

Efficacy of Enhanced Protein-Energy Provision via the Enteral Route in Critically Ill Patients: The PEP uP Trial

A Single center feasibility trial

PEP uP Study Team

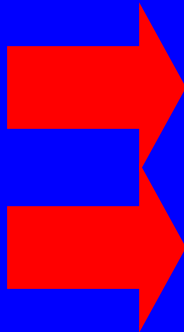
Daren, John, John, Roy, Ahmed, Fiona, Paula,
Susy and Nicole

Introduction

Whereas we used to consider nutrition as supportive care, we now consider it as a form of therapy, as it modulates the underlying inflammatory disease process and improves patient outcomes



Adjunctive
Supportive
Care

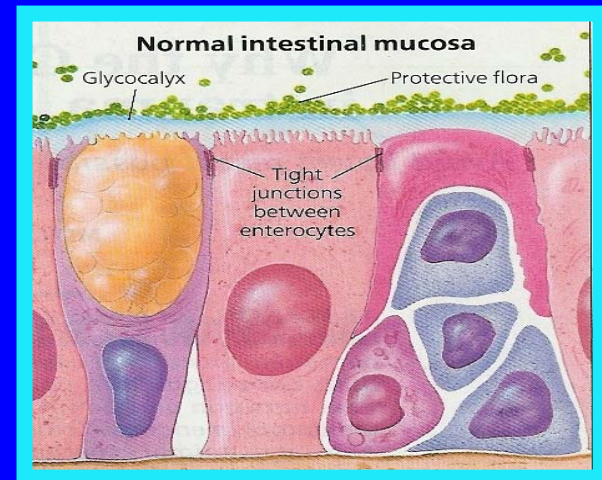
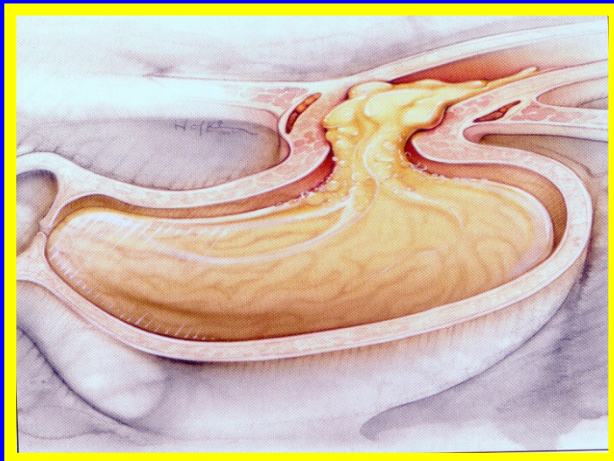


Proactive
Primary
Therapy

- ✓ Enteral feeding supports gastrointestinal structure and function and attenuates the stress response
- ✓ Starting Enteral Nutrition within 24-48 hours of admission is associated with reduced infectious complications and reduced mortality!

