (e.g., lactose free, gluten free, low in long chain triglycerides, substitution with medium chain triglycerides, provision of protein as peptides or amino acids, etc.), or by utilizing pharmacologic means to treat the etiology of the malabsorption (e.g., pancreatic enzymes or bile salts, broad spectrum antibiotics for bacterial overgrowth, prokinetic medication for reduced motility, etc.).
    - Members who receive intradialytic parenteral nutrition must meet the qualifications for parenteral nutrition listed in categories A through F, or in categories i and ii and G and H.

III. Peripheral parenteral therapy should be limited to 10 to 14 days (National Institute for Health and Care Excellence, 2017; Worthington, 2017).

Alternative covered services:

None.

Background

Numerous conditions can restrict the function of the upper alimentary tract or limit the absorption of nutrition, including cancer; trauma; burns; surgery; diseases of the liver, kidney, and pancreas; inflammatory bowel disease; and organ transplantation. Enteral nutrition, defined as passing through the intestine, can be delivered through the mouth as in normal eating or supplementation taken orally or, when there are some limitations to the functioning of the upper gastrointestinal tract, an enteral tube (known as a feeding tube) may be used to deliver nutrients directly into the stomach or small intestine. When orally introduced nutrition is insufficient, tube feeding is usually preferable to parenteral nutrition, because when fluid is restricted, tube feeding allows delivery of all necessary nutrients in a more concentrated volume than parenteral nutrition and permits safer feeding in the home (Centers for Medicare & Medicaid Services, 2017a).

Parenteral nutrition, used when the gastrointestinal tract is not sufficiently functional, is delivered through a catheter placed in a central venous line, in a vein in the arm, neck, or chest. The tip lies within the proximal third of the superior vena cava, the inferior vena cava, or the right atrium, allowing delivery directly into the bloodstream. Central venous catheters can also be used for the delivery of medication. Total parenteral nutrition means that all daily nutritional requirements are received intravenously. Typically, about 2 liters of fluid with added nutrients are given, with the nutrient combination varying according to the member's specific health condition, disorders, and age (Thomas, 2017). In adults, the solution consists of water (30 – 40 mL/kg/day), energy (30 – 45 kcal/kg/day), amino acids (1.0 – 2.0 g/kg/day, depending on the degree of catabolism), essential fatty acids, vitamins, and minerals. The solution for children may be based on a different fluid amount and include a higher energy content. Parenteral nutrition is generally reserved for those who do not have a functioning gastrointestinal tract or who need complete bowel rest because of the high rate of adverse outcomes associated with parenteral nutrition, which include complications in accessing the venous line, sepsis, glucose abnormalities, hepatic complications, volume overload, serum electrolyte and mineral imbalance, and bone disease. Parenteral nutrition may be delivered into the catheter at home, including by a lay caregiver or a medical professional.

Peripheral parenteral nutition is delivered through a vein other than than the superior vena cava. The veins used are the cephalic, basilica, median antecubital, and median antebrachial. This method of delivery is used when a central line is not available or when the anticipated need is 10 to 14 days or less, as problems in maintaining venous access increase after 10 days and long-term delivery of peripheral parenteral nutrition is associated with a high rate of infection and phlebitis (National Institute for Health and Care Excellence, 2017; Worthington, 2017). It may be necessary to rotate the site of access to reduce the risk of adverse impact. A nutritional solution may be delivered through a continous or intermittent flow, with initiation and termination tapered to avoid sharp changes in blood sugar. Peripheral parenteral nutrition may be used short-term in well-nourished pediatric patients.

Searches

AmeriHealth Caritas searched PubMed and the databases of:

- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality's National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services.

We conducted searches on May 24, 2018. Search terms were: "parenteral nutrition," "intradialytic," "dialysis," and "nutrition."

We included:

- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic

reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.

- **Guidelines based on systematic reviews.**
- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

Findings

Guidelines generally suggest that enteral over parenteral nutrition should be used (National Guideline Clearinghouse, 2016). In a member at low nutritional risk (as measured by Nutrition Risk Screening, 2002, as ≤3 or Nutritional Risk in the Critically Ill as ≤5), exclusive parenteral nutrition should be avoided for the first seven days after admission to intensive care if the patient is not able to eat on their volition and if it is not feasible to provide enteral feeding. Among critically ill members at high nutritional risk (Nutrition Risk Screening 2002 ≥5 or Nutrition in the Critically Ill ≥5) or severely malnourished, when enteral feeding is not possible, parenteral feeding is recommended to begin as soon as possible after admission to intensive care. Among those at either low or high nutrition risk, use of supplemental parenteral nutrition should be considered after seven to 10 days if it is not possible to meet at least 60 percent of energy and protein requirements through enteral feeding alone. Initiating supplemental parenteral nutrition prior to this seven- to 10-day period in critically ill patients on some enteral nutrition does not improve outcomes and may be detrimental to the patient.

