Practice Guidelines For Nutrition in Critically ill Patients: A Relook for Indian Scenario

Yatin Mehta

MD, MNAMS, FRCA, FAMS, FIACTA, FICCM, FTEE

President ISCCM

Chairman, Medanta Institute of Critical Care and Anesthesiology

Medanta The Medicity

Gurgaon

Learning Objectives

To provide an overview of practice guidelines about nutrition in critically ill patients in Indian scenario

Intensivists' Dilemma on Nutritional Support in Critically Ill Patient

Nutrition in Critically Ill is Critical

Malnourished ICU patients experience immune dysfunction, weakened respiratory muscles, lowered ventilation capacity and reduced GI tolerance. Therefore, they possess increased risk of developing complications such as:

Ventilator dependence → Gastro-oesophageal reflux → Pulmonary aspiration → Infections that can lead to sepsis, multiorgan failure, and death.

ICU: Intensive care unit; GI: Gastrointestinal

Sharada M, *et al. JIACM* 2014; 15(3-4): 205-9.

Nutritional Support is Suboptimal in Critically Ill

Because of lack of consensus with respect to:

- Which is the preferred route of feeding?
- To which patients should nutritional support be offered?
- How much feed should be offered to patients?
- What is the ideal composition of feed?
- When to start nutritional support?
- Why is it necessary to feed ICU patients?

ICU: Intensive care unit

Which Guidelines Are Available?

American Society for Parenteral and Enteral Nutrition

The European Society for Clinical Nutrition and Metabolism

Society of Critical Care Medicine

Canadian Critical Care Nutrition Group

Are there any Indian guidelines available on nutrition in critically ill patients?

Sioson MS, *et al. Clin Nutr ESPEN*. 2018;24:156-164.

Introducing…

Indian Practice Guidelines on Nutrition in Critically Ill Patients

Strength of Evidence and Grade of Recommendations

Strength for supportive evidence		
Type of evidence (at least one supporting)	**Strength**	
Existing guidelines	High	I
RCTs/meta-analysis	High	II
Controlled trial/studies	Moderate	III
Uncontrolled trial/studies	Moderate to weak	IV
Review article	Moderate to weak	V
Expert opinion/advisory board opinion	Weak	VI

Grade of recommendation based on strength of supporting evidence		
Grade of recommendation	**Strength of supporting evidence**	**Level of recommendation**
A	High (I, II)	We strongly recommend
B	Moderate/moderate to weak (III, IV, V)	We recommend
C	Weak (VI)	We suggest

Mehta Y, *et al. Indian J Crit Care Med.* 2018;22:263–273.

Overview of Topics Answered

- Nutrition Assessment
- Nutrition Practices
- Role of Disease Specific Nutrition if any
- Documentation Practices
- Monitoring Tolerance and Adequacy

Nutrition Screening and Assessment

Nutrition status of Indian malnourished patients can be assessed by subjective global assessment (B III)
Initial monitoring of nutrition intervention must be done on daily basis and nutrition plans should be modified accordingly (A I)
It is imperative that nutritional assessment is done by well-qualified and trained nutritionists, dedicated to the ICU (A I)
It is desirable that nutritionist-to-critically ill patient ratio be maintained at 1:25 (C)
Wherever feasible, computed tomography (cross-sectional imaging) or ultrasonography (U/S) can be used to assess the lean muscle mass (B V)

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Importance/Indications/Timing of Nutrition in Critically Ill Patients

EN should be started early, preferably within first 24–48 h (A I)

Tube feeding to be considered if even 50%–60% of nutrition targets are not met adequately within 72 h of oral nutrition support (C).

Observation of signs of malnutrition (e.g., cachexia, edema, muscle atrophy, BMI <20 kg/m^2) is critical (A I)

In case the nutrition requirement is not met adequately with EN even after 7 days of ICU admission, then usage of parenteral nutrition may be considered (A I)

