

Nutrition-Based Home Care

David Richards

3-4-10

Introduction

- Home care includes:
 - EN
 - PN
- Tube feedings done for centuries
- PN for >3 decades
- Incidence/prevalence = unknown
- Primary/comorbid dz usual determinant of longevity not home PN/EN

Indications

- EN preferred to PN
- PN only for intestinal failure to Rx/prevent starvation
- PN < 2 weeks = no proven value
- No diff indications from in-hospital

Costs

- Include tubing, pumps, RNs, transportation, feeds themselves
- EN \lll PN
- 1995 EN \$18,000/pt/yr, PN \$70,700/pt/yr
- 2008 EN \$27,000/pt/yr, PN \$100,000/pt/yr
- EN feeds often not covered by ins
- PN unaffordable without insurance

Table 13.1
Medicare Criteria for Coverage of Home TPN

- Permanent condition of at least 3 months duration and
- Significant impairment of absorption or motility
 - Massive small bowel resection leaving ≤ 5 feet of small bowel beyond ligament of Treitz *and* surgery within 3 months *or*
 - Short bowel syndrome with enteral losses $> 50\%$ of intake *and* intake ≥ 2.5 –3 l/day *and* urine output < 1 liter/day *or*
 - Bowel rest required for ≥ 3 months *and* patient receiving 20–35 kcal/kg/day IV *and* patient has one of the following
 - Symptomatic pancreatitis *or*
 - Severe exacerbation of regional enteritis *or*
 - High output enterocutaneous fistula and distal tube feeding not possible *or*
 - Complete mechanical bowel obstruction *and* surgery not an option *or*
 - 10% weight loss in ≤ 3 months *and* serum albumin ≤ 3.4 *and* fecal fat test demonstrates loss of $> 50\%$ of oral/enteral intake on ≥ 50 g fat/day diet *or*
 - 10% weight loss in ≤ 3 months *and* serum albumin ≤ 3.4 *and* patient is taking maximum doses of prokinetic agent *and* patient has daily nausea/vomiting *and* has diagnostic test documenting motility disturbance *and* radioisotope, barium, or pellets fail to reach the right colon by 6 h *and* patient is not acutely ill *or* on any medication that would decrease motility *or*
 - Documented failure of a tube feed trial *and* 10% weight loss in ≤ 3 months *and* serum albumin ≤ 3.4 *and* altering the composition of an enteral diet or administering medications to treat the etiology of the malabsorption will not maintain the patient's health status *and* patient has moderate abnormality such as:
 - 72-h fecal fat test shows $> 25\%$ loss of ≥ 50 g fat/day diet *or*
 - Confirmation of malabsorption by other test (sudan stain, d-xylose, etc.) *or*
 - Gastroparesis unresponsive to prokinetic agent demonstrated on study with failure of isotope or barium or pellets to reach right colon in 3–6 h *or* by manometric motility study *or*
 - Small bowel dysmotility unresponsive to prokinetic agent demonstrated with gastric to right colon transit time between 3–6 h *or*

Table 13.1
(Continued)

- Small bowel resection that left > 5 feet of small bowel beyond the ligament of Treitz *or*
- Less severe short bowel syndrome *or*
- Mild to moderate exacerbation of regional enteritis or enterocutaneous fistula *or*
- Inoperable partial mechanical small bowel obstruction

Adapted from <http://www.cignamedicare.com/dnere/mr/pdfs/decisiontree.pdf> accessed March 22, 2006.

Quality of Life

- Pts on EN/PN have dec QOL
- Dz related: high-output stomas, sick in gen, neurologic dz
- Tube related prob: poor ostomy closure, spillage of bowel contents onto clothes,
- QOL similar scored to pts on HD
- EN -> some improvement in QOL after starting but up to half have psychological intolerance

QOL

- Less ancillary support after hosp D/C (Dieticians, RNs)
- Involvement in support groups/foundations helps with QOL, depression, rehosp rates
- Anxiety over newly needed skills
- Unpredictable delivery of products
- At mercy of technology (eg power outage, transit strikes)

Survival

- Dependent on surviving underlying Dz
- Complications with PN/EN -> hospitalization and morbidity >> mortality
- Diff to tell efficacy of EN vs PN
- Small but non-sig inc in mortality with EN vs PN

EN Survival

- Depends on underlying dz
- Survival with cancer is 20% in 12 Mo but
Young pts with neuromusc dz 80% in 12 Mo
- Dec survival as age inc
- Better if can resume nl diet (?selection bias?)