Findings vary on whether parenteral feeding is associated with a higher rate of complications. A systematic review and meta-analysis comparing enteral and parenteral nutrition among critically ill patients found that parenteral nutrition did not have an overall effect on mortality but was associated with a longer stay in the intensive care unit and a higher rate of complications from infection (Elke, 2016). A systematic review comparing the rate of catheter-related bloodstream infections in parenteral and nonparenteral nutrition was not able to make a determination (Gavin, 2017). Infections may be reduced with the use of medication-impregnated dressings (Ullman, 2016). A recent meta-analysis (Shehle, 2017) found that parenteral nutrition for critically ill patients without renal or hepatic failure, when supplemented with glutamine dipeptides, was associated with reduced complications from infections, length of stay in both intensive care and in hospital, use of mechanical ventilation, and overall hospital mortality.

In anorexia nervosa, Mehler (2010) noted that enteral or parenteral nutrition may be used in the most refractory cases. Hart's (2013) review found that there is no conclusive data on the best feeding method in anorexia nervosa, and that further research is urgently needed. Marzola's (2013) review found that if parenteral or enteral refeeding is necessary due to extreme resistance, the administration of nutrients should be done slowly. It should start with no more than 500 kcal/day and this should be in the form of a complete liquid diet for several days. The caloric load can the gradually be increased in a step-wise matter. The National Institute for Clinical Excellence (2004) stated that parenteral nutrition should be

used in anorexia nervosa only in severe gastrointestinal dysfunction. The Centers for Medicare & Medicaid Services (2017a) appears to hold a position consistent with the latter.

In the context of renal failure, there is little rigorous research on the clinical outcomes of intradialytic parenteral nutrition (parenteral nutrition delivered during dialysis treatments). In pediatric populations, intradialytic parenteral nutrition does not provide a needed benefit over enteral supplementation and is seldom necessary if the member is compliant and there is sufficient intestinal function (Dudley, 2014). Additional metabolic and renal side effects of parenteral nutrition may be severe in this population. A systematic review of nutritional interventions for malnutrition in hemodialysis among adults published in 2010 found only one randomized controlled study of intradialytic parenteral nutrition, which found improved serum albumin and body weight, and an improvement in survival (Bossola, 2010). More recently, a multicenter, prospective, open-label study that enrolled 107 participants on maintenance hemodialysis found that parenteral nutrition delivered three times weekly during each dialysis session for 12 weeks, followed by 12 weeks with no treatment, resulted in immediate and sustained improved prealbumin levels at a statistically significant level (Marsen, 2017). Additional well-designed studies are needed to provide more data on intradialytic parenteral nutrition therapy.

Surgery to manage Crohn's disease often results in complications that are related to preoperative poor nutritional status. A meta-analysis examining the interventions of preoperative enteral nutrition and total parenteral nutrition found that, of the two nutritional interventions, preoperative enteral nutrition resulted in a statistically significant reduction in postsurgical complications, while total parenteral nutrition did not (Brennan, 2018).

As described above, the parenteral nutrition formula is adjusted based on the medical condition. Omega-3 fatty acids have been examined as a potential treatment in gastrointestinal cancers. A meta-analysis examining the addition of omega-3 fatty acid to parenteral nutrition confirmed that early intervention with omega-3 fatty acid emulsion in gastrointestinal cancer can not only improve the postoperative indicators of immune function, reduce inflammatory reaction, and improve the postoperative curative effect, but also improve the immune suppression induced by conventional parenteral nutrition or the malignancy itself (Zhao, 2018). While the authors concluded that omega-3 unsaturated fatty acids should be added to the parenteral nutrition formula of gastric cancer patients, they recommend that additional high-quality randomized clinical trials be performed to verify the observed benefits. Omega-3 fatty acid added to parenteral nutrition has also been shown to be effective in postoperative gastrointestinal cancer (Bai, 2018).

