Chennai Critical Care Consultants Group

Apollo Hospitals
touching lives

Apollo Hospitals
touching lives

Current concepts in Critical Care Nutrition

Dr.N.Ramakrishnan AB (Int Med), AB (Crit Care), MMM, FACP, FCCP, FCCM

Director, Critical Care Services

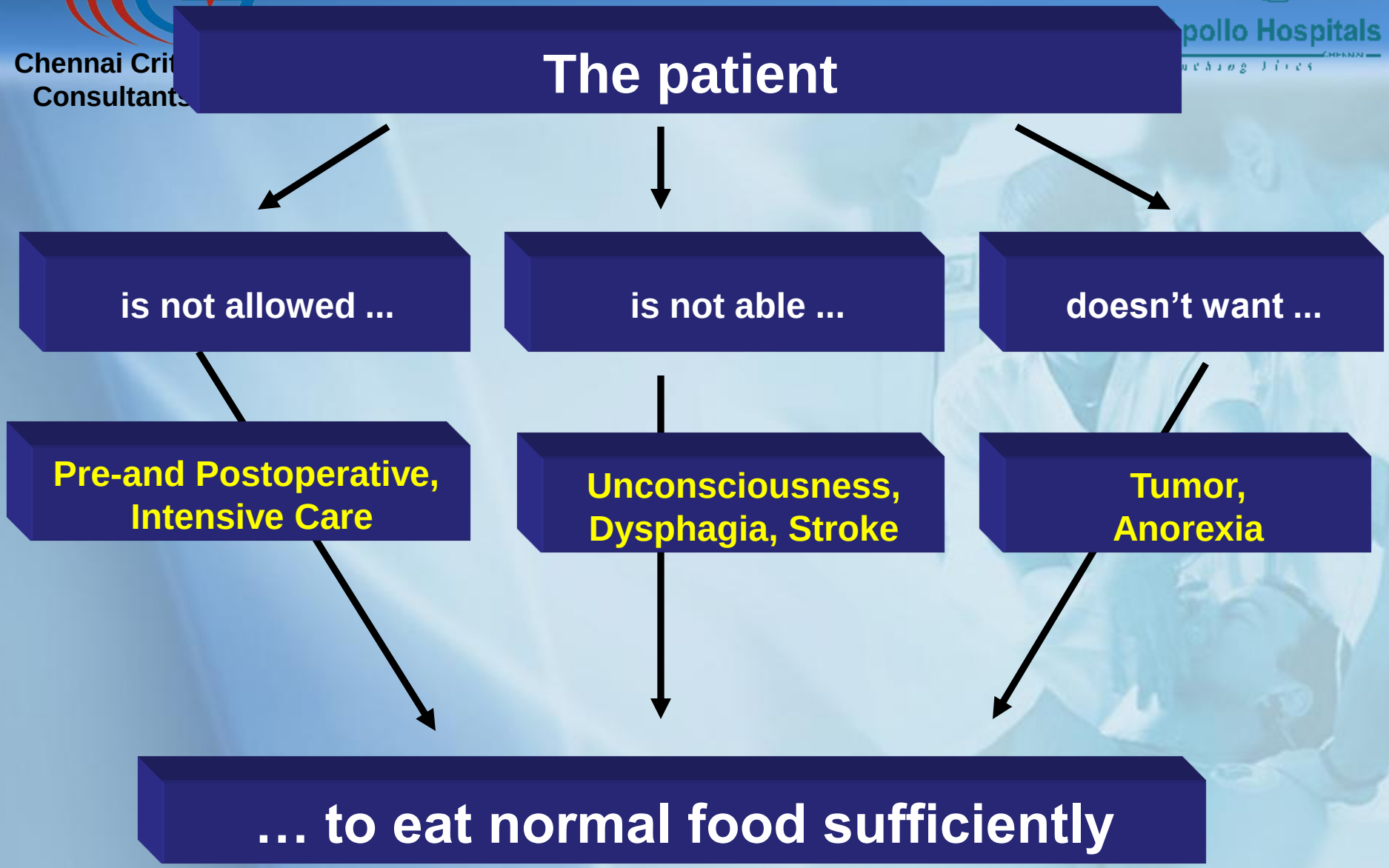
Apollo Hospitals, Chennai

Chennai Critical Care Consultants Group

Apollo Hospitals

Objectives

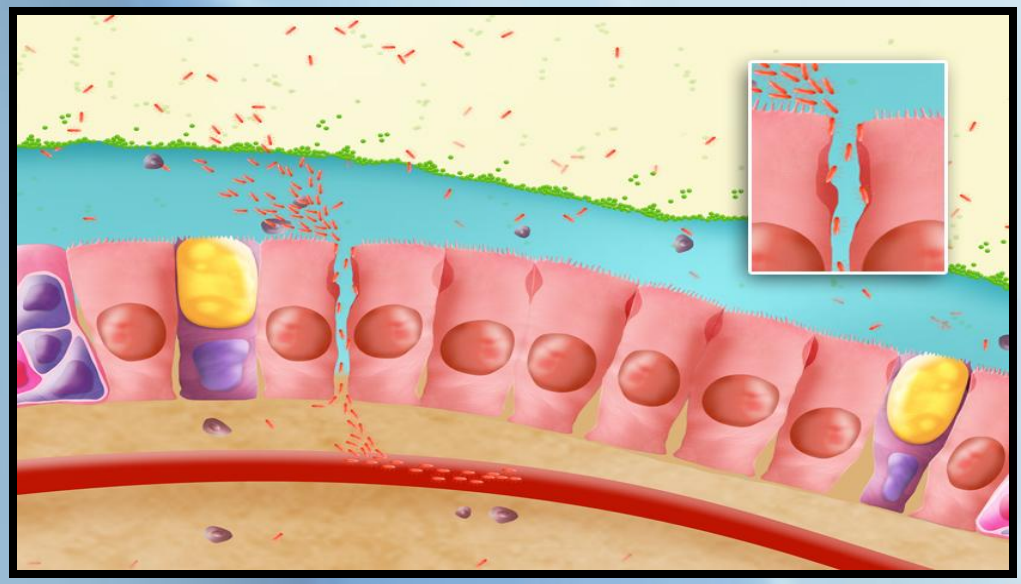
- *Why?*
  - Enteral or Parenteral
- *When?*
  - Early usage of Nutrition
  - Does it impact outcome?
- *How?*
  - Routes
- *What?*
  - Commercial vs Kitchen feeds


The patient
is not allowed ...
is not able ...
doesn't want ...
Pre-and Postoperative, Intensive Care
Unconsciousness, Dysphagia, Stroke
Tumor, Anorexia
… to eat normal food sufficiently

Chennai Critical Care Consultants Group

Apollo Hospitals

Alteration of Gut Structure and Function: Bacterial Overgrowth



- Intestinal epithelial cell death
- Decreased enzyme production
- Decreased blood flow
- Decreased immunoglobulin production
- Increased translocation of bacteria and cytokines

Enteral vs. Parenteral

- **Advantages of Enteral:**
  - ***Safer (Fewer complications)***
    - **Metabolic: Dextrose; Fluid and electrolyte**
    - **Catheter Related: Mechanical & Septic**
  - ***Maintains GI Function***
