Healthline VOLUME 35

Coram®* Continuing Education Program

# Successful Home Enteral Tube Feeding

*"Enteral — within, by way of, or pertaining to the gastrointestinal tract."*

The history of enteral nutrition dates back to the time of the ancient Egyptians who administered nutrient enemas to preserve health. Early Greek physicians used enemas consisting of wine, milk, whey, wheat and barley broth to provide nutrition and treat constipation (Weinmann-Winkler, et al., 1986).

Advances in the 18th and 19th century allowed enteral feedings consisting of beef and chicken broth, raw eggs and brandy administered through the rectum and the transverse colon. In 1881, when an assassin fatally wounded President James Garfield, he was maintained for 79 days on this type of "rectal feeding."

The early 1900s brought the introduction of the first nasogastric feeding tube, allowing the absorptive capacity of the upper GI tract to be utilized. By the 1950s, numerous studies were published documenting that the cycle of starvation and malnutrition can be broken with the therapeutic intervention of tube feeding. Most of these early tube feedings were thick mixtures of blenderized foods, including raw eggs, vitamins and minerals. Gradually the feeding tubes evolved from wide, rigid catheters to soft, flexible small bore tubes.

Today, in the 21st century, there are endless choices for safe and easy administration of enteral tube feedings. Feeding tubes are small and flexible and designed for all routes of administration. Feeding pumps and administration sets make tube feeding administration as easy as spiking a bag and pressing a button. A vast array of formulas are available to provide specific nutrients to meet complex nutritional and metabolic requirements. In the early years of enteral nutrition, the philosophy was "if the gut works, use it." Now the attitude is "if the gut does not work, make it work."

> A successful home enteral nutrition regimen allows the patient to function in the comfort and convenience of their own environment at a fraction of the costs typically incurred in the acute care setting.

Home enteral nutrition support emerged from an effort to reduce hospital expenses by discharging patients early and the demand has grown as more hospital patients continue their care at home. In 1990, 57 percent of hospitalized patients continued their nutrition support at home. The trend continues as the number of patients increased to 71 percent in 1996, and continues to grow (World Nutritionals Market, 1997).

## Candidates

Enteral tube feeding can be successfully accomplished in a wide variety of patients with a full spectrum of complicated disease processes. The GI tract can be utilized for nutrition support with as little as 100 cm of functional jejunum and 150 cm of functional ileum. The ileocecal valve must be intact in order to achieve sufficient nutrient absorption (Ireton-Jones, et al., 1996).

Enteral nutrition support with a tube feeding is appropriate for any patient who is malnourished, is likely to become malnourished, and in whom oral feedings are inadequate to maintain nutritional status. The specific indications are too numerous to list, but it is interesting to note that many of the most common diagnoses in the general home care population are nutrition-related (American Dietetic Association, 1999):

- Circulatory and neurological diseases
- Endocrine, metabolic and immune disorders
- Injury and fracture
- Respiratory system diseases
- Diabetes
- Malignant tumors

## Formulation

Considerations in the selection of the appropriate enteral formula include digestive and absorptive capacity, nutritional status, medical diagnosis, fluid tolerance, renal function, location of administration and drug therapy. Figure 1 provides a decision tree to facilitate formula selection.

## Route to Administration

Each route of administration or access location offers distinct advantages and disadvantages (Figure 2). In general, nasal-placed tubes are not preferred in the home care setting due to frequent displacement and the complications associated with unintended formula administration into the esophagus, peritoneal cavity or nasopharynx. The frail elderly patient with respiratory compromise is at high-risk for nasal displacement and an alternate feeding location should be utilized. The following criteria are evaluated when placing an enteral feeding tube:

- Length of time the patient is expected to receive the tube feeding
- Volume of formula and thickness (viscosity) to be administered
- Administration rate
- Risk of aspiration
- Presence or absence of gag reflex
- GI function
- Alterations in consciousness

## Types of Administration

Several types of tube feeding administration regimens are available to the home care patient (Figure 3). A school-aged child or active adult may be best suited for a nocturnal feeding to allow