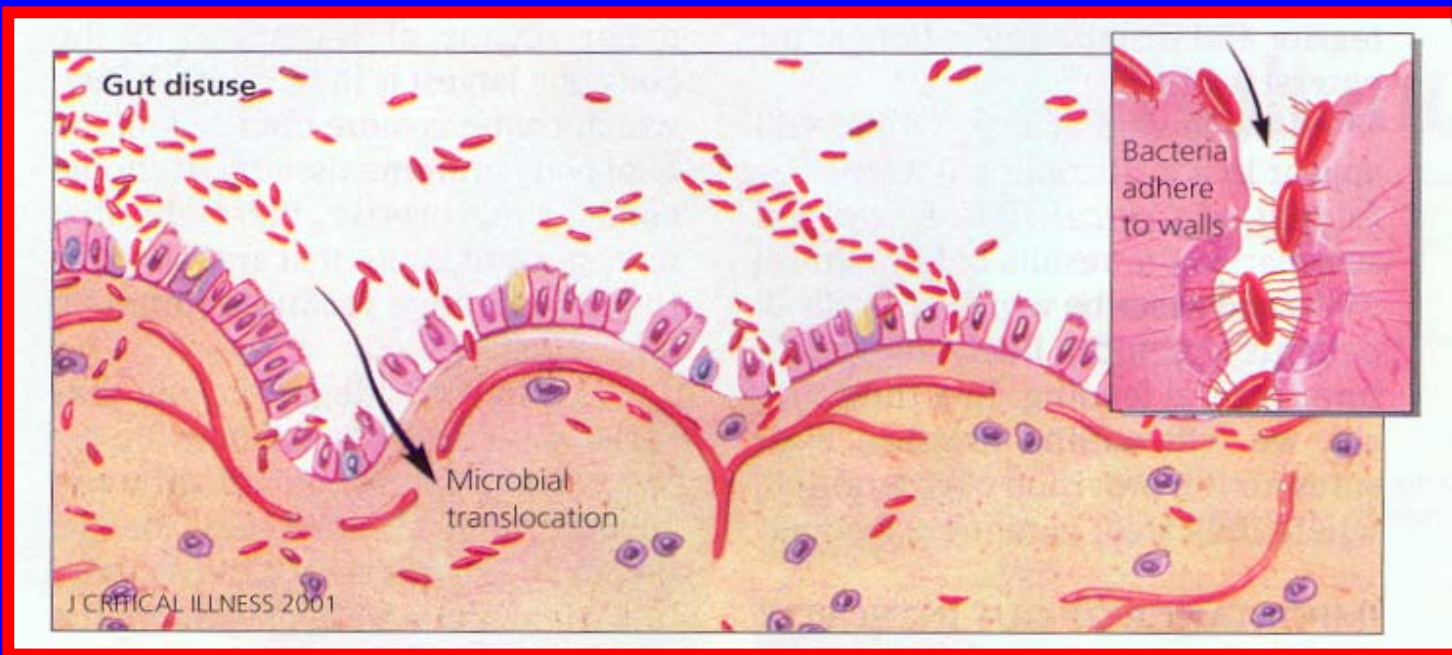


Therefore, Enteral Nutrition(EN) is recommended over Parenteral Nutrition (PN)



When patients are NPO or on TPN, GUT disuse causes loss of functional and structural integrity of the GI tract and is associated with increased complications!

These changes are time dependent; the longer they are left NPO, the greater the complications.



Just Say No to NPO

Advocate for your Patient!

They may need a gentle reminder to get the feeding tube or NG in place and sign the feeding protocol orders

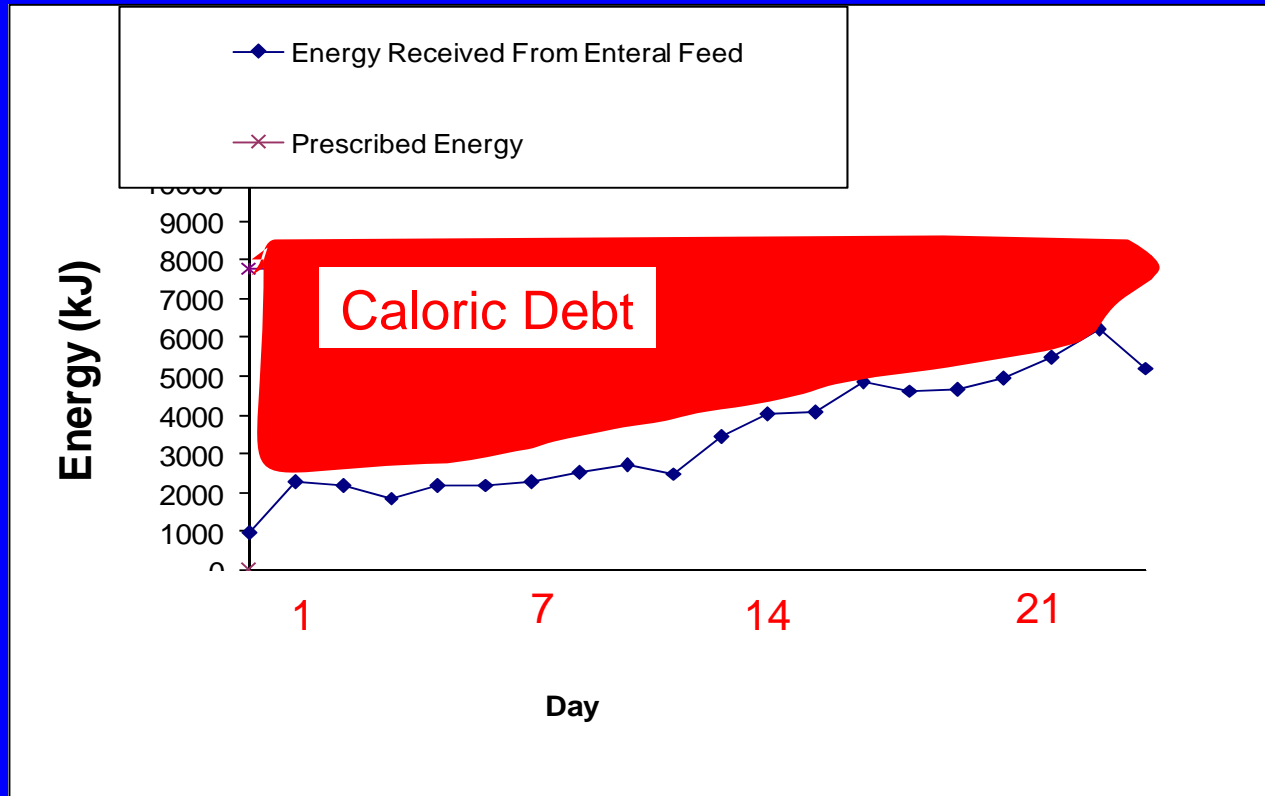
Hey Dr.
can we start the feeds!