    - **TPN: Loss of GI function: atrophy**
    - **Immune function: Prevents bacterial translocation**

Enteral vs Parenteral

- **Advantages of Enteral**
  - ***Lower Cost:***
    - **Formula and delivery system costs**
    - **Less patient care time**
  - ***Simpler system***
    - **Easier for caregiver or self administration**

PN vs EN in critically Ill

- Simpson & Doig 2004
- 11 trials
  - No additional immune enhancing ingredients
- Significant increase in infectious complications with PN (OR 1.66)
- Reduced mortality with PN (OR 0.51, p=0.04)
- PN vs early EN (<24 h) no significant difference
- *B+ recommendation for PN in patients in whom EN cannot be initiated within 24 hrs*

- Gramlich et al. 2004
- 1 meta-analysis
- 12 studies
  - No elective surgery
  - 5 studies associated PN with a larger caloric intake
- EN is associated with fewer infectious complications (RR 0.64)
- No significant difference in mortality
- 4 studies reported cost savings with EN
- *EN should be first choice for nutritional support in ICU*

Enteral feeding *should be part of routine care*

- Protein-calorie malnutrition with inadequate oral intake for the previous 5 days
- Severe dysphagia
- Major full-thickness burns
- Massive small bowel resection in combination with administration of TPN
- Low output enterocutaneous fistulas