**Tube Feeding Formula Decision Tree**

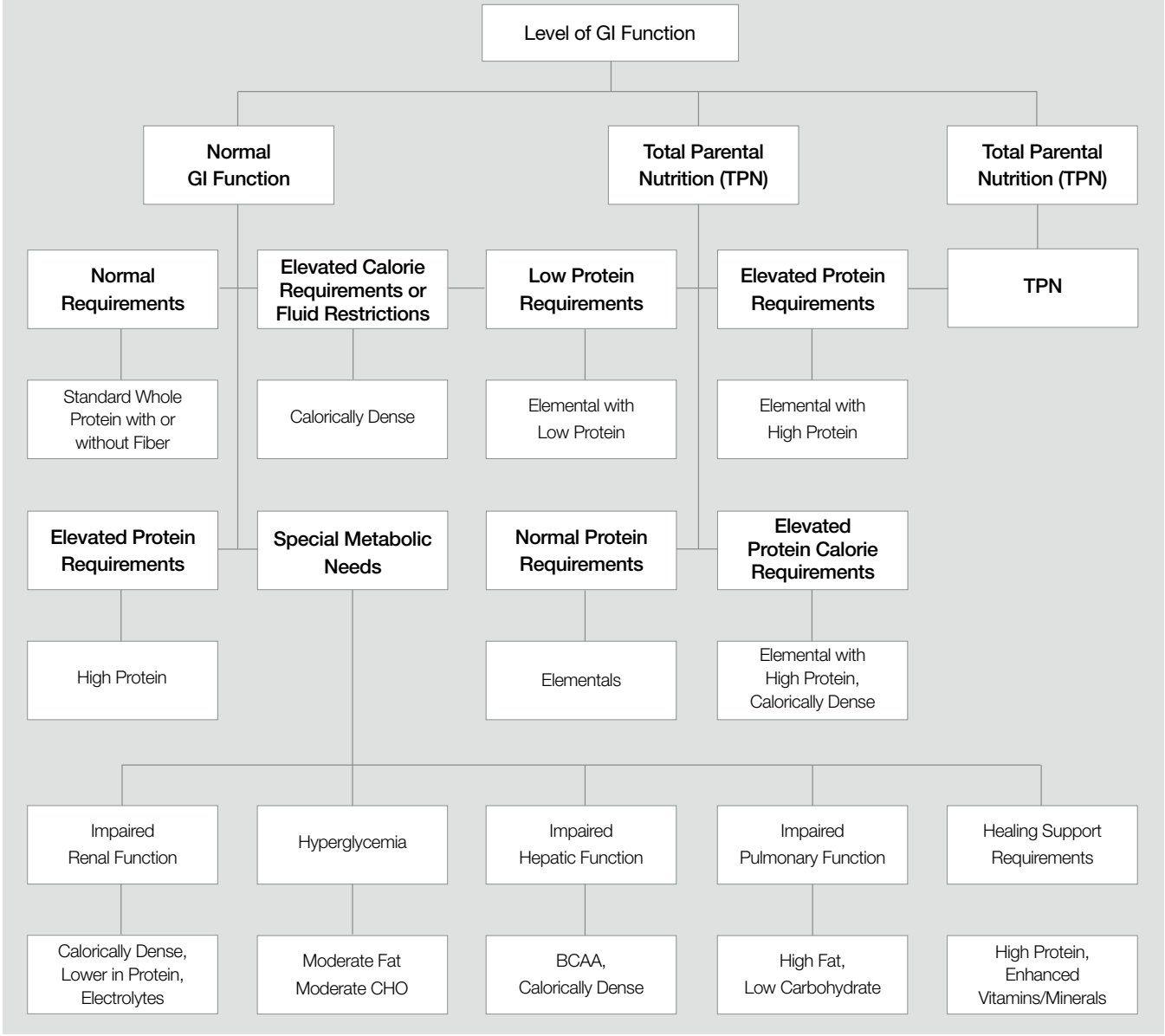


*Figure 1*

freedom during the day. An elderly diabetic patient may be most successful regulating their blood glucose with a continuous feeding. The appropriate regimen should be determined by evaluating the following factors:

- Presence or absence of a reliable caregiver
- Need for strict blood glucose control
- Risk of aspiration
- Reimbursement eligibility
- Activity level
- Lifestyle management

## Troubleshooting Complications

Even with the correct formulation, proper access location and suitable administration regimen, mechanical or physiologic complications can occur.