BMI: Body mass index; EN: Enteral nutrition: ICU: Intensive care unit

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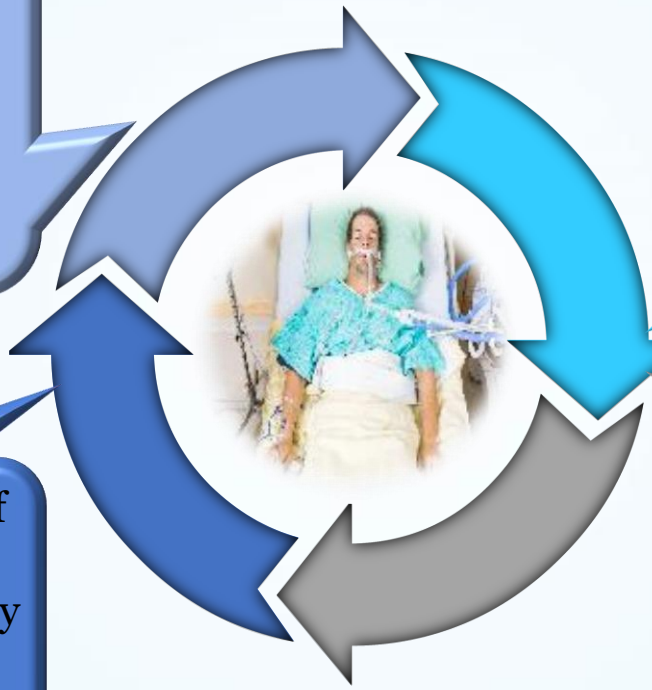
Feeding Practices in Hemodynamically Unstable Patients

Once the patient has been fluid resuscitated and stabilized on declining doses of <2 vasopressors, EN may be started cautiously at low rates (A I)

EN should be administered within 24–48 h once the patient is stable with vasopressors (A I)



Clinical monitoring of gut functioning should be started early when the patient is HD stable (C)

In persistent shock, early EN should be avoided (A I).

HD: hemodynamically; EN: Enteral nutrition

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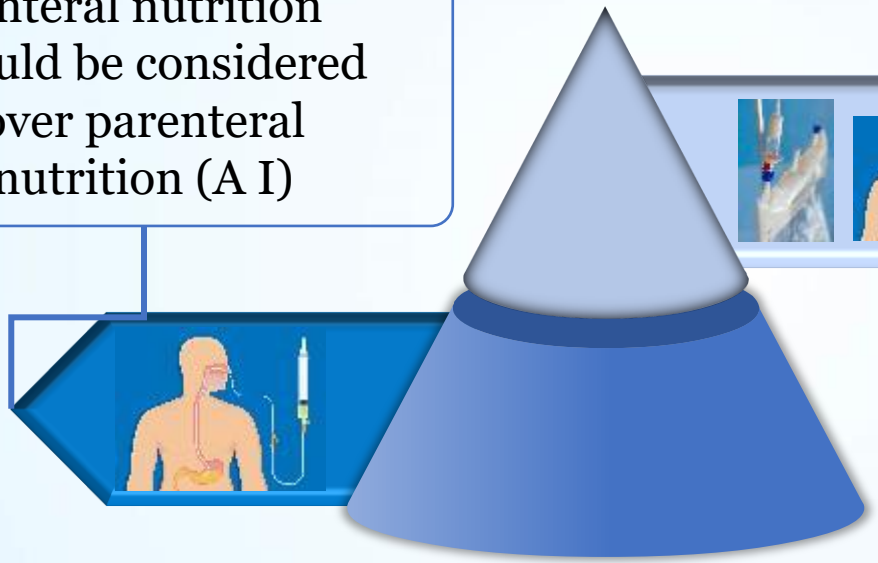
Route of Nutrition (Enteral Tube Feeding vs. Parenteral): Preference in Critical-Care Settings

Enteral nutrition should be considered over parenteral nutrition (A I)



Combination of EN and parenteral nutrition should not be routinely recommended, except for specific indication (A II)

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Tube Feeding

Tube Feeding

- Nasogastric route should be the first choice of enteral feeding. Jejunal route can be used if required (A I)
- Continuous formula feeding with pumps or gravity bags can be preferably done via fine bore (8F–12F) tubes (A I).

Tube Feeding and Nosocomial Infections

- Scientific formula feed should be preferred over blenderized feeds to minimize feed contamination (B III)
- Whenever feasible, closed system ready-to-hang formula feeds should be preferred(B III)
- Blenderized formulae are more likely to have bacteria contamination than other hospital prepared diets (B IV)
- Hygienic methods of feed preparation, storage, and handling of both formula feeds and blenderized feeds are necessary (B III).