Enteral feeding *would usually be helpful*

- Major trauma
- Radiation therapy
- Chemotherapy
- Liver failure and severe renal dysfunction

Chennai Critical Care Consultants Group

Apollo Hospitals

Enteral feeding *of limited or undetermined value*

- Immediate postoperative or poststress period
- Acute enteritis
- Less than 10% remaining small intestine

Enteral feeding *should not be used*

- Complete mechanical intestinal obstuction
- Severe uncontrollable diarrhea
- High output external fistulas
- Severe pancreatitis (not any more!)
- Shock

Chennai Critical Care Consultants Group

Apollo Hospitals

Early Enteral Nutrition

- ***How early is early?***
  - Less than 36 hours
- ***Meta analysis (Moore et al. Ann Surg 216 (2); 172-183)***
  - Reduced post operative infections
- ***Zaloga et al (2001)***
  - Early nutrition (12-24 hrs post insult) reduced LOS and mortality

Early EN in polytrauma

- Early EN (initiated 4.4 hours after ICU admission on average) resulted in less organ dysfunction than delayed feeding (initiated 36.5 hours after ICU admission on average)
  - Kompan et al. *Intensive Care Med* 1999; 25:157-61

Chennai Critical Care Consultants Group

Apollo Hospitals

Early EN in polytrauma

NPO Days	Calorie Deficit (kcal)	MOF	Vent Days	% with Infections	ICU LOS	Hosp LOS	Day Diet Started
<3 days n=20	-12057	45%	5.4	40%	11.4	20.4	1.6
>3 days n=42	-22199	68%	11.5*	54%	19.8*	28.8**	5.6*

*p<.05; **p=.06

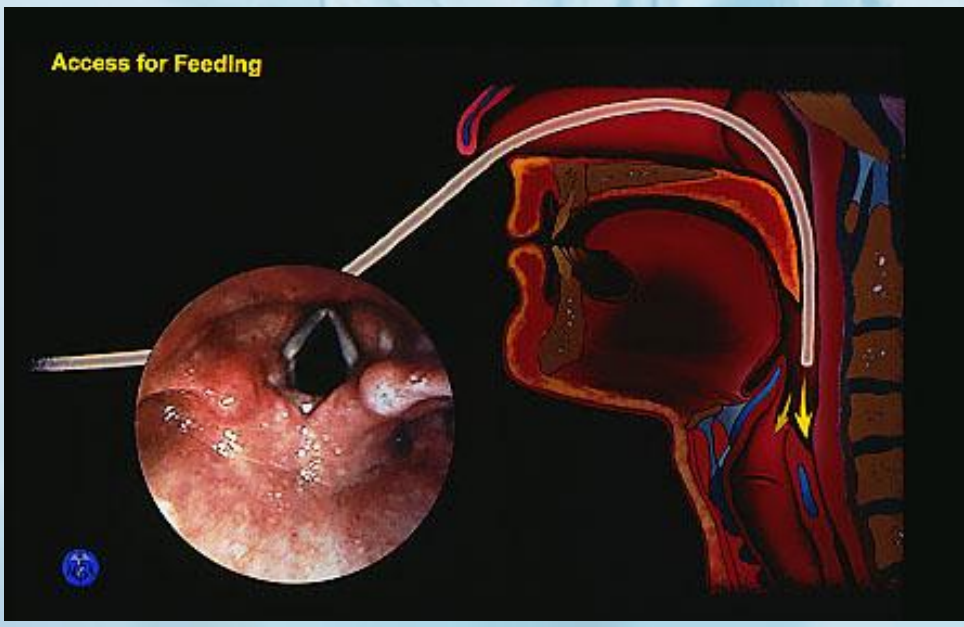
(Franklin, McClave, et al. JPEN 2008;32(3):324)

Chennai Critical Care Consultants Group

Apollo Hospitals

Administration Techniques

- Short term access
- Long term access
- Continuous feeding
- Bolus feeding



Short term access

- NG (Nasogastric) tube or Ryle's tube
  - Made of soft silastic material
  - Various sizes
    - Small bore feeding tube more comfortable
    - Larger bore tube (sump): check gastric residuals
  - Placement verified by x-ray

Continuous vs bolus feeding

- *Continuous*
  - Most frequent method used in hospitals and nursing homes
    Less nursing time
  - Generally better tolerance: Less diarrhea and emesis
  - Better compliance
- *Bolus*
  - Often used for home patients to self administer
  - Costs less to administer
  - Simplest to teach
  - More patient freedom

Cyclic

- At night only to improve oral intake during the day
- Calorie adjustments appropriately for nocturnal cycling

Chennai Critical Care Consultants Group

Apollo Hospitals

How much is enough?