Mechanical complications are primarily related to the feeding equipment. Physiologic complications are associated with gastrointestinal intolerance and usually manifest as nausea, diarrhea, vomiting and constipation. A well-informed patient or caregiver can easily manage the problems outlined in Figure 4.

| Placement Location | Advantages | Disadvantages |
|---|---|---|
| Nasogastric | • Low cost<br>• Easy placement | • Uncomfortable<br>• Irritating to oral and nasal tissue<br>• Easily displaced<br>• Increased risk of aspiration<br>• Not advised for long-term use |
| Gastrostomy | • Secure<br>• Easy placement<br>• Better long-term acceptance<br>• Unobtrusive | • Potential risk of aspiration<br>• Requires endoscopic or surgical placement<br>• Potential infection at stoma site |
| Jejunostomy | • Decreased risk of aspiration<br>• Easy placement | • Small diameter tubes may occlude more easily<br>• Requires endoscopic or surgical placement<br>• Potential infection at stoma site |

*Figure 2*

| Placement Location | Advantages | Disadvantages |
|---|---|---|
| **Bolus Feeding**<br>Administered with a syringe, usually over 15 to 20 minutes four to six times per day. | • Similar to regular meal pattern<br>• Easy to administer<br>• Flexible schedule<br>• Lower cost<br>• Minimal administration time | • Large volume at one time may be difficult to tolerate<br>• Higher risk of aspiration<br>• Blood glucose levels may vary |
| **Intermittent/Gravity Feeding**<br>Administered by gravity dip, usually over 20 to 60 minutes four to six times per day. | • Some ability to control rate<br>• Less handling required than with bolus<br>• Mimics meal times<br>• Lower cost than pump | • Rate is not precise<br>• Higher cost than bolus<br>• Risk of aspiration<br>• Blood glucose levels may vary |
| **Continuous Feeding**<br>Administered with a pump at a constant rate over an extended period of time, usually 12 to 24 hours. | • Predictable flow rate<br>• Better blood glucose control<br>• Reduces risk of aspiration<br>• Reduces risk of reflux | • Attached to pump tubing for extended time period<br>• More costly<br>• Potentially requires more troubleshooting<br>• Requires more patient training<br>• Must justify use for reimbursement |
| **Nocturnal or Cyclical Feeding**<br>Administered with a pump at a constant rate over a condensed period of time, usually eight to 12 hours. | • Minimizes time attached to pump<br>• Enhances quality of life<br>• Ideal for children and active adults<br>• Utilizing a calorically-dense formula decreases administration time | • Requires reliable self-care or caregiver throughout the night<br>• Sleep is disturbed if trouble shooting is required<br>• Must be able to tolerate a higher flow rate/hour<br>• May improve compliance to tube feeding regimen |