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Estimating Energy/Protein Requirements

Protein requirement for most critically ill patients is in range of 1.2-2.0 g/kg body weight/day(A I)

In severely hypercatabolic patients such as extensive burns and polytrauma, ratio of Kcal: nitrogen should be 120:1 or even 100:1 has been accepted (B V)

Calories should be in range of 25-30 Kcal/kg body weight/day for most critically ill patients(A I)

Toronto formula is useful for estimating energy requirements in acute stages of burn injury and must be assessed and adjusted to changes in monitoring parameters(C)

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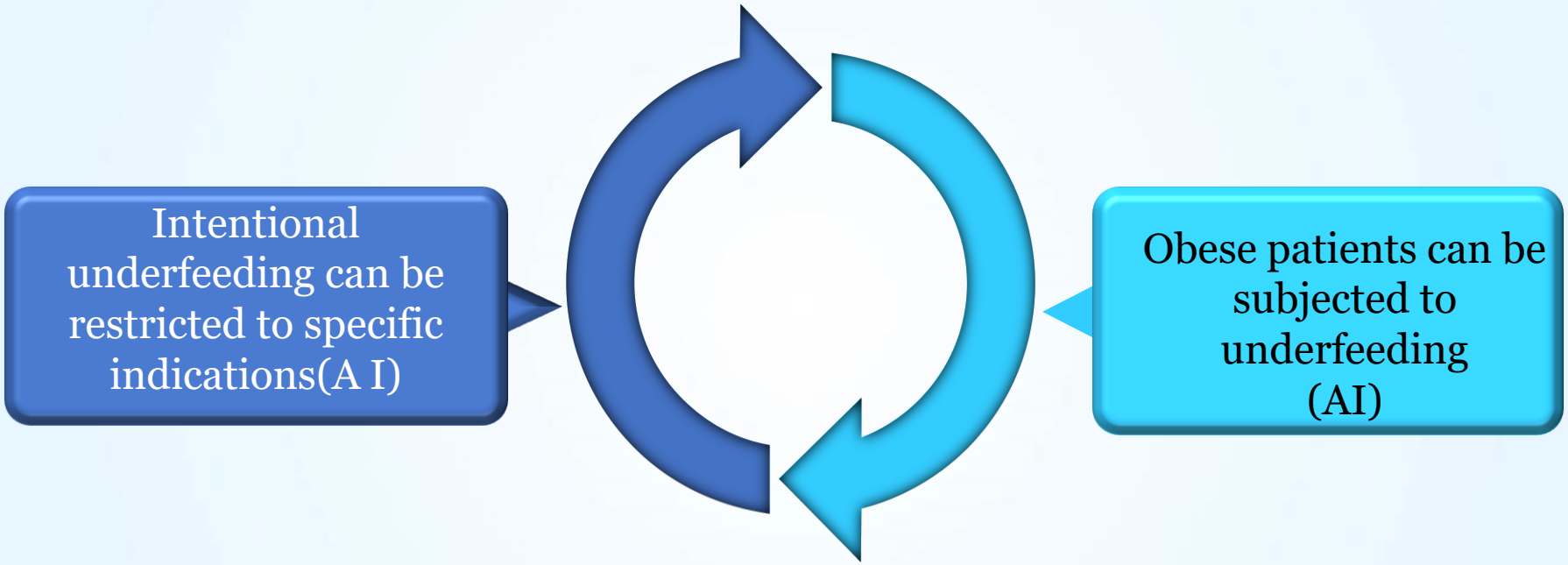
Toronto Formula

For all patients: REE (kcal) = -4343 + (10.5 x TBSA burned) + (0.23 x kcals) + (0.84 x Harris Benedict) + (114 x T (oC)) - (4.5 x days post-burn)

- TBSA = total body surface area burned;
- kcals = calorie intake in past 24 hours;
- Harris Benedict = basal requirements in calories using the Harris Benedict equation with no stress factors or activity factors;
- T = body temperature in degrees Celsius;
- days post-burn = the number of days after the burn injury is sustained using the day
- itself as day zero

Permissible Underfeeding



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Selection of Appropriate Enteral Formula

Standard polymeric formula feed should be recommended in critically ill patients (A I)

Inconsistency in nutrient level can be avoided using the standard polymeric formula feeds (B III)

Routine use of specialty formula feeds should be avoided (A I).