- Immune benefit
  - 15 – 30% calories needed
- Visceral blood flow benefit
  - 10 – 20% calories enterally
- Maintenance of gut mass and gut barrier function
  - 50 - 60% requirements early post injury (24 - 48 hours)

(Cresci & Martindale 2001)
(Bistrian, ESPEN, 2002)
(US Summit, JPEN 2001)

Chennai Critical Care Consultants Group

Apollo Hospitals

Products

- Complete Formulas
- Modular (Supplements)
- Elemental
- Disease Specific

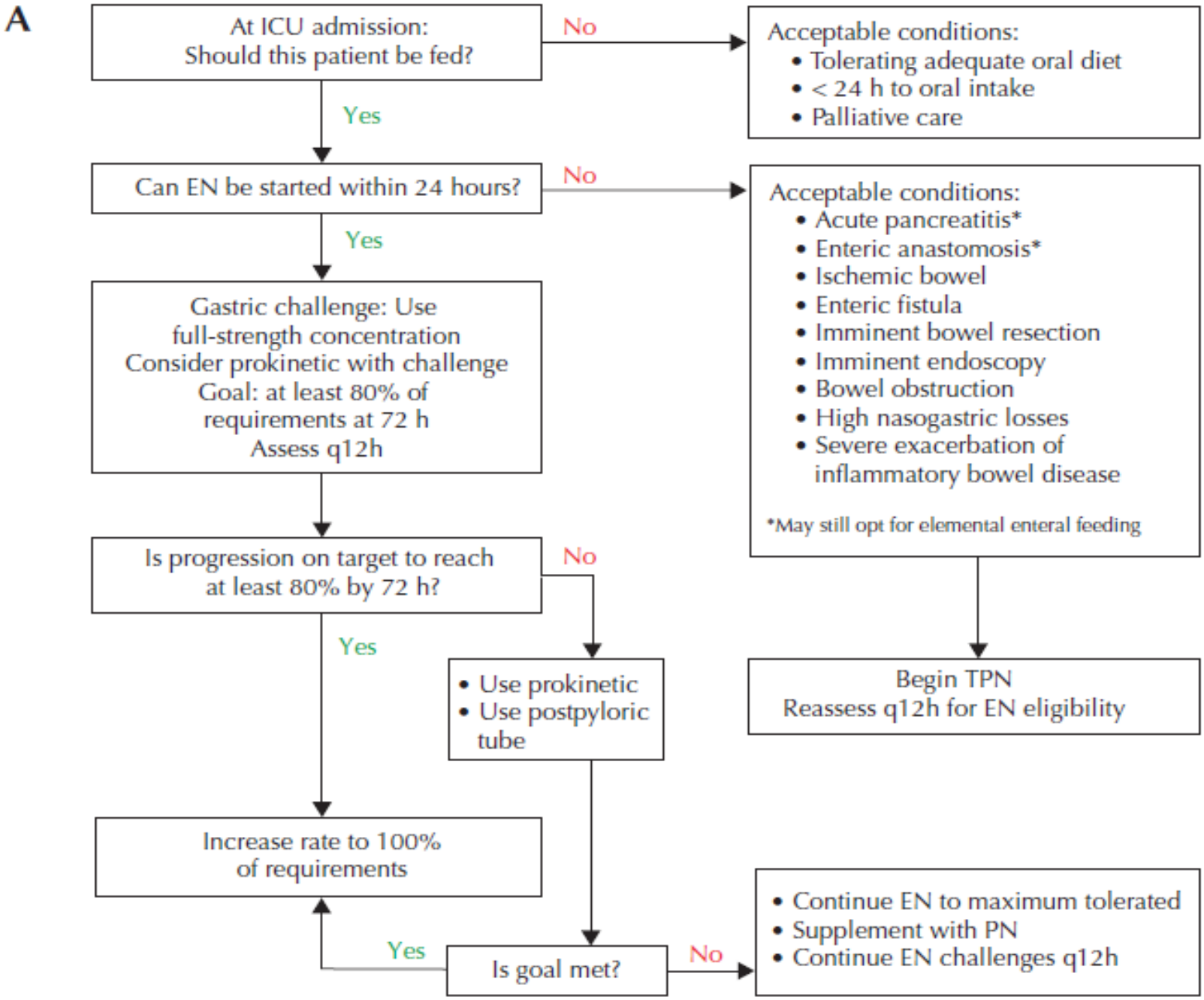
Chennai Critical Care Consultants Group

Apollo Hospitals

Multicentre, clinical trial of algorithms for critical-care enteral and parenteral therapy (ACCEPT)

- Evidence-based recommendations for nutritional support can be implemented as a set of algorithms and can improve nutritional support to critically ill patients, leading to a decrease in hospital mortality rate and length of stay

  – Martin et al. CMAJ 2004; 170 (2):197


A
At ICU admission:
Should this patient be fed?
No
Acceptable conditions:
• Tolerating adequate oral diet
• < 24 h to oral intake
• Palliative care
Yes
Can EN be started within 24 hours?
No
Acceptable conditions:
• Acute pancreatitis*
• Enteric anastomosis*
• Ischemic bowel
• Enteric fistula
• Imminent bowel resection
• Imminent endoscopy
• Bowel obstruction
• High nasogastric losses
• Severe exacerbation of inflammatory bowel disease
*May still opt for elemental enteral feeding
Yes
Gastric challenge: Use full-strength concentration
Consider prokinetic with challenge
Goal: at least 80% of requirements at 72 h
Assess q12h
Is progression on target to reach at least 80% by 72 h?
No
Yes
• Use prokinetic
• Use postpyloric tube
Begin TPN
Reassess q12h for EN eligibility
Increase rate to 100% of requirements
Yes
Is goal met?
No
• Continue EN to maximum tolerated
• Supplement with PN
• Continue EN challenges q12h