In sick newborns, increased parenteral amino acid intake is theorized to improve nitrogen balance, growth, and infant health. A Cochrane review examining amino acids in parenteral nutrition treatment for newborns found low-quality evidence suggesting that higher amino acid intake in parenteral nutrition does not have an impact on mortality (Osborn, 2018). The analysis showed very low-quality evidence suggesting that higher amino acids intake reduces postnatal growth failure, and that it reduces retinopathy of prematurity but not severe retinopathy of prematurity. There was insufficient evidence to examine effects on neurodevelopment. The authors found very low-quality evidence suggesting

higher amino acid intake was associated with potentially adverse biochemical effects resulting from excess amino acid load, including azotaemia. The authors suggest that further research with adequate power is necessary to determine the optimal amount of amino acids and effects of caloric balance in parenteral nutrition on the brain and on neurodevelopment. A systematic review of parenteral nutrition found that ready-to-use parenteral nutrition as opposed to that produced on-site has the potential benefits of supplying adequate nutrition, generating growth, facilitating use, while potentially decreasing prescription errors, infection risk, and costs, but that research on its short- and long-term impact is needed (Mena, 2018).

The use of peripheral parenteral nutrition is more common in Europe than in the United States, however, there is a lack of research examining whether expanded use is beneficial (Worthington, 2017). In general, there is limited high quality research demonstrating which patient populations would benefit most from peripheral parenteral nutrition. Worthington, et al.'s (2017) consensus recommendation provides the following:

- For adults, use peripheral parenteral nutrition for only short periods of no more than 10-14 days. This may be as a bridge during transition periods when oral or enteral therapy is inadequate, or as supplemental parenteral nutrition. Estimate the osmolarity of formulations of peripheral parenteral nutrition, and maintain a limit of no more than 900 mOsm/L of the formulation.
- For well-nourished neonatal and pediatric patients, peripheral parenteral nutrition should be used for short periods until oral or enteral intake is established. Alternately, peripheral parenteral nutrition may serve as a bridge to central line parenteral nutrition.

Policy updates:

None.

Summary of clinical evidence:

Citation	Content, Methods, Recommendations
Brennan (2018) Does preoperative enteral or parenteral nutrition reduce postoperative complications in Crohn's disease patients: a meta-analysis	**Key points:** • Five studies with a total of 1,111 participants with Crohn's disease were included. • Surgery with either method of nutrition support was associated with a lower complications rate. However, of the two interventions, preoperative enteral nutrition was associated with the most benefit. Postoperative complications occurred in 21.9% in the group that received preoperative enteral nutrition compared with 73.2% in the group that did not (OR=0.09, 95% CI: 0.06-0.13, *P* < 001). The analysis resulted in a number needed to treat of two. • Preoperative total parenteral nutrition resulted in reduced postoperative complications but the results were not statistically significant. • Further studies are necessary to evaluate specific components in enteral nutrition and total parenteral nutrition that may be most beneficial for Crohn's disease patients requiring surgical intervention.

Citation	Content, Methods, Recommendations
Gavin (2017) Does parenteral nutrition increase the risk of catheter-related bloodstream infection?	**Key points:** • Eleven observational studies were identified, comprising 2,854 participants with 6,287 central venous access devices. • Six studies showed significant results in favor of nonparenteral nutrition, four showed no evidence of a difference between parenteral and nonparenteral nutrition, and one showed significant results in favor of parenteral nutrition when analyzed per patient with multiple central venous access devices. Incidence ranged from 0 to 6.6 catheter-related bloodstream infections per 1,000 central venous access device days in the parenteral nutrition patients and 0.39 to 3.6 catheter-related bloodstream infections per 1,000 central venous access device days in the nonparenteral nutrition patients. • The Cochrane risk of bias assessment tool for nonrandomized studies of interventions was used. Eight studies were rated as moderate risk of bias, two as serious, and one as critical. • The data examined in this systematic review were not sufficient to establish whether receiving parenteral nutrition has a higher risk of developing catheter-related bloodstream infections than those who do not. Future parenteral nutrition studies should be designed to adjust for baseline imbalances and improve quality and reporting.
Marsen (2017) Intradialytic parenteral nutrition in maintenance hemodialysis patients suffering from protein-energy wasting	**Key points:** • This was a prospective, multicenter, randomized, open-label, controlled, parallel-group Phase IV clinical trial in 107 maintenance hemodialysis patients suffering from protein-energy wasting. The goal was to assess the impact of intradialytic parenteral nutrition on prealbumin and other biochemical and clinical parameters reflecting nutritional status. Participants randomized to the intervention group received standardized nutritional counseling plus intradialytic parenteral nutrition three times weekly over 16 weeks followed by no treatment for 12 weeks. The control arm received standardized nutritional counseling only. Inclusion criteria included moderate to severe malnutrition (Subjective Global Assessment score B or C), maintenance hemodialysis therapy (three times per week) for more than six months, and presence of two out of the following three criteria: albumin <35 g/L, prealbumin <250 mg/L, phase angle alpha <4.5° assessed by bioelectrical impedance analysis. • Intradialytic parenteral nutrition significantly increased prealbumin ($p< 0.05$), showing rapid rise within 16 weeks of treatment, with a sustained response. In the full analysis set, 41.0% of 39 patients receiving intradialytic parenteral nutrition achieved a relevant (i.e., at least 15%) increase in prealbumin over baseline at week 4 compared to 20.5% of 44 patients in the control group. Considerably more participants with intradialytic parenteral nutrition therapy achieved an increment of prealbumin >30 mg/L at week 16 (48.7% versus 31.8%). Prealbumin response was more pronounced in those suffering from moderate malnutrition (SGA score B) compared to those with severe malnutrition (SGA score C). • The results demonstrate for the first time that intradialytic parenteral nutrition therapy, given thrice weekly for 16 weeks, results in a statistically significant and clinically relevant improvement increase in mean serum prealbumin, a surrogate marker for outcome and survival in hemodialysis patients suffering from protein-energy wasting, and is superior to nutritional counseling.