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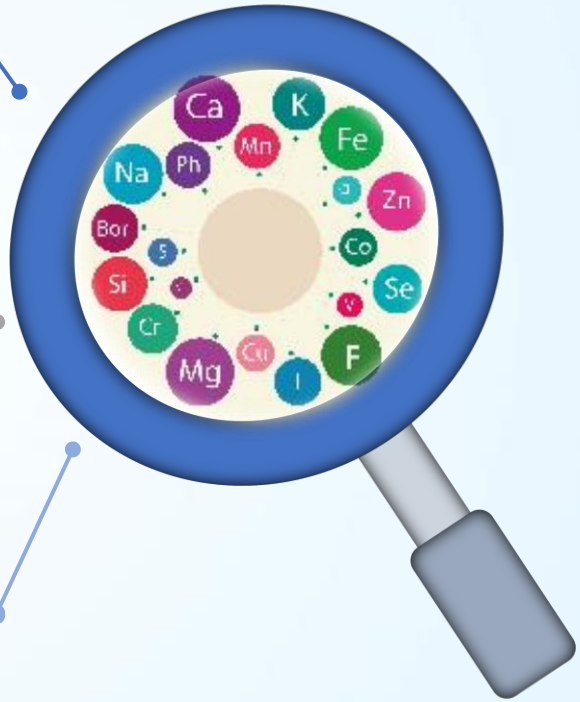
Importance of Micronutrients

Patients on formula feeds may not require additional micronutrients, vitamins, and trace elements, if they are on complete and balanced formula feeds (A I)

Micronutrients can be supplemented in patients on blenderized feeds and those on parenteral nutrition (C)

Pre-existing micronutrients' deficiency should be evaluated/assessed (B V)



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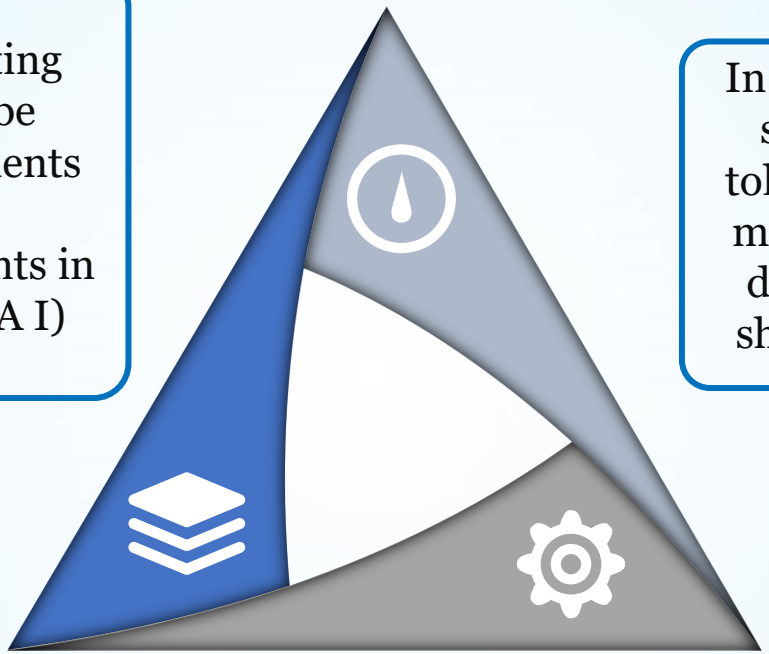
Immune-Enhancing Enteral Nutrition

Immune-modulating nutrients could be considered for patients with TBI and perioperative patients in the surgical ICU (A I)



In ICU patients with very severe illness and not tolerating more than 700 mL enteral formulae per day, immune nutrients should not be used (A I)

Immune-modulating nutrients should not be used routinely (A I)

Glutamine is not recommended in critically ill patients with multiple organ failure (B V).