Bowel sounds
not necessary
to start EN

A major problem develops when the patient receives inadequate amounts of EN or there is a gap between what the patient was prescribed and what they actually rec'd. We call this the 'caloric debt.'

Adequacy
of EN

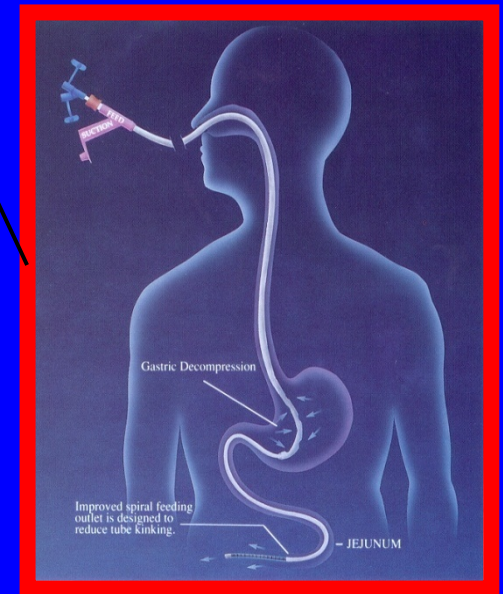


- ↑ Caloric debt associated with:
 - ↑ Days on mechanical ventilation
 - ↑ Complications
 - ↑ Longer ICU stay
 - ↑ Mortality

The more you enterally feed your patient, the better off they will be.

Our Field of Dreams:
“If you feed them,
they will leave
(sooner)!”

Providing more EN via aggressive enteral feeding is also associated with reduced infectious complications and reduced mortality!

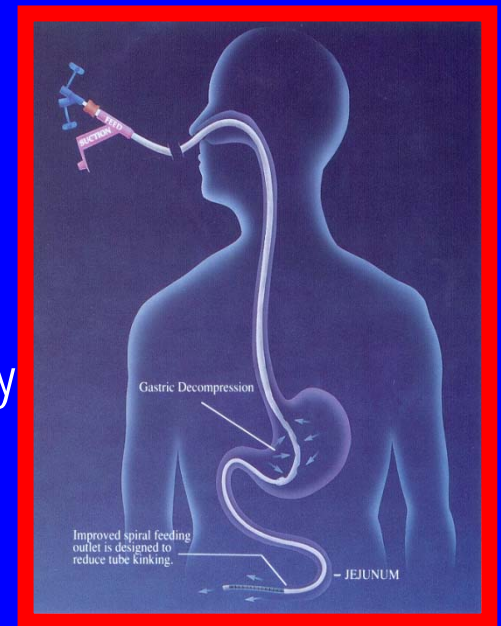


To address this problem, we are revising our feeding protocol- the purpose of this slide deck is to introduce you to our new feeding protocol

The Efficacy of Enhanced Protein-Energy Provision via the Enteral Route in Critically Ill Patients: The PEP uP Protocol!