PN Survival

- Depends on underlying dz
- Complications more freq and more morbidity/mortality than EN
- Complications can account for up to 11% of mortalities
- Survival nonCA/nonHIV 91% in 12 Mo and 62% at 5 yrs

PN Survival

- Diff study saw 6-12 Mo mortality in 1997 as:
 - 4 % Crohns
 - 13 % Vasc dz
 - 16 % “others”
 - 21 % Rad enteritis
 - 34 % AIDS
 - 74 % CA

Complications of EN

- Tube issues – clogging, skin excoriation, breakage
- Water deficits
- Electrolyte imbalances
- Unusual to get essential fatty acid def w/o malabs
- Can get reduced levels of chol, alpha tocopherol, fatty acids

Complications of PN

- Mechanical/thrombotic/metabolic/infectious
- Less common, esp infxn, at home vs hosp
- 1-2 complications/yr with ave 3-5days in hosp

Comp of PN: Liver

- Can lead to ESLD
- Biochemical cholestasis in up to 65% in 6 Mo and up to 72% after 6 yrs
- Over feeding esp of carbs worsens cholestasis
- Inflammatory markers inc with inc carbs/total calories. Markers correlate with liver failure
- ? Help with supplementing spec nutrients (? Choline reversed steatosis/normalized alk phos and LFTs in 1 study)

TPN induced Cholestasis

- Improves after cessation of TPN
- Ranges from sm LFT inc to steatosis/steatohepatitis, cholangitis, fibrosis/cirrhosis
- Inc direct bili by 2, inc alk phos, inc LDH, inc GGT
- Occurs 2 weeks after starting TPN to Mos later

Nutrition 2000; 16:1090-1092

Clinics in Liver Disease 2008; 12:97-110

TPN induced Cholestasis

- Assoc with lipid emulsions > 1g/kg/day
- AA def common (serine/methionine/taurine)
- May interfere with conjugation of BA
- Can -> dec LDL synthesis
- No gut stim of CCK (help with exog CCK or pulse AA inf)
- Worse with inc duration of TPN or continuous infusion = build in breaks

TPN induced Cholestasis

- Can lead to dec alb (<2 g/dL, ?marker of stress vs poor nutrition)
- Changes BA ratio (increase in lithocolic acid by bact overgrowth)
- Lack of release of po stim GI hormones
- Increases gut stasis -> bact overgrowth
- -> enterocyte hypoplasia-> inc bact translocation -> inc inflamm

TPN Cholestasis: Rx

- Watch LFTs
- Flagyl 250mg TID to dec bact overgrowth
- Urso 20-30 mg/kg/day (can reverse)
- D/C TPN ASAP (LFTs -> nl in 1 mo)
- No excess nutrients
 - AA 0.8-1.5 g/kg/d (≤ 1.3 x basal energy expend)
 - Dextrose 5mg/kg/min
 - Lipids < 1g/kg/d (25-35% tot energy, 2-4% non prot cal from linoleic acid)

TPN Cholestasis: Rx

- ASAP start po or EN or stop it
- Cyclic regimens (12-16 hrs on)
- Molybdenum?
- Antiox: vit E, selenium?
- 1 case report used anti-TNF alphas
- Transplant sm bowel/liver
- ? S-adenosylmethionine (100mg/kg)???

Comp of PN: Infection

- Occur at catheter exits, in tunnels, or in blood
- Catheter sepsis 0.34 episodes/pt/yr and is 80% of catheter infections
- 60% G(+) organisms (coag neg staph), 14% fungal, 26% G(-) org
- Inv proportional to remaining sm bowel in SBS
- ? Inc in PICCs vs other CVCs
- 2/2 contam of flushes/break in sterile technique/contam of stock solutions

Comp of PN: Other

- Catheter occlusions 0.07 episodes/pt/yr
- Central vein thrombosis 0.027 ep/pt/yr
- Renal dysfunction 5%/yr

Comp of PN: Deficiencies/Toxicities

- Essential fatty acid def w/o lipids or malabs
- Selenium/arginine/choline def
- Iron def -> need for parenteral iron
- Many infusions contam with Al -> aluminum tox: enceph, bone dz
- Mn tox -> extrapyramidal syndrome (sim to Parkinsons), may get too much if you supp = Mn contamination may be enough to meet needs

Table 13.5
Deficiencies and Toxicities Seen in HPN Patients

	<i>Nutrient</i>	<i>Signs/symptoms</i>	<i>Laboratory assessment</i>
Deficiency	EFA	Scaling skin, growth retardation, sparse hair, neuropathy	Triene:tetraene ratio > 0.4
	Selenium	Cardiomyopathy	Hyperammonemia
	Arginine Choline	Encephalopathy	Liver enzyme abnormalities
Toxicity	Iron		Microcytic anemia
	Aluminum	Apraxia, dementia, seizures, osteomalacia, microcytic anemia	Al level, deferoxamine stimulation test
	Manganese	Extrapyramidal symptoms	RBC Mn level, MRI of brain

Comp of PN: Metabolic Bone Dz

- Inc risk osteopenia/osteoporosis
- ? 2/2 Aluminum tox
- ? 2/2 altered vit D metabolism
- ? 2/2 chronic inflamm

PN Infusion

- PN usually done over 8-12 hrs with 1 hr taper up and down to avoid hyper/hypoglycemia (limited data)
- Fingerticks q2-4 hrs if needed
- Nocturnal infusions are norm
- Portable pumps available (eg in backpack)

EN Infusion

- Rapid bolus/slower bolus/continuous
- Can give ON
- If G tube will likely tolerate bolus feeds
- If motility issue may need slower infusion
- J tubes req continuous feedings by pump but can do slower bolus feeds
- Also have portable pumps