TBI: Traumatic brain injury; ICU: Intensive care unit

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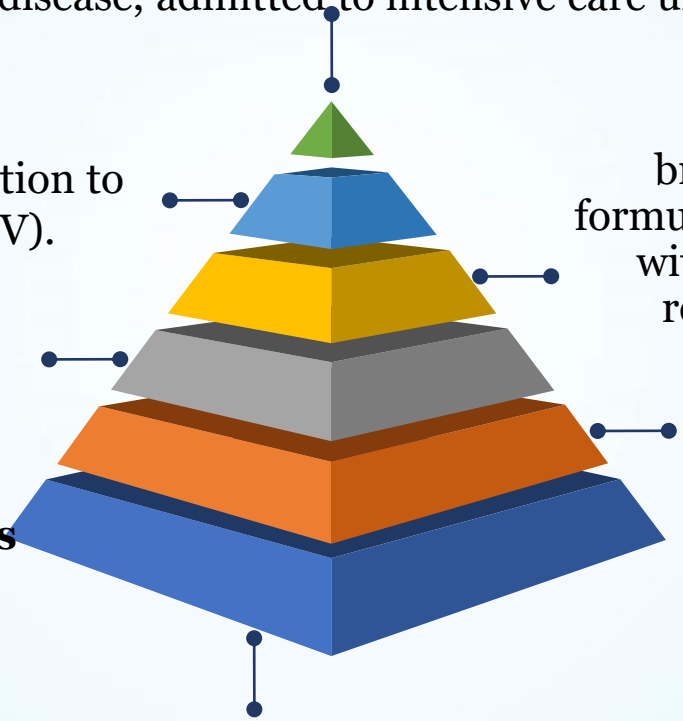
Standard Nutrition in Hepatic Failure

Enteral nutrition should be preferred in patients with acute and/or chronic liver disease, admitted to intensive care unit (A I)

Tailor sodium restriction to absolute need (B V).

A whole-protein formula providing 35–40 kcal/kg body weight/day energy intake and 1.2–1.5 g/kg body weight/day protein is recommended (A I)



No beneficial effects of branched-chain amino acid formulations in critically ill patients with encephalopathy who are receiving first-line luminal antibiotics (A I)

Protein restriction should be avoided in refractory encephalopathy (B V)

Protein supplementation is recommended in liver failure. Protein-energy determination should be based on “dry” body weight or usual weight instead of actual weight (A I)

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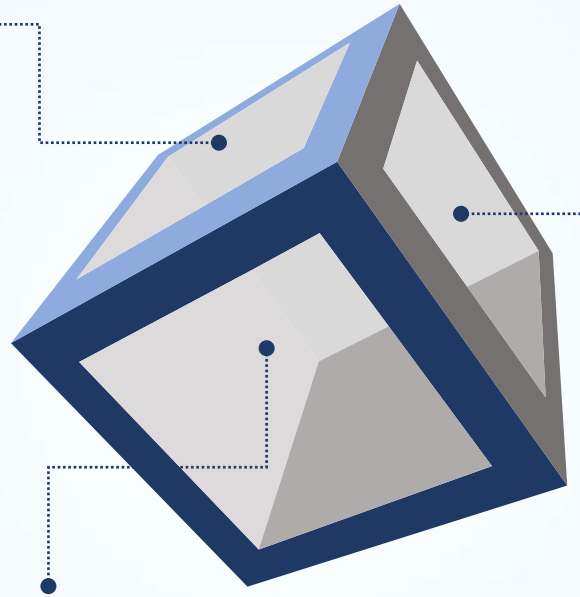
Standard Nutrition in Traumatic Brain Injury

Initiation of early EN after post trauma period (within 24–48 h of injury), once the patient is HD stable, is recommended (A I)



Protein recommendations should be in the range of 1.5–2.5 g/kg/day (A I)

Arginine-containing immune-modulating formulations or eicosapentaenoic acid/docosahexaenoic acid supplement with standard enteral formula in TBI patients is recommended (A I).