Citation	Content, Methods, Recommendations
Stehle (2017) Glutamine dipeptide-supplemented parenteral nutrition improves the clinical outcomes of critically ill patients	**Key points:** • This systematic review of 15 randomized clinical trials (n = 842 critically ill participants without renal or hepatic failure) found that parenteral nutrition supplemented with glutamine dipeptides reduced several negative outcomes: complications of infection (relative risk [RR] = 0.70, 95% CI 0.60, 0.83, *P* < .0001); length of stay in intensive care (common mean difference [MD] -1.61 days, 95% CI -3.17, -0.05, *P* = .04); length of stay in hospital (MD -2.30 days, 95% CI -4.14, -0.45, *P* = .01); and mechanical ventilation duration (MD -1.56 days, 95% CI -2.88, -0.24, *P* = .02). In addition, it reduced the hospital mortality rate by 45% (RR = 0.55, 95% CI 0.32, 0.94, *P* = .03) but had no effect on mortality in intensive care. Visual inspection of funnel plots did not reveal any potential selective reporting of studies. • The authors conclude that the results demonstrate the importance of delivering glutamine dipeptides together with adequate parenteral energy and nitrogen so that the administered glutamine serves as precursor in various biosynthetic pathways rather than simply as a fuel.
Yao (2017) Enteral versus parenteral nutrition in critically ill patients with severe pancreatitis	**Key points:** • Parenteral and enteral nutrition were compared in severe pancreatitis in five randomized control trials that included 348 patients. • Enteral nutrition was associated with a significant reduction in both overall mortality (RR = 0.36, 95% confidence interval (CI) 0.20-0.65, *P* = .001) and in the rate of multiple organ failure (RR = 0.39, 95% CI 0.21-0.73, *P* = .003). • Enteral nutrition should be recommended above parenteral nutrition as the preferred route of nutrition for critically ill patients with severe acute pancreatitis.
Elke (2016) Enteral versus parenteral nutrition among critically ill patients	**Key points:** • This systematic review and meta-analysis included 18 randomized controlled trials of 3,347 participants. • No significant difference was found for overall mortality (RR 1.04, 95% CI 0.82, 1.33, *P* = .75, heterogeneity I[2] = 11%). • Enteral compared to parenteral nutrition was associated with reduced infectious complications (RR 0.64, 95% CI 0.48, 0.87, *P* = .004, I[2] = 47%). This was more pronounced in the subgroup of studies in which the parenteral group received significantly more calories (RR 0.55, 95% CI 0.37, 0.82, *P* = .003, I[2] = 0%), while no effect was seen in trials where both groups had a similar caloric intake (RR 0.94, 95% CI 0.80, 1.10, *P* = .44, I[2] = 0%; test for subgroup differences, *P* = .003). • Enteral nutrition was associated with significant reduction in length of stay in the intensive care unit (ICU) (weighted mean difference [WMD] -0.80, 95% CI -1.23, -0.37, *P* = .0003, I[2] = 0%) while no significant differences in hospital length of stay or mechanical ventilation were observed. • The publication year and methodological quality had no effect on these findings. However, a publication bias may be present as the test of asymmetry was significant (*P* = .003). • Among critically ill patients, enteral as compared to parenteral nutrition has no effect on overall mortality but decreases infectious complications and length of stay in the ICU, although not in the hospital. This may be explained by the benefit of reduced