The Major Changes in this Protocol

- Not all critically ill patients are the same; we have different feeding options based on hemodynamic stability and suitability for high volume intragastric feeds.
- In select patients, we start the EN immediately at goal rate, not at 25 ml/hr.
- We target a 24 hour volume of EN rather than an hourly rate and provide the nurse with the latitude to increase the hourly rate to make up the 24 hour volume.
- Motility agents and protein supplements are started immediately, rather than started when there is a problem.



Let's discuss each of these points individually

The PEP uP Protocol

Stable patients should be able to tolerate goal rate

We use a concentrated solution to maximize calories per ml

If unstable or unsuitable, just use trophic feeds

Note indications for trophic feeds

Drs need to justify why there are keeping patients NPO

Note, there are only a few absolute contraindications to EN

We want to minimize the use of NPO but if selected, need to reassess next day

1) Begin Volume-Based feeds. The 24 hour periods runs from 7 AM to 7 AM. Patient is to receive Peptamen 1.5. The total target volume for this 24 hr period is $17\text{ml} \times \text{patient's weight (kg, to a maximum of 100kg)}$ = _____ (write in 24hr target volume). Since day of admission will be an incomplete 24 hour period, modify the goal for day 1 to be equal to the 24 hr target volume \times (number of hours from admission to 7 AM/24). Determine hourly rate as per Volume Based Feeding Schedule. Monitor gastric residual volumes as per Adult Gastric Flow Chart and Volume Based Feeding Schedule .

OR

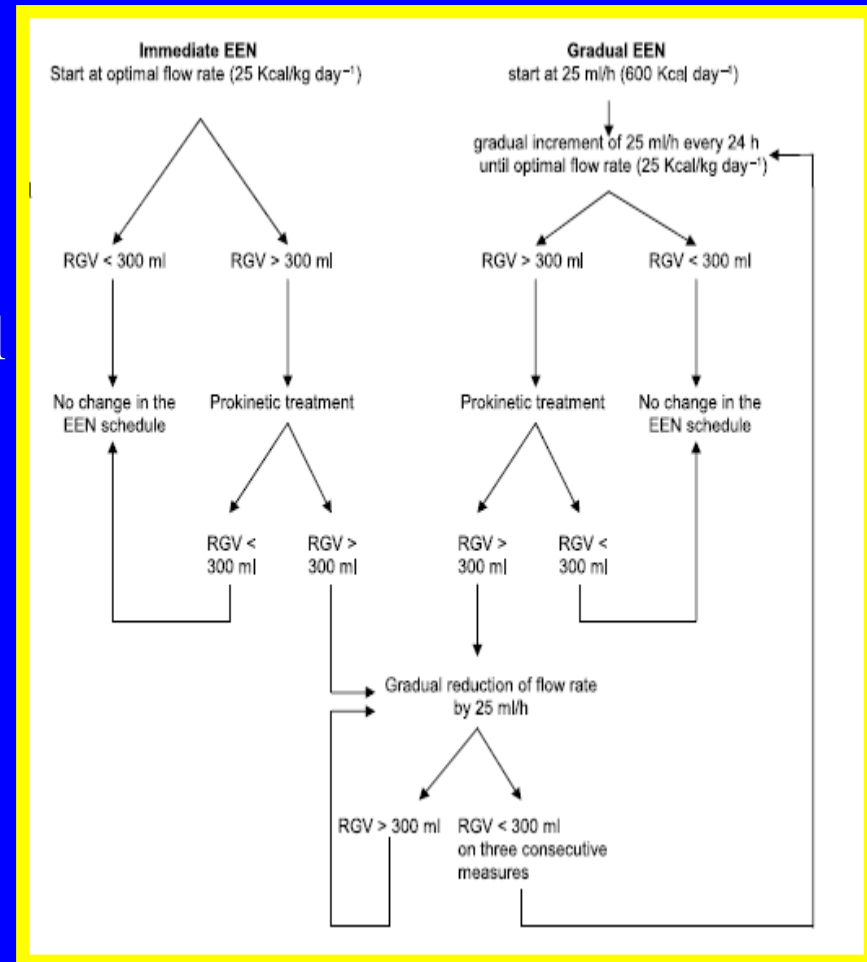
2) Begin Peptamen 1.5 at 10 mL/h after initial tube placement confirmed. Hold if gastric residual volume >500 ml and ask Doctor to reassess. Reassess ability to transition to Volume-Based feeds next day. *{Intended for patient who is hemodynamically unstable (on high dose or escalating doses of vasopressors, or inadequately resuscitated) or not suitable for high volume enteral feeding (ruptured AAA, surgically place jejunostomy, upper intestinal anastomosis, or impending intubation)}*

OR

3) NPO. Please write in reason: _____. *(only if contraindication to EN present: bowel perforation, bowel obstruction, proximal high output fistula. Recent operation and high NG output not a contraindication to EN.)* Reassess ability to transition to Volume-Based feeds next day.