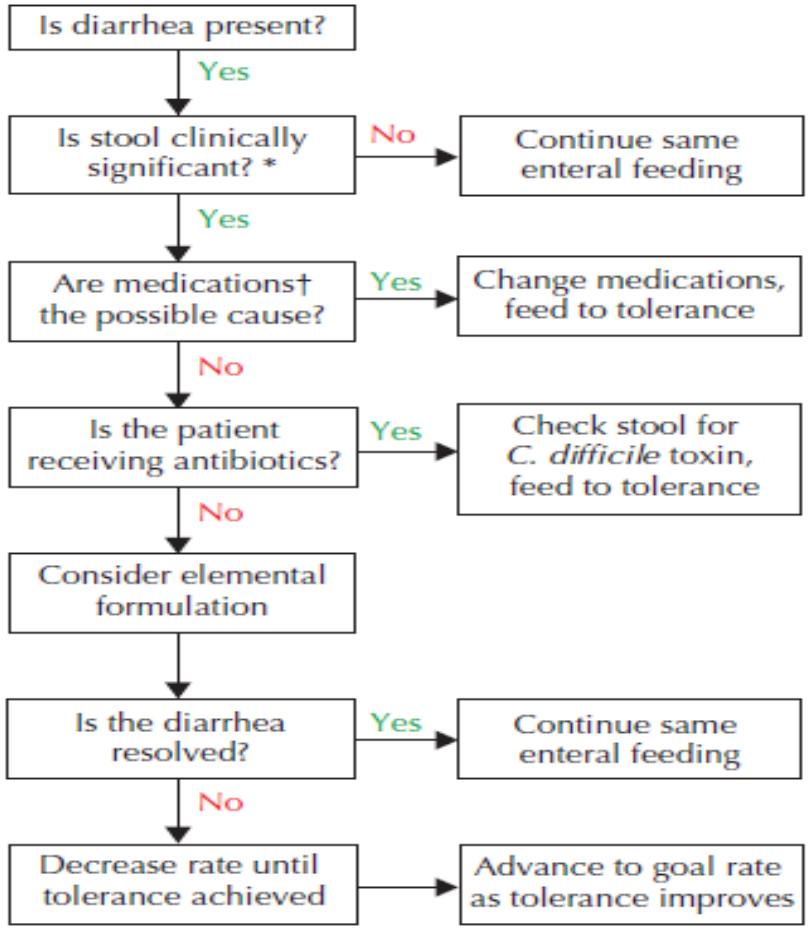
Chennai Critical Care Consultants Group

Apollo Hospitals

Diarrhea: Prevention & Treament

- Use isotonic feedings
- Start feeding at 25 -50 ml/hr & advance gradually
- Limit hang time to 6 hours or use ready to hang product
- Enzyme deficiency: use elemental feeding
- Change medications if possible
- Check stool for C. difficile titre
- Use a product with fiber

B



*Clinically significant stools:
- Liquid stools > 300 mL/d or
- > 4 loose stools per day or
- Risk of contamination of wounds or catheters

†Medications that commonly cause diarrhea:
- Metoclopramide
- Quinidine
- Xylitol
- Magnesium
- Erythromycin
- Aminophylline
- Sorbitol
- Phosphorus

C

Assess gastrointestinal tolerance to tube feeding q4h

Intolerant patients have:
- Clinically significant stools or
- Readily apparent abdominal distension or
- Increased abdominal girth or
- Multiple emetic episodes or
- Clinically detected aspiration or
- Gastric residuals > 200 mL for nasogastric feeds

Chennai Critical Care

Apollo Hospitals

Multiple Containers

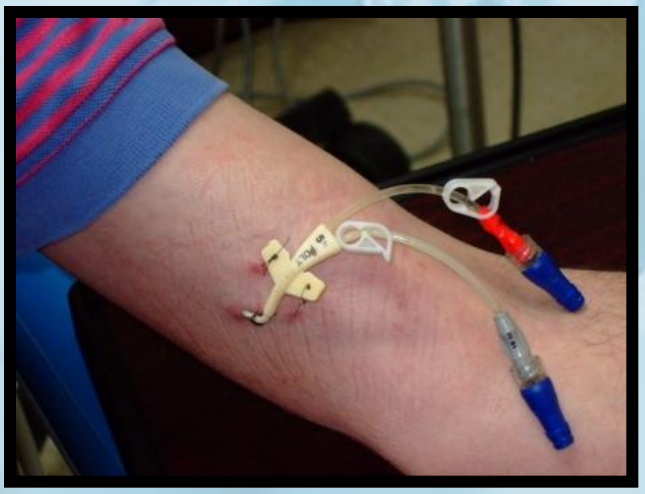
- *Advantages*
  - Varied proportion of carbohydrate, protein and Lipid can be used
  - One component can be avoided if desired
- *Disadvantages*
  - Errors in mixing causing incompatibilities
  - Labile components like vitamins, polyunsaturated fatty acids can be degraded during hang time
