Nutrition Therapy in Intensive Care Unit - Knowledge Attitude and Practice among the Staff Nurses and Residents- A Questionnaire Based Observational Study

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ABSTRACT
Introduction: Patients admitted to ICU are usually associated with many comorbidities apart from primary disease process. Nutrition therapy that states that anabolic resistance and metabolic stress in ICU in form of catabolism and loss of lean body mass, may be taken care of by taking care of proper nutritional needs and providing adequate exogenous source of energy. Material and method: We prepared a questionnaire in ICU consisting of 15 general questions and distributed it among 30 participants. We included junior residents and staff nurses. Participation was entirely voluntary.
Results: Kitchen meals (blenderized preparation) was more preferred (60%) than premixed formulas. Awareness of nutrition was present in 100 % of participants. Nearly 86.66% (26/30) were of the opinion that enteral nutrition is better than parenteral form. About 83.33% (25/30) of staff nurses were aware of availability of specific guidelines or nutrition protocols for accessing nutrition, type and amount of feed. 26/30 understood the importance of early EN. About 78% knew that EN has an upper hand than parenteral but rationale behind it was not clear. About 73.33% (22/30) were of view that presence of bowel sounds and passage of flatus both were required for starting nutrition in ICU. 7 agreed to just presence of bowel sounds but none were of opinion that both are not required as a criteria to begin feeding. GRV was checked by 100% before every feed i.e. approximately 4 hourly. Majority (18/30) were of view that feed should be withheld if GRV>100 ml. 10/30 agreed that 100 ml of aspirate indicated withholding the next feed while 2 agreed that even a GRV of 50 ml is an indication enough to stop feed.
Conclusion: Assessment of patients on admission to ICU for malnutrition, calculation of energy and protein required, determining the exact goals of therapy and being flexible enough to change these on a daily basis, while taking care to reduce catabolic stress is required. Prevention of infection and aspiration, regular monitoring with vigilance is the key to success.

Keywords: NIL

INTRODUCTION
Nutrition support in intensive care unit gains importance in that it aims to increase survival, prevents the catabolic stress response in already compromised body, limits sarcopenia (muscle wasting) and improves the overall functional outcome aswell as quality of patient care. Patients admitted to ICU are usually associated with much comorbidity apart from primary disease process, for example trauma may be primary reason of admission but diabetes, hypertension, tuberculosis may already be present, thus increasing the stress in an already immunocompromised patient. This leads to a baloney of problems- increased infectious morbidity, succumbing to multiple organ failure, increased length of stay and increased mortality.1,2

Understanding the pathophysiology behind malnutrition, molecular and biological mechanism influencing the metabolism and importance of macro and micro nutrients in maintaining an overall homeostasis in critically ill patients- may ultimately influence our way of conceiving the problems faced in ICU. This concept has recently been advanced to
‘Nutrition therapy’ that states that anabolic resistance and metabolic stress in ICU in form of catabolism and loss of lean body mass, may be taken care of by providing adequate exogenous source of energy. The pathophysiology and various metabolic and endocrine derangements in ICU patients are complex. Nutrition therapy is required to prevent the molecular and cellular damage occurring that leads to multiple organ dysfunction later on. In a nutshell, early qualitative nutritional support through a proactive therapeutic strategy, calculation of nutrition through time tested formulae (NUTRIC etc), starting early nutrition- (enteral when possible or parenteral otherwise), providing support in form of micronutrients, while taking overall care to prevent deficiency, disease process and infection from source of feed etc can come a long way to take good care of our patients.1,2

It was very important to know already present knowledge, awareness and attitude to patient care among staff nurses and junior residents who are involved in primary care of patients. ‘A journey of a thousand miles begins with a single step’.

MATERIAL AND METHOD

The study was conducted in the ICU of department of anaesthesiology, PGIMS, Rohtak. We prepared a questionnaire in ICU consisting of 15 general questions and distributed it among 30 participants. We included junior residents and staff nurses. Participation was entirely voluntary. The confidentiality of data and anonymity of personal details was ensured to the participants. A complete database was prepared and data was compiled.