Initial Efficacy and Tolerability of Early Enteral Nutrition with Immediate or Gradual Introduction in Intubated Patients

- This study randomized 100 mechanically ventilated patients (not in shock) to Immediate goal rate vs. gradual ramp up (our usual standard).
- The immediate goal group rec'd more calories with no increase in complications
- Suggests that this approach is safe



Rather than hourly goal rate, we are changing to a 24 hour volume-based goal

Nursing has responsibility to administer than volume over the 24 period with the following guidelines:

- Order for volume based enteral feeding will be total volume goal for 24 hours.
- 24 hour period goes from 7 am to 7 am each day.
- If the total volume ordered is 1800 mL the hourly amount to feed is 75 mL/hour. If patient was fed 450 mL of feeding (6 hours) and the tube feeding is on “hold” for 5 hours, then subtract from goal volume the amount of feeding patient has already received.

Volume Ordered per 24 hours 1800 mL – Tube feeding in (current day) 450 = Volume of feeding remaining in day to feed. $1800 - 450 = 1350$ mL remaining to feed

- Patient now has 13 hours left in the day to receive 1350 mL of tube feeding.
- Divide remaining volume over remaining hours (1350ml/13 hrs) to determine new hourly goal rate
- Round up so new rate would be 105 ml/hr for 13 hours.
- The following day, at shift change, the rate drops back to 75 ml/hour.
- A chart is provided to help with the calculations

Please contact dietitian if you have any questions

Rather than hourly goal rate, we are changing to a 24 hour volume-based goal

Nursing has responsibility to administer than volume over the 24 period with the following guidelines:

- Since day 1 (From admission to ICU till the next 7 am time period) is an incomplete day, the nurse will have to calculate the proportion of time remaining in that 24 hour period and set the rate based on that pro rated 24 hour period.
- For example, a patients is admitted at 3 PM in the afternoon. There are 16 hours till next 7AM. If the volume ordered per 24 hours is 1800 mL, for day 1, the target volume is:
 - ✓ $1800 \times 16/24 = 1200$ ml.
- If the patient was admitted at 3AM, there are only 4 hours left till day 2 (next 7AM to 7 AM shift), so the patient would receive:
 - ✓ $1800 \times 4/24 = 300$ ml
- In both cases, divide revised target volume over remaining hours to determine the hourly goal rate for day 1

Please contact dietitian if you have any questions

Nursing Guidelines for Volume-based Enteral Feeding

- The gastric feeding flow chart and Volume-based feeding schedule are meant to be a guideline and should not replace common clinical sense. If you are uncomfortable with what is being suggested, discuss with dietitian and/or attending physician or ICU fellow.
- The maximum hourly rate of infusion should be 150 ml/hr.
- If a change is made to the feeding formula, prescribe amount of EN solution to be delivered in remaining part of day and amount to be delivered in next 24 hr period.

Prescription should read:

“Start {insert feeding formula} as per volume based protocol. 24 goal volume= {insert target volume}”

- All future EN orders need to clearly state the solution and the amount to be delivered in a 24 hr period.
- At the end of each shift, double check the math to be sure patient is on target to receive 24 hr amount of calories and hand over the plan to the incoming nurse.