EN: Enteral nutrition; HD: Hemodynamically; TBI: Traumatic brain injury

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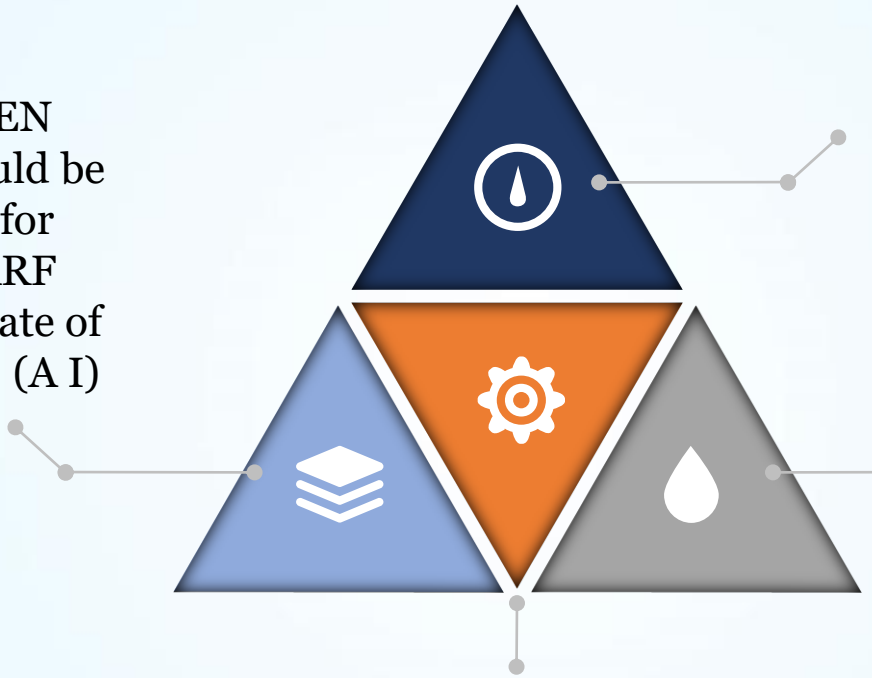
Standard Nutrition in Respiratory Compromised

Small frequent feeds should be preferred to improve nutritional compliance (A I)

Calorie-dense EN formulations should be recommended for patients with ARF (especially if in state of volume overload) (A I)



A specialty high-fat/low-carbohydrate formulation is not recommended for ICU patients with ARF (A I)

There is no additional advantage of disease-specific low-carbohydrate and high-fat over standard or high-protein or high-energy oral nutritional supplement in stable COPD patients (A I).

EN: Enteral nutrition; ARF: acute respiratory failure; ICU: Intensive care unit; COPD :Chronic obstructive pulmonary disease

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Standard Nutrition in Acute Kidney Injury

01 Standard enteral formula is recommended for ICU patients with AKI (A I)

02 Protein should not be restricted in patients with renal insufficiency (A I)

03 Daily protein intake should be in the range of 1.2–1.7 g/kg actual body weight in AKI patients (C)

04 **In case of significant electrolyte imbalance, a specialty formulation designed for renal failure should be considered (A I)**

AKI: Acute kidney injury; ICU: Intensive care unit

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Documentation of Nutrition Practices

Documentation of body weight and its review on weekly basis is recommended. (A II)

Documentation of the below mentioned is also recommended (C):

- Screening and assessment tools used along with their scores and the weekly review scores
- Nutritional diagnosis
- Nutrition care plan on daily basis
- Infectious complications and stool frequency on daily basis.

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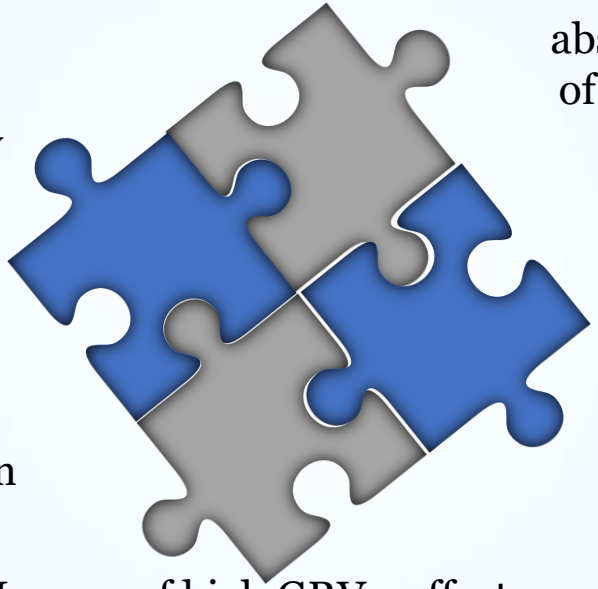
Monitoring Tolerance and Adequacy

Gastric residual volume should be measured by syringe aspiration and not by suction pump (A II)

Holding EN for GRVs <500 mL in the absence of other signs of intolerance should be avoided (A I)



However, GRV cutoff range of 300–500 mL can be considered (C), in Indian ICUs (C)

Prokinetic agents such as metoclopramide and erythromycin can be recommended in patients with intolerance and risk of aspiration (A I)

In case of high GRVs, efforts should be made to continue feeding with reduced volumes (C)

GRV: Gastric residual volumel ICU: Intensive care unit; EN: Enteral nutrition

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Enteral Feeding and Diarrhea