Citation	Content, Methods, Recommendations
	macronutrient intake rather than the enteral route itself.
Feinberg (2016) Nutrition support in hospitalised adults at nutritional risk	**Key points:** • This systematic review of 244 trials, with a total of 28,619 participants, assessed the effects of different kinds of nutrition support (i.e., dietary counseling, enriching regular food with extra protein and calories, protein shakes, tube feeding, and parenteral feeding directly into the stomach or gut) among hospitalized adults at risk for malnutrition. • No evidence was found of a difference between nutrition support and control groups for risk of death, neither at short-term nor the longest point of follow-up (low quality of evidence). We found no evidence of a difference between nutrition support and control for risk of a serious complications in the short or long term (low quality of evidence). These results are based on just over 21,000 participants. Nutrition may increase weight by about 1.32 kg compared with people in the control groups. It is not known whether this weight gain is of clinical benefit. • A secondary analysis suggested that tube-feeding might be beneficial, reducing serious complications at maximum follow-up, but the strength of this finding is low.
Ward (2015) Nutritional support in children and young people with cancer undergoing chemotherapy	**Key points:** • This systematic review included 14 studies. One small trial found that compared to enteral nutrition, parenteral nutrition significantly increased weight (MD 4.12, 95% CI 1.91 to 6.33); serum albumin levels (MD 0.70, 95% CI 0.14 to 1.26); calorie intake (MD 22.00, 95% CI 5.12 to 38.88); and protein intake (MD 0.80, 95% CI 0.45 to 1.15). One trial comparing peripheral parenteral and enteral nutrition with central parenteral nutrition found that mean daily weight gain (MD -27.00, 95% CI -43.32 to -10.68) and energy intake (MD -15.00, 95% CI -26.81 to -3.19) were significantly less for the peripheral parenteral and enteral nutrition group, whereas mean change in serum albumin was significantly greater for that group (MD 0.47, 95% CI 0.13 to 0.81, *P* = .008). Another trial with few participants found an increase in mean energy intake (% recommended daily amount) in children fed an energy-dense feed compared to a standard calorie feed (MD +28%, 95% CI 17% to 39%). • There is limited evidence from individual trials to suggest that parenteral nutrition is superior to enteral nutrition in a well-nourished pediatric population with cancer undergoing chemotherapy. There is unclear evidence for other methods of nutritional support. Limited evidence suggests an energy-dense feed increases mean daily energy intake and has a positive effect on weight gain. Evidence suggesting glutamine supplementation reduces incidence and severity of mucositis, infection rates, and length of hospital stay is not statistically significant.
Burden (2012) Pre-operative nutrition support in patients undergoing gastrointestinal surgery	**Key points:** • Three trials of a total of 260 participants evaluated parenteral nutrition before gastrointestinal surgery, compared to controls. A significant reduction in postoperative complications was demonstrated (RR 0.64, 95% CI 0.46, 0.87) with low heterogeneity, in predominantly malnourished participants.
Bossola (2010) Artificial nutritional support	**Key points:** • Seventeen studies of intradialytic parenteral nutrition, which included 2,475 participants,

Citation	Content, Methods, Recommendations
in chronic hemodialysis patients: a narrative review	found an improvement in serum albumin and body weight. Limited data were available on survival, which found no effect.

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Commonly submitted codes

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill accordingly.

CPT Code	Description	Comments
99507	Home visit for care and maintenance of catheter(s) (e.g., urinary, drainage, and enteral)	
99601	Home infusion/specialty drug administration, per visit (up to 2 hours)	
+ 99602	each additional hour (list separately in addition to code for primary procedure)	