Please contact dietitian if you have any questions

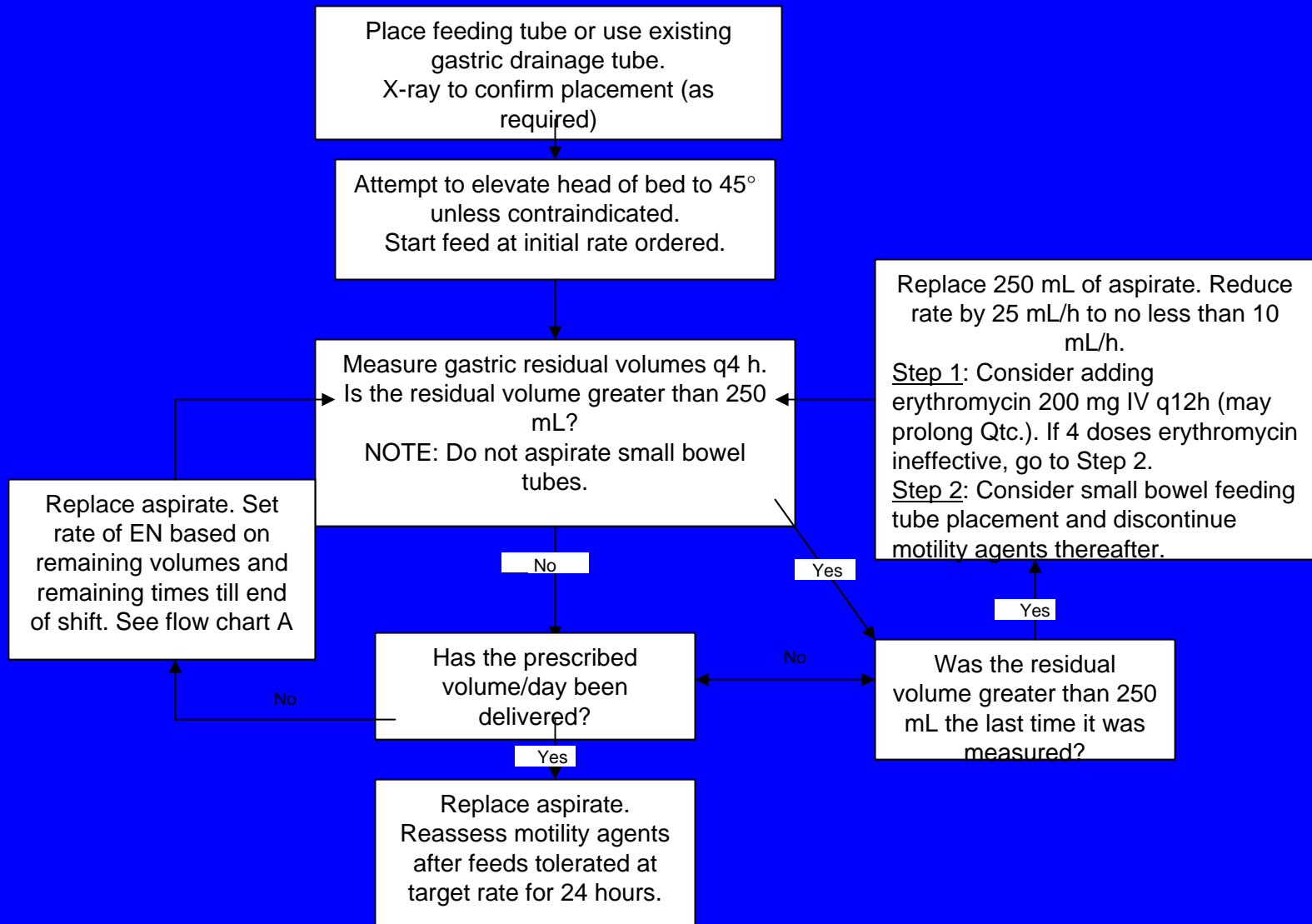
Nursing Guidelines for Volume-based Enteral Feeding

- There may be conflict in managing the hourly rate of EN and the ordered TFI.
- In all cases, the nutrition rate trumps the TFI order. If you need to provide more than the TFI to get on the EN delivered, this is acceptable.
- For example, if the TFI order is 100ml/hr and you are running 70 ml/hr of Jevity and 30 ml/hr of crystalloid solution, if the feeds are held for 4 hours- Do not increase IV rate and you will need to increase the EN rate to >100 ml/hr for a short period of time. The important point is that at the end of the day, the patient has still only rec'd 2400 ml (100ml/hrx24hr) of fluid (IV and EN).