*Figure 3*

| Complication | Troubleshooting Suggestion |
|---|---|
| Aspiration | • Elevate head of bed 30-45 degrees during and after feeding<br>• Discontinue feeding 30 minutes before lowering head of bed<br>• Check gastric residuals and hold feeding if greater than 150 mL;<br>• Check residual again after one hour |
| Tube Clogging | • Flush tube with at least 20 to 30 mL water:<br>  • Before and after each bolus and intermittent feeding<br>  • Every four hours during a continuous feeding<br>  • Before and after administering a medication through the feeding tube<br>  • Each time feeding is stopped or interrupted |
| Dehydration | • Calculate each patient's additional water requirements and administer via tube as a flush:<br>  • Normal fluid requirements = 30 to 35 mL/kg/day<br>  • Water provided from formula = % water in formula X mL of formula administered<br>  • Additional water required = normal fluid requirements — water provided from formula<br>  • Adjust fluid requirements based on cardiac and renal function |
| Diarrhea | • Review medication list for possible causes:<br>  • Antibiotics<br>  • Laxatives<br>  • Sorbitol-containing elixirs<br>  • Magnesium, phosphorus or potassium medications<br>• Assess gastrointestinal tract function:<br>  • Motility<br>  • Stool patterns<br>  • Stool culture<br>• Evaluate appropriateness of tube feeding formula:<br>  • Osmolality<br>  • MCT:LCT ratio<br>  • Low-residue or fiber-containing<br>  • Whey- or peptide-based protein profile<br>  • Intact- or peptide-based protein profile<br>• Adjust administration regimen:<br>  • Volume administered (mL/feeding or mL/hour)<br>  • Technique (bolus, gravity, pump)<br>• Eliminate handling and manipulations which increase risk of formula contamination:<br>  • Volume administered (mL/feeding or mL/hour)<br>  • Technique (bolus, gravity, pump) |
| Constipation | • Evaluate fluid and/or fiber intake<br>  • Increase volume of free water administered<br>  • Change to a fiber-containing formula<br>• Review concurrent medications for side effects of constipation<br>  • Consider administering laxatives or stool softeners<br>• Assess activity level<br>  • Encourage ambulation whenever possible |
| Contamination | • Frequent hand washing<br>• Utilize clean technique when handling formula and tube feeding equipment<br>• Consider utilizing a closed system to reduce manipulation and handling<br>• Follow strict guidelines when using an open system:<br>  • Limit hang time to four hours for reconstituted powders and eight hours for liquids<br>  • Rinse feeding container with water before refilling<br>  • Do not add new formula to formula already in the feeding container<br>  • Replace feeding container and administration set every 24 hours |
| Non-compliance to Tube Feeding Regimen | • Calculate time required for physical care, therapy and activities (hours/day) and adjust feeding administration time accordingly<br>  • Increase feeding rate/hour and decrease feeding hours/day<br>  • Change to nocturnal feedings<br>  • Change to calorically dense formula and administer over fewer hours<br>• Evaluate time required to prepare powder formula<br>  • Consider a ready-to-use liquid<br>  • Evaluate the reliability of patient and caregiver to follow instructions<br>  • Simplify feeding regimen with closed feeding system |

*Figure 4*

Routine clinical monitoring is necessary to help avoid tube feeding complications and to determine the effectiveness and appropriateness of the nutrition support therapy. The following list includes standard assessment techniques that patients, caregivers and home care providers should include in their clinical monitoring plan:

- Verify tube placement and patency
- Monitor weight at established intervals
- Monitor intake and output
  - Adjust additional fluid requirement as necessary
- Assess GI status
  - Abdominal distension
  - Active bowel sounds
  - Frequency and consistency of stools
- Review laboratory values
  - Treat nutrient deficiencies or excesses
- Assess respiratory status for signs and symptoms of aspiration
- Include laboratory monitoring if feasible and available
  - Electrolytes, visceral protein, blood count, etc.
- Evaluate quality of life
  - Feeling of well-being
  - Ability to perform activities of daily living
  - Improvement in muscle strength
  - Changes in home environment
  - Reliability of patient and/or caregiver

## Managing Malabsorption

It is not unusual for patients in the home care setting to have several disease states and/or complications that impair their ability to obtain

adequate nutrition and put them at risk for malnutrition. Many patients are discharged home with malfunctioning digestive tracts. Malabsorption is considered clinically significant when an individual is unable to maintain normal nutritional parameters on a standard diet. It can result from a wide range of diseases, treatments and surgeries:

- Loss of absorptive surface resulting from surgical resection of the small intestine or short bowel syndrome
- Abnormalities in the structure of the GI tract, such as an enterocutaneous fistula
- Inflammation of the intestine, as in Crohn's disease or ulcerative colitis
- Damage to the intestinal mucosa from treatments, such as radiation therapy or chemotherapy
- Reduced capacity to metabolize specific nutrients, as in pancreatitis
- Systemic reactions to specific nutrients, such as severe protein allergy
- Opportunistic infections in the GI tract and intestinal lesions typical of the HIV infection or other immunosuppressive conditions
- Ill-defined cause or GI pathology of unknown etiology which results in classic symptoms of malabsorption (diarrhea, weight loss, abdominal distension, cramps and abdominal pain).