ICD-10 Code	Description	Comments
C00.0 - C21.8	Malignant neoplasm of lip, oral cavity, pharynx, esophagus, stomach, small intestine, colon, rectosigmoid junction, rectum, anus and anal canal	
C76.0	Malignant neoplasm of head, face and neck	
E40, E41, E42, E43	Kwashiorkor, nutritional marasmus, marasmic kwashiokor and unspecified severe protein-hyphencalorie malnutrition	
E44.0 - E44.1	Protein-hyphencalorie malnutrition of moderate and mild degree	
E45	Retarded development following protein-hyphencalorie malnutrition	
E46	Unspecified protein-hyphencalorie malnutrition	
I69.091 **I69.191** **I69.291** **I69.391** **I69.891** **I69.991**	Sequelae of cerebrovascular disease [dysphagia]	
K22.4	Dyskinesia of esophagus	
O21.0	Mild hyperemesis gravidarum	
O21.1	Hyperemesis gravidarum with metabolic disturbance	
O21.2	Late vomiting of pregnancy	
O21.8	Other vomiting complicating pregnancy	
O21.9	Vomiting of pregnancy, unspecified	
R13.0 - R13.19	Aphagia and dysphagia	
Z93.1	Gastrostomy status	
Z93.4	Other artificial openings of gastrointestinal tract status	

HCPCS Level II Code	Description	Comments
A9152	Single vitamin/mineral/trace element, oral, per dose, not otherwise specified	
A9153	Multiple vitamins, with or without minerals and trace elements, oral, per dose, not otherwise specified	
B4034 – B4083, B4102 – B9999	Enteral and Parenteral Therapy (except food thickener)	
B4087	Gastrostomy/jejunostomy tube, standard, any material, any type, each	
B4088	Gastrostomy/jejunostomy tube, low-hyphenprofile, any material, any type, each	
B4102	Enteral formula, for adults, used to replace fluids and electrolytes (e.g., clear liquids), 500 ml= 1 unit	
B4103	Enteral formula, for pediatrics, used to replace fluids and electrolytes (e.g., clear liquids), 500 ml = 1 unit	
B4104	Additive for enteral formula (e.g., fiber)	
B4149	Enteral formula, manufactured blenderized natural foods with intact nutrients, includes proteins, fats, carbohydrates, vitamins and minerals, may include fiber, administered through an enteral feeding tube, 100 calories = 1 unit	
S5497	Home infusion therapy, catheter care/maintenance, not otherwise classified; includes administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately), per diem	
S5498	Home infusion therapy, catheter care/maintenance, simple (single lumen),	

HCPCS Level II Code	Description	Comments
	includes administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately), per diem	
S5501	Home infusion therapy, catheter care/maintenance, complex (more than one lumen), includes administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately), per diem	
S5502	Home infusion therapy, catheter care/maintenance, implanted access device, includes administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately), per diem (use this code for interim maintenance of vascular access not currently in use)	
S5517	Home infusion therapy, all supplies necessary for restoration of catheter patency or declotting	
S5518	Home infusion therapy, all supplies necessary for catheter repair	
S5520	Home infusion therapy, all supplies (including catheter) necessary for a peripherally inserted central venous catheter (PICC) line insertion	
S5521	Home infusion therapy, all supplies (including catheter) necessary for a midline catheter insertion	
S5522	Home infusion therapy, insertion of peripherally inserted central venous catheter (PICC), nursing services only (no supplies or catheter included)	
S5523	Home infusion therapy, insertion of midline central catheter, nursing services only (no supplies or catheter included)	
S9342	Home therapy; enteral nutrition via pump; administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (enteral formula and nursing visits coded separately), per diem	
S9343	Home therapy; enteral nutrition via bolus; administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (enteral formula and nursing visits coded separately), per diem	
S9364	Home infusion therapy, total parenteral nutrition (TPN); administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment including standard TPN formula (lipids, specialty amino acid formulas, drugs other than in standard formula and nursing visits coded separately), per diem	
S9365	Home infusion therapy, total parenteral nutrition (TPN); 1 liter per day, administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment including standard TPN formula (lipids, specialty amino acid formulas, drugs other than in standard formula and nursing visits coded separately), per diem	
S9366	Home infusion therapy, total parenteral nutrition (TPN); more than 1 liter but no more than 2 liters per day, administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment including standard TPN formula (lipids, specialty amino acid formulas, drugs other than in standard formula and nursing visits coded separately), per diem	
S9367	Home infusion therapy, total parenteral nutrition (TPN); more than 2 liters but no more than 3 liters per day, administrative services, professional pharmacy	

HCPCS Level II Code	Description	Comments
	services, care coordination, and all necessary supplies and equipment including standard TPN formula (lipids, specialty amino acid formulas, drugs other than in standard formula and nursing visits coded separately), per diem	
S9368	Home infusion therapy, total parenteral nutrition (TPN); more than 3 liters per day, administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment including standard TPN formula (lipids, specialty amino acid formulas, drugs other than in standard formula and nursing visits coded separately), per diem	