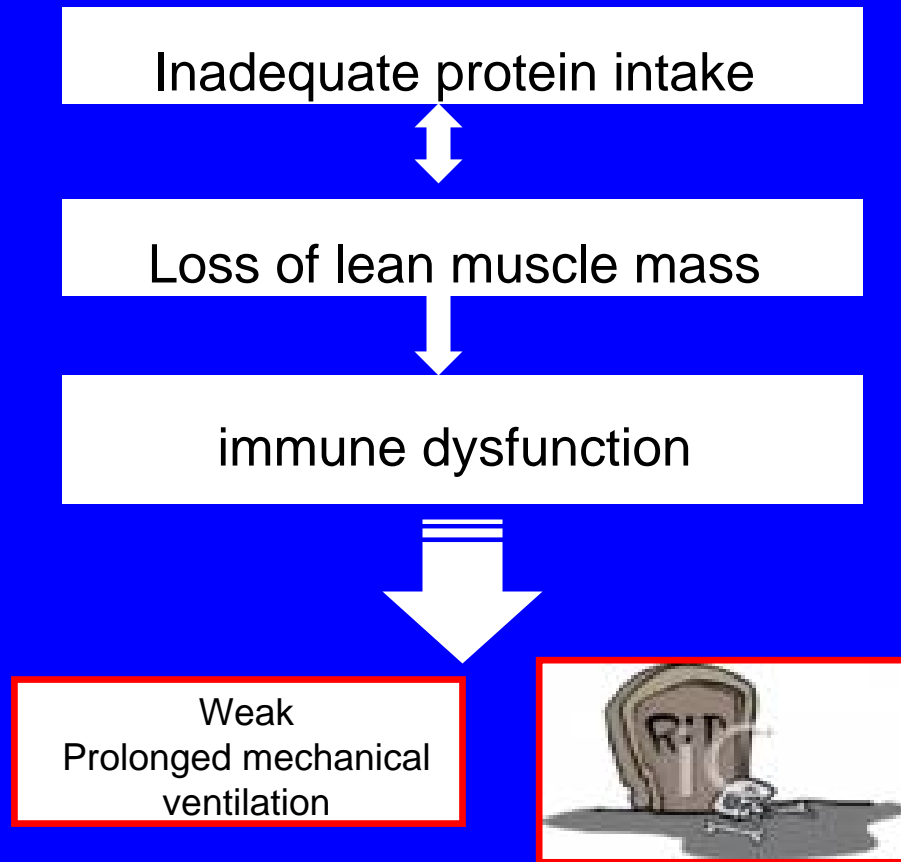
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As a consequence, our bedside feeding algorithm has changed...

Adult ICU Gastric Feeding Flow Chart



It's not just about calories...



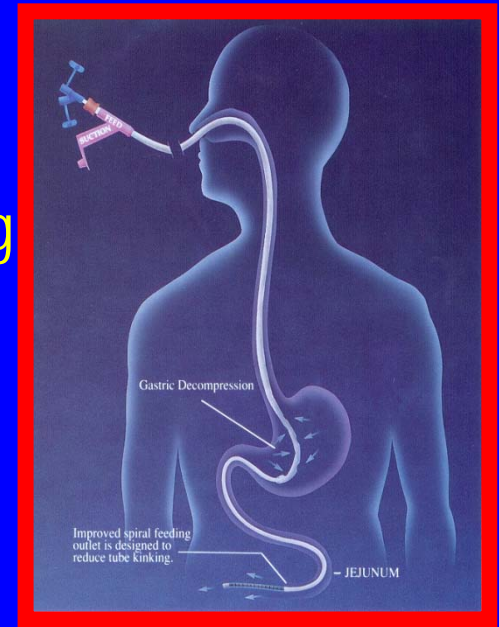
So in order to minimize this, we order:

- ✓ Protein supplement Beneprotein® 14 grams mixed in 120 mls sterile water administered bid via NG

Not a good idea if in renal failure and not yet dialyzed or if has hepatic encephalopathy

Aggressive feeding in patients who haven't been eating much or in skinny patients, may cause problems with electrolyte and Phos balance.

Potential for
refeeding
syndrome



That's why we check the lytes, Phos, Mg and Ca at least twice a day for the first 3 days, and then if no problem, back to usual ICU blood work. If there are problems then at rate of feeding needs to be decreased or not accelerated until the lytes etc. are corrected.

A Word About Gastric Residual Volumes (GRV)

- GRV are not necessary for small bowel tubes; there is no reservoir to collect feeds
- Saliva & gastric fluids may total 125-166 ml/hr so other sources contribute to GRV than feeds.
- Nevertheless, high GRV is a marker of delayed gastric emptying potentially placing your patient at risk of regurgitation and aspiration
- Need to interpret the GRV in light of the rest of abdo exam and clinical condition of the patient. Isolated high GRV in a patient doing well, belly soft, not a problem.

