ICU Management Protocol No. 4

ENTERAL FEEDING

General Points

1. All ventilated patients must receive a nasogastric or orogastric tube. It is preferable to use 12FG in adults. The correct position of the tube should be confirmed by 2 out of the following 3 criteria. The criteria are (i) injecting 10-20 ml of air down the tube and auscultating the epigastric area (ii) use of litmus paper and (iii) radiography.

2. Early enteral feeding should be commenced within 24-48 hours after ICU admission whenever the gastrointestinal tract is deemed to be functioning. This applies to all mechanically ventilated patients who have been adequately resuscitated and haemodynamically stable.

3. Enteral feeding for patients who have undergone recent abdominal and bowel surgeries may require prior discussion with the surgeon and ICU specialist before commencement.

4. Patients should preferably receive feeding continuously during the acute phase. They can be switched to intermittent bolus technique later.

   (i) **Continuous feeding**
   Start at 20-40ml/hr continuously. Aspirate the feeding tube every 4 hours.
   (a) If aspirate < 200ml, return all aspirate. Increase rate by 20ml/hr every 3 cycles till a flow rate that meets the caloric needs of the patient. Once target caloric needs are met, the feeds may be further diluted with water to meet the fluid requirements of the patient.

   (b) If aspirate >200ml, return 200ml aspirate to patient and reduce rate by 50% of initial rate. Exclude bowel obstruction first. If there is no clinical evidence of bowel obstruction, administer prokinetic agents (see 11). Once further aspirates are < 200ml, follow (i-a). If aspirates continue to exceed 200 ml after the above has been carried out, consider the use of small bowel feeding (see 10) and elemental formulas (see 9).

   (ii) **Intermittent bolus feeding**
   Start with 50ml every 3 hours. Aspirate before every feed.
   (a) If aspirate < 200ml return aspirate to patient. Increase by 50ml after every 4 feeds. Increase by 100 ml/feed every 24 hr till caloric needs are met. Once target caloric needs are met, the feeds may be further diluted with water to meet the fluid requirements of the patient.

(b) If aspirate >200ml, return 200ml aspirate to patient and reduce by 50ml per feed. Exclude bowel obstruction first. If there is no clinical evidence of bowel obstruction, administer prokinetic agents (see 11). Once further aspirates are < 200ml, follow (ii-a). If aspirates continue to exceed 200 ml after the above has been carried out, consider the use of continuous feeding (see 4).

5. Where feasible, enteral feeds can be administered via the closed system. Closed system refers to the "ready to hang formulas". Once connected the duration of feeding is 24 hrs. During initiation of feeding, use the open system (to reduce wastage) and where feasible, use the closed system once target feeding has been achieved.

6. All patients receiving feeding must be placed in the semi-recumbent position with the head of the bed elevated to 45 ^{0}. Head injured patients will have head elevated to 30 ^{0}. Patients who have to be prone should be in the anti-trendelenberg position (10-20 ^{0})

7. Current recommendations suggest a target energy intake of 25 kcal/kg/day and at least 1.2-1.5 g/kg/day of protein.
   For obese patients, use 120% of ideal body weight (IBW) or (Actual Body Weight - IBW) X 0.25 + IBW.
   For underweight patients, use actual body weight.
   Energy intake should be adjusted according to the severity and type of illness. Feeding should be administered via a stepwise gradual introduction of feeds over first 48 hrs. Avoid overfeeding.

8. Use polymeric formulas (whole protein formula) for feeding.

9. Peptide based or elemental formulas (eg Peptamen, Alitrac) have been shown to be useful in patients with gastrointestinal complications (short bowel syndrome, pancreatitis). However, there is insufficient evidence to demonstrate any favourable treatment effects.

10. Small bowel feeding (nasojejunal/nasoduodenal) can be considered for patients who are intolerant to enteral feeding (high inotropic support, continuous infusion of sedatives, or paralytic agents or with high gastric residual volumes) or in pancreatitis

11. Motility agents such as IV metochlopramide 10-20mg 6-8 hourly and/or IV erythromycin 125 mg QID or 250 mg BID to be used in patients who experience feed intolerance (high gastric residuals, emesis).

12. Nutrient mixtures prepared in the kitchen ("blenderised diet") should not be used as this type of feed is unbalanced, causes feeding tube occlusion and diarrhea secondary to bacterial contamination.

Types of enteral feeds

Type	Energy	Indications	** Suggested maximum volume/day
Polymeric -Ensure -Enercal -Isocal -Nutren	1kcal/ml	Most patients	60-80 ml/hr or 200-250 ml 3 hourly
-Glucerna -Nutren diabetic	1kcal/ml	-Diabetic patients -Stress induced hyperglycemia	60-80 ml/hr or 200-250 ml 3 hourly
Fiber-enriched -Jevity -Nutren fiber	1 kcal/ml	-Patient who develop diarrhea to non-fiber containing feeds	60-80 ml/hr or 200-250 ml 3 hourly
Disease specific -Nepro	2 kcal/ml	-Renal failure with fluid restriction and on dialysis	30-40 ml/hr or 100-120 ml 3 hourly
Disease specific -Suplena	2 kcal/ml	-Renal failure with fluid, protein, electrolytes restriction and not on dialysis	30-40 ml/hr or 100-120 ml 3 hourly
Disease specific -Pulmocare	1.5 kcal/ml	-Patients with hypercapnia (eg COAD)	50-60 ml /hr or 150-200 ml 3 hourly
Elemental -Peptamen -Alitrac	1 kcal/ml	-Patients with gastrointestinal problems (pancreatitis, short bowel syndrome)	60-80 ml/hr

** Please note that the suggested maximum volume is not restricted to the examples given. It is important that the target caloric needs are eventually met in whatever volume that is delivered to the patient. If the patient has increased fluid requirements, supplemental fluids may be given as diluted feeds (the maximum flow rates can be increased) or given intravenously.

References
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4. McClave SA et al Crit Care Med 2005;33:324-330
5. Artinian et al Chest 2006;129(4):960-967

ALGORITHM FOR ENTERAL FEEDING (CONTINOUS METHOD)