  - Needs frequent bottle change, increasing risk of contamination

Chennai Critical Care Consultants Group

Apollo Hospitals

Peripheral TPN

- *Advantages*
  - Easy access
- *Disadvantages*
  - May be difficult to meet caloric demands, particularly if volume restricted
- *Remember*
  - Use when enteral route not available
  - Central Line not available or infected
  - Ideal for short term use
  - Total or Partial PN
  - Osmolality less than 900 mosm



Central TPN

- Aseptic precautions for insertion
- Transparent dressing / no gauze
- No three way
- Hand hygiene – while handling
- Do not use for other purpose
  - Dedicated port
- Change IV set every 24hrs
- Resite / remove line when infected

Monitoring TPN

- Monitor parameters at least once in 3 days
- *Labs*
  - CBC, Glucose, Electrolytes, BUN, Creat
  - LFT, TGL, PT
- Close monitoring of Blood glucose
- Intake and output
- Watch for line related complications

Chennai Critical Care Consultants Group

Apollo Hospitals

Nutritional Approach

- Nutritional assessment & support must be implemented upon admission
- Enteral Nutrition (EN) is preferred
- Parenteral nutrition is used to supplement EN when necessary & when EN not feasible
- Overfeeding is avoided and tight glycemic control maintained
- Diarrhea is aggressively managed

Chennai Critical Care Consultants Group

Apollo Hospitals

Chennai Critical Care Consultants Group

Apollo Hospitals

Nutrition Support Team

THE APOLLO WAY