High Gastric Residual Volumes

- Some advocate that we not measure GRV or that if we measure, we use a very high threshold (>500ml).
- Historically, we have used a GRV greater than 200 to be considered high.
- We are changing that to a GRV of >250ml
- An isolated (GRV>250) is not a problem but if it persists, it will require action.
- Re-instill up to 250 ml of gastric contents through feeding tube
 - Potassium levels were lower in patients who had full GRV discarded
- Any volume above 250 ml must be discarded and documented as output
 - i.e. GRV = 280 ml; re-instill 250 ml, discard the remaining 30 ml & document as NG output

Other Strategies to Maximize the Benefits and Minimize the Risks of EN

- Head of Bed elevation to 45 (or at least 30 if the patient doesn't tolerate 45)
 - This will reduce regurgitation, aspiration and subsequent Pneumonia

List of Contraindications to HOB Elevation

- unstable c-spine
- hemodynamically unstable
- Pelvic fractures with instability
- Prone position
- Intra-aortic balloon pump
- Procedures
- Unable because of obesity



Other Strategies to Maximize the Benefits and Minimize the Risks of EN

- Motility agents started at initiation of EN rather than waiting till problems with High GRV develop.
 - Maxeran 10 mg IV q 6h (halved in renal failure)
 - If still develops high gastric residuals, add Erythromycin 200 mg q 12h.
 - Can be used together for up to 7 days but should be discontinued when not needed any more
 - Reassess need for motility agents daily



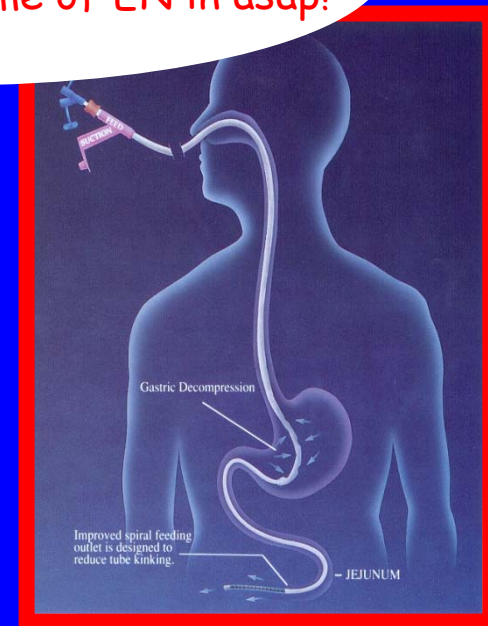
Other Strategies to Maximize the Benefits and Minimize the Risks of EN

- If intragastric feeds not tolerated, problems with high GRVs refractory to motility agents, we recommend small bowel feeding tube

They may need a gentle reminder to get the small bowel feeding tube in place

Hey Dr.

can we get that small bowel tube in place so I can get their volume of EN in asap!



A Change to Nursing Report

Please report this
% on rounds as
part of the GI
systems report

Adequacy of Nutrition Support =

24 hour volume of EN received

Volume prescribed to meet caloric requirements
in 24 hours

Summary of Key Principles

- Nutrients/Nutritional strategies modulate underlying pathophysiological processes and Improve clinical outcomes

Nutrition as Therapy

- Disease processes and treatment effects of nutrition are time dependent, the sooner started the better



- Increased quantity of nutrition therapy associated with improved outcomes

PEP uP Protocol redesigned to facilitate more aggressive provision of calories and protein

Evaluation Plan

- Starting February 2 2009, we will formally evaluate this new protocol in all new ICU admission until we have 30 patients on the protocol who have stayed mechanically vent'd in ICU for at least 3 days (so we can compare to the 20 patients in May 2008 audit)
- At the end of each nursing shift, will ask the nurse the following 4 questions:

Evaluation Questions

1. Were you exposed to the educational interventions and if so, how useful did you find them?
2. Did you encounter any situation or event that in your opinion, compromised the patient's safety?
3. Overall, how acceptable was this new protocol (1-totally unacceptable; 10- totally acceptable)
4. Any suggestions for improving the protocol?
5. Others?



Questions?