Nutrition intervention for malabsorption must address the specific disorder and its associated risk of nutrient deficiencies. Successful home enteral nutrition can be facilitated with a tube feeding formula containing easily digested and absorbed nutrients. These basic guidelines can be utilized to develop a care plan for the patient with malabsorption:

- Continuous tube feeding may aid in maximizing absorptive capacity.
- A tube feeding formula with a lipid blend containing a high percentage of medium chain triglycerides (MCT) can facilitate fat absorption and help avoid steatorrhea.
- Formulations containing peptides as the protein source are associated with superior absorption, tolerance and nitrogen utilization as compared to intact protein or free amino acid diets.
- Calorically-dense, peptide-based formulas are well tolerated by patients with elevated calorie requirements and/or those who require a shortened administration time (cyclical or nocturnal feedings).
- Peptide formulas with a whey-based protein source may result in improved gastric emptying.
- Vitamin and mineral supplementation should be administered to correct nutrient deficiencies.

A diagnosis of malabsorption adds an additional challenge for the patient, caregiver and home care support team. Studies demonstrate that these patients do have good outcomes — many are able to resume regular oral nutrition and experience significant rehabilitation. In contrast, patients on home parenteral nutrition may experience additional complications and additional cost.[5]

## Summary

The objective of good healthcare is to provide the best care and improve outcomes for every patient. The formulas and equipment available today make it feasible even for patients with complicated gastrointestinal disorders to obtain life-sustaining nutrition outside the hospital. A well-educated patient is a reflection of the training and support provided by the home care provider. A successful home enteral nutrition regimen allows the patient to function in the comfort and convenience of their own environment at a fraction of the costs typically incurred in the acute care setting.

Choosing the most appropriate formula, administration route and type of administration are the first steps toward positive clinical and functional outcomes. Providing the tools and education which enables each patient to confidently manage his or her own care and troubleshoot some basic problems can affect outcomes associated with improved quality of life and personal satisfaction. Reducing complications, medical interventions, and hospitalizations help maintain costs and improves financial outcomes for the home care provider and all others who share in the responsibility of providing successful home enteral tube feeding. ♦


**References**

1. Howard L, Ament M, Fleming CR, et al. Current use and clinical outcome of home parenteral and enteral nutrition therapies in the United States. *Gastroenterology* 1995;109:355–65.\
2. Ireton-Jones CS, et al. Care of patients receiving home enteral nutrition. *Infusion* 1996; March: 30–43.
3. Practice report of The American Dietetic Association: Home care – An emerging practice area for dietetics. *J Am Diet Assoc* 1999; 99: 1453–59.
4. Theta Reports. World Nutritionals Market, 1997.
5. Weinmann-Winkler S, et al. Enteral nutrition history — past, present, and future. *Nutr Supp Serv* 1986; 6:7,18.

# Self-Assessment Quiz: Successful Home Enteral Tube Feeding

## LEARNING GOAL

To understand causes of malabsorption in tube fed patients and describe ways to manage enteral patients who experience this problem.

## LEARNING OBJECTIVES

At the end of this program, the reader will be able to:

1. To provide participants with a review of patients requiring enteral tube feedings and guidelines for determining the appropriate formula and route of administration.
2. To help participants simplify the process of monitoring tube fed patients and troubleshooting possible complications.
3. To educate participants about the use of elemental diets for the home enteral nutrition patient with impaired GI function.

## SELF-ASSESSMENT QUESTIONS

**In the Quiz Answers section on the next page, fill in the correct answer for each question. To obtain two (2.0) contact hours toward CE credit, the passing score is 100%.** Return your Self-Assesment Quiz to Coram via email or fax. See the next page for details on how to return to your quiz. Please allow approximately seven days to process your test and receive your certificate upon achieving a passing score.