Table 13.6
Options for Infusion and Timing of HPEN

HPN

Programmable electronic pump

Duration 8 to 24 h

Ramp up 1st hour

Ramp down last hour

Portable vs. fixed to pole

HEN

Electronic Pump

Duration 8 to 24 h

Useful if intolerant to bolus feeds

Portable pump with sealing bags available

Slow gravity bolus

250-1,000 ml feed product in bag

Bag must be hung (pole or hook)

Rate adjusted by flow regulator

Reduced mobility during longer period

Rapid gravity bolus

Attach body of 60-ml catheter syringe to end of feeding tube

Patient holds syringe and pours aliquots of feeding product into syringe

Usually 250 to 500 ml feeding product per session

Special Considerations: Crohns

- Common cause of IF
- Many surgical interventions and resections
- Only 3% req PN for extended period (2-13 yrs)

Special Consid: CA

- Good data to support EN/PN during short term curative therapy to help complete Rx
- Use of EN/PN more controversial if terminal CA
 - Some QOL benefit in some studies
 - Occ pt that lives extended period but no predictive factors
 - High short term mortality and no controlled studies -> PN long been questioned

Other Considerations

- Tube feeding does not reduce asp PNA (still asp saliva)
 - Only if can't maintain adeq nourishment
- No prospective data but no diff in longevity for adv dementia +/- tube feeds
- PEG helpful for ALS to stabilize nutritional state but longevity not affected
- Post CVA need periodic swallow assessment for return of fxn (back to oral feeds 13%)

STAT "PLACE X IN BOX IF STAT"

"Authorization is hereby given to dispense the Generic equivalent or Medical Staff approved therapeutic equivalent unless otherwise indicated by the words - DO NOT SUBSTITUTE - MEDICAL NECESSITY"

ALLERGIES: NKA YES

DRUG: _____

OTHER: _____

WT: _____ kg. HT: _____ cm.

INTESTINAL REHABILITATION TRANSPLANT CLINIC PARENTERAL HOMECARE ORDERS

Patient Name: _____ Date/Time _____ Weight: _____ Age: _____

Patient Clinical Information Treatment Diagnosis: _____ Allergies: _____

IV Access (check one)

External Central Line: Tunneled Non-Tunneled PICC Line Portacath Pheresis

Lumens/Ports (check one): Single Double Triple

Alternative lumens for IV Antibiotic medication infusion: Yes No

Flush Medications:

- Active Lumen/Port Flush: Flush IV line with 5 milliliters Normal Saline before and after antibiotic administration, then Heplock with 3 milliliters of heparin (10 units/milliliter)

• Dormant Lumen/Port Flush:

Dispense _____ day(s) of heparin and saline with _____ refills

Normal Saline 5 milliliters prn IV line maintenance

Normal Saline flush IV line with 5 milliliters Normal Saline then heplock with heparin

Check one:

- Heparin 3 milliliters (100 units/milliliter) IV every day (Central Line, PICC)
- Heparin 5 milliliters (100 units/milliliter) IV every month and prn to de-access portacath needle (portacath)
- Heparin 5 milliliters (10 units/milliliter) IV twice daily (pheresis)
- Heparin 3 milliliters (10 units/milliliter) IV every day (<2 years or <24 gauged catheters)
- Other

Nursing Supplies:

- Skilled Nursing visits to instruct on Intravenous Line Care and medication infusion therapy, continue until caregiver independent with care.
- Intravenous line dressing per homecare protocol
- Intravenous line dressing change supplies
- Intravenous injection caps to be changed weekly and as needed
- Additional Supplies: _____

Nutrition Support:

Total Parenteral Nutrition Support (if checked, completed TPN/IL form must be attached)

Enteral Nutrition Support

Enteral Access (check one): Nasogastric tube Gastrostomy tube Gastrostomy/Jejunostomy tube
 Jejunostomy tube

Enteral Nutrition Order: _____

Labs (check which apply)

- Weekly: complete metabolic panel, ionized calcium, magnesium, phosphorus, CBC with differential and platelets, triglycerides, hepatic panel including GGT and direct bilirubin
- Monthly: prealbumin, C-reactive protein, transferrin, coagulation panel
- Every three months: anemia panel (transferrin, serum iron, %iron saturation, TIBC, UIBC), folate, vitamin B 12, Copper, Zinc, Selenium, Chromium, Manganese
- Every 6 months: Vitamin A, E, D (1, 25) and (25)

Please fax results to Texas Liver Center #713-704-6616

Physician's Signature

Physician Print Name

MSID #

Date/Time

**MEMORIAL
HERMANN**
Texas Medical Center

Parenteral Homecare Orders



References

- DeLegge, MH. *Nutrition and Gastrointestinal Disease 2008*; Human Press, Chapter 13
- Burstyne, RD et al. Abnormal Liver Functions as a Result of TPN in a Patient with Short-Bowel Syndrome. *Nutrition 2000*; 16:1090-1092
- Guglielmi, FW et al. Cholestasis Induced by TPN. *Clinics in Liver Disease 2008*; 12:97-110