Enteral nutrition should not be interrupted in the event of diarrhea (A I)

Feeds can be continued while evaluating the etiology of diarrhea (A I)

Use of a soluble fiber-containing formula or small peptide semi-elemental formula in divided doses over 24 h may benefit to patients with persistent diarrhea (after exclusion of hyperosmolar agent intake and *C. difficile* infection) (A I)

Routine use of probiotics across the general population of ICU patients is not recommended. Probiotics should be used only for select medical and surgical patient populations, for which RCTs have documented safety and outcome benefit (A I)

RCT: Randomized controlled trials; ICU: Intensive care unit

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Intensive Care Unit Nutrition Protocol

ALGORITHM: INTENSIVE CARE UNIT NUTRITION PROTOCOL (BASED ON Indian practice guidelines)

ICU NUTRITION PROTOCOL (BASED ON INDIAN PRACTICE GUIDELINES)

PATIENT ADMISSION

Check if patient hemodynamically stable (Section 1)

No → Wait for stabilization

Screening & assessment of nutrition status (2A)
- Assess for malnutrition
- Calculate the nutrition requirement (2B)

Can enteral feeding be initiated?

Yes
- Oral: Monitor patient's intake; Start ONS/EN if requirement is not met
- Tube feeding → INITIATE EN
  - Tube placement
  - Start within 24–48 h of admission

No → Initiate PN, if the patient is malnourished

START EARLY – Advance towards full goals gradually
- Start with standard polymeric formula
- TROPHIC feeds 10–20 mL/h

CHECK TOLERANCE

Patients tolerating feeds → Start as tolerated → Step up calories and volume gradually to achieve desired intakes

Patients not tolerating feeds → Evaluate symptoms & if patient unconscious, then check aspirate (Section 3) → Check other reasons for intolerance (4A) → Measures to improve tolerance (4B) → Switch to semi-elemental formula

Section 1 Hemodynamic instability
- 2 or more vasopressor/inotropes

Section 2A Nutritional Assessment

1. Patient history
- Disease state associated with risk of malnutrition
- Recent weight loss (5% BW in 3 weeks or 10% BW in 3 months)
- Decreased Food intake before admission
- History of alcoholism and drug abuse

2. Assessment of present condition
- Disease associated with hyper-metabolism and prolonged catabolic activity
- (Multiple injuries/burns/sepsis/mods)
- Signs of malnutrition on physical examination (Cachexia, muscle atrophy and oedema)
- BMI

Section 2B Energy Protein requirement
- Energy: 25–30 kcal/kg BW/day
- Protein: 1.2–2 gm/kg BW

Can be higher in trauma
(Depends also on patient condition)

Section 3 Symptoms indicating gut dysfunction
- Regurgitation/nausea/vomiting
- Aspiration (presence of feeding formula in tracheal aspirate)
- GRV: >300 mL, monitoring 4–8 hourly
- Diarrhea: >3 loose stools /day

Section 4A Reasons for intolerance
- Antibiotics/Sorbitol
- Infections/Osmotic diarrhea
- Other medications

Section 4B Measures to improve tolerance
- Use of prokinetics • Head of bed at 30–45°
- Use of post pyloric route of feed • To avoid VAP, use chlorhexidine mouthwash

BW: Body weight; BMI: Body mass index; GRV: Gastric residual volume; VAP: Ventilator associated pneumonia; EN: Enteral nutrition; PN: Parenteral nutrition; ONS: Oral nutritional support

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Summary (Part 1/2)

Observation of signs of malnutrition (e.g., cachexia, edema, muscle atrophy, BMI <20 kg/m2) is critical (A I)	EN should be started early, preferably within first 24–48 h (A I)	In case the nutrition requirement is not met adequately with EN even after 7 days of ICU admission, then usage of parenteral nutrition may be considered (A I)
Assessment of drug–nutrient interaction to be done on daily basis(B V)	Tube feeding to be considered if even 50%–60% of nutrition targets are not met adequately within 72 h of oral nutrition support.	Clinical monitoring of gut functioning should be started early when the patient is HD stable.
Once the patient has been fluid resuscitated and stabilized on declining doses of <2 vasopressors, EN may be started cautiously at low rates (A I)	In persistent shock, early EN should be avoided (A I).	Nutrition status of Indian malnourished patients can be assessed by SGA (B III)