1. **Tube feeding in the home environment:**
   a. Typically costs more than using tube feeding in an acute care setting
   b. Is a rapidly decreasing trend
   c. Allows a patient to function in the comfort of his/her own environment
   d. Offers a patient limited options when administering tube feeding
2. **One advantage of having a gastrostomy tube is:**
   a. It is quick and easy to place
   b. It is small in diameter
   c. It is easy to maintain
   d. It is a low-cost device
3. **A disadvantage of a nasogastric tube is:**
   a. It can be uncomfortable
   b. It is small in diameter and may clog easily
   c. It is unobtrusive
   d. It is expensive to place
4. **A nocturnal or cyclical feeding:**
   a. Is administered with a gravity drip
   b. Mimics mealtimes
   c. Requires reliable self-care or a caregiver throughout the night
   d. Increases time attached to a pump
5. **Bolus feeding:**
   a. Reduces risk of aspiration
   b. Decreases blood glucose variations
   c. Gives a predictable flow rate
   d. Allows for a flexible schedule
6. **A potential complication of tube feeding includes:**
   a. Dry skin
   b. Memory loss
   c. Dehydration
   d. Delayed wound healing
7. **If a patient is experiencing diarrhea on tube feedings, a clinician should:**
   a. Evaluate the formula for vitamin content
   b. Only administer tube feeding via bolus method
   c. Administer a bolus of water to the patient every two hours
   d. Review medications the patient is taking
8. **To decrease contamination of tube feeding formulas, the following action should be taken:**
   a. Limit hand time of formula to 24 hours or less when using an open system for feeding
   b. Wash hands frequently
   c. Add formula to the feeding container every hour
   d. Replace feeding container and administration set every 72 hours
9. **To prevent a feeding tube from clogging, one should:**
   a. Flush the tube with 30 cc cranberry juice every four hours on continuous feeding
   b. Flush the tube with 30 cc soda every four hours on continuous feeding
   c. Flush the tube with 30 cc water every four hours on continuous feeding
   d. Flush the tube with 30 cc soda once/day on bolus feeding
10. **If an enteral patient is experiencing malabsorption, the following actions may help:**
    a. Choose a tube feeding formula with a high amount of omega-3 fats as the lipid source
    b. Change the patient to bolus feedings
    c. Administer a tube feeding formula containing peptides as the protein source
    d. Administer a tube feeding formula containing free amino acids as the protein source

# Healthline VOLUME 35

Coram®* Continuing Education Program

## Successful Home Enteral Tube Feeding

### QUIZ ANSWERS

Fill in the key below with the correct answers to receive 2.0 Continuing Education credits.**

1. (a) (b) (c) (d)
2. (a) (b) (c) (d)
3. (a) (b) (c) (d)
4. (a) (b) (c) (d)
5. (a) (b) (c) (d)
6. (a) (b) (c) (d)
7. (a) (b) (c) (d)
8. (a) (b) (c) (d)
9. (a) (b) (c) (d)
10. (a) (b) (c) (d)

****Accreditation Information**

- Provider approved by the California Board of Registered Nursing, Provider Number 15200 for 2.0 contact hours.
- Coram CVS Specialty® Infusion Services is approved by the Delaware Board of Nursing, Provider Number DE-14-010517.
- Coram CVS Specialty Infusion Services is approved by The Commission for Case Manager Certification to provide continuing education credit to CCM® board certified case managers.
- Coram CVS Specialty Infusion Services is a Continuing Professional Education (CPE) accredited provider with the Commission on Dietetic Registration (CDR). Registered Dietitians (RDs) and Dietetic Technicians Registered (DTRs) will receive 2.0 continuing professional education units (CPEU) for completion of this program/material. CDR Provider CO100.
- Provider approved by the National Association of Social Workers (Approval Number 886613245).
- Coram CVS Specialty Infusion Services is an approved provider for the American Board for Transplant Certification (ABTC). Coram CVS Specialty Infusion Services will grant one Continuing Education Point for Transplant Certification (CEPTC) for this offering. Provider Number 147.
- Coram CVS Specialty Infusion Services is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

*Coram CVS Specialty Infusion Services



COR16007-0515

**To obtain Continuing Education credits, please complete this information in full. Please print clearly.**

Name: _____

Address: _____

City: _____ State: _____ ZIP: _____

License Number *(required to receive CEs)*: _____

❑ RN ❑ LPN ❑ Certified Case Manager ❑ Social Worker

Employer: _____

Work Phone: _____

Coram Representative: _____ Date: _____

**Was this material:**

Useful in your practice? ❑ Yes ❑ No

Comprehensive enough? ❑ Yes ❑ No

Well organized? ❑ Yes ❑ No

**Certificate delivery:**

❑ I would like my certificate mailed to the address provided above.

❑ I would like my certificate emailed to me at: _____

*(ex: john.smith@coramhc.com)*

Fax this page to Coram at 949-462-8990, or

**SUBMIT FORM VIA EMAIL**: CEDept@coramhc.com

**Clear Form Fields**