EN: Enteral nutrition: ICU: Intensive care unit; SGA: Subjective global assessment

Summary (Part 2/2)

Enteral nutrition should be administered within 24–48 h once the patient is stable with vasopressors (A I)

It is imperative that nutritional assessment is done by well-qualified and trained nutritionists, dedicated to the ICU (A I)

It is desirable that nutritionist-to-critically ill patient ratio be maintained at 1:25 (C)

In severely hypercatabolic patients such as extensive burns and polytrauma, ratio of Kcal: nitrogen should be 120:1 or even 100:1 has been accepted (B V)

Toronto formula is useful for estimating energy requirements in acute stages of burn injury and must be assessed and adjusted to changes in monitoring parameters (C)

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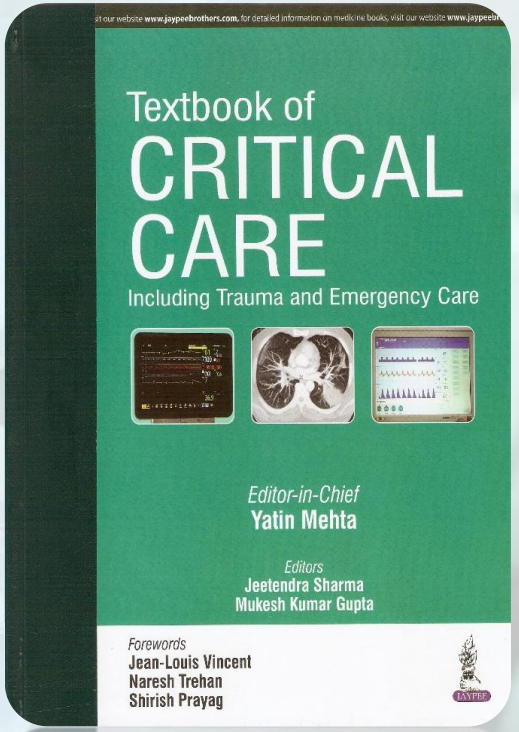
ICU: Intensive care unit; ARF: Acute respiratory failure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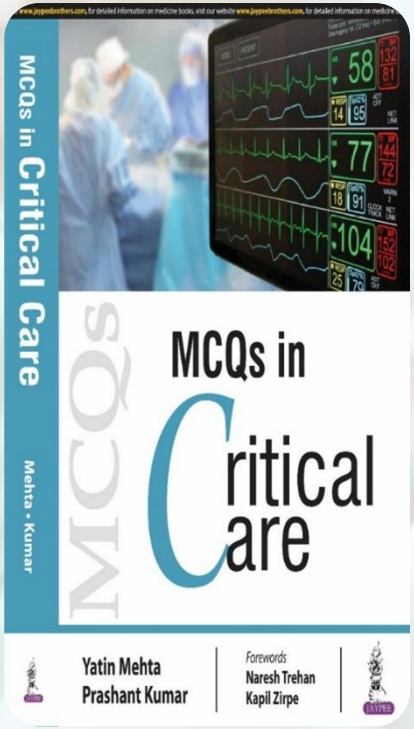
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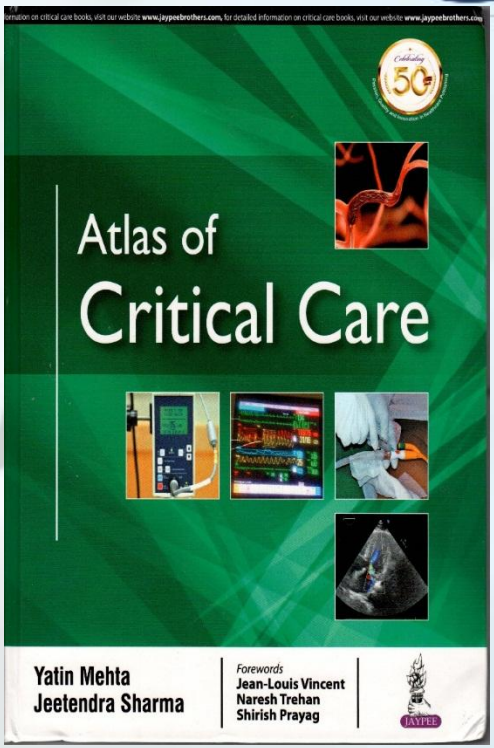
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