Table: Questionaire to access knowledge, attitude and practice among the icu staff [total number of questionaires distributed (n)= 30]

| No | Question                                                                 | n =30                  |                                                                 |
|----|--------------------------------------------------------------------------|------------------------|
| 1  | Awareness of types of nutrition                                         | Yes 30 (100%)          | No 0                                                               |
| 2  | Type of nutrition preferred                                              | Enteral 26 (86.66%)    | Parenteral 4 (13.33%)                                             |
| 3  | Awareness of guidelines/protocols                                        | Yes 25 (83.33%)        | No 5 (16.66%)                                                      |
| 4  | Preference of Nutrition                                                  | Early 26 (86.66%)      | Late 4 (13.33%)                                                    |
| 5  | Awareness of advantages of enteral nutrition over parenteral             | Yes 26 (86.66%)        | No 4 (13.33%)                                                      |
| 6  | Absolute indication for starting enteral nutrition in ICU                | Presence of bowel sounds 7(23.33%) | Passage of flatus 1(3.33%) | None 0 | Both 22(73.33%) |
| 7  | Awareness for prokinetic agents                                          | Yes 30 (100%)          | No 0                                                               |
**RESULTS:**

Awareness of nutrition was present in 100% of participants which reflects a positive attitude towards patient care. The final aim of ASPEN AND SCCM (American society of parenteral and enteral nutrition and society of critical care medicine) is to improve patient care by advancing the practice of critical care and scientific reason behind it. As regards the type of nutrition preferred (whether enteral or parenteral, nearly 86.66% (26/30) were of the opinion that enteral nutrition is better than parenteral form. About 83.33% (25/30) of staff nurses were aware of availability of specific guidelines or nutrition protocols for accessing nutrition, type and amount of feed. 26/30 understood the importance of early enteral nutrition. About 78% knew that enteral nutrition has an upper hand than parenteral but rationale behind it was not clear. About 73.33% (22/30) were of view that presence of bowel sounds and passage of flatus both were required for starting nutrition in ICU. 7 agreed to just presence of bowel sounds but none were of opinion that both are not required as a criteria to begin feeding. All were aware of use of prokinetic agents in cases of increased gastric residual volume (GRV).
Figure 1

Percentage of people involved in study

- Staff nurses: 60%
- Junior residents: 40%

Figure 2

Awareness about types of nutrition

- Enteral: 26%
- Parenteral: 4%

Figure 3

Types of nutrition preferred

- Natural kitchen meals: 18
- Premixed feeds: 12
- Premixed feeds: 12
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20 participants agreed that the feed was modified according to the associated patient comorbidities while 10 were in concert that the same type of generalized feed is provided to all the patients. The exact amount of proteins, carbohydrates and fat was not calculated by 73.33%. Kitchen meals (blenderized preparation) were more preferred (60%) than premixed formulas available in the market. Majority (56.66%) were in favour of discarding the RT feed within 6 hours. 10 were of view that it should be discarded within 2 hours of preparation. Only 2 were in favour of waiting upto 12 hours before discarding the feed. 20 were in favour of replacing a new RT in 2 weeks while 9 were of view that a wait of 1 week is enough before discarding RT. All were of a unanimous view that head end of bed is always raised before feeding the patient except in fracture cervical spine or haemodynamically unstable patients.

GRV was checked by 100% before every feed i.e. approximately 4 hourly. Majority (18/30) were of view that feed should be withheld if GRV>100 ml. 10/30 agreed that 100 ml of aspirate indicated withholding the next feed while 2 agreed that even a GRV of 50 ml is an indication enough to stop feed. RT for medication was not preferred by a majority but was not aware of exact rationale behind it.

After collection and interpretation of data, a discussion was conducted taking one question at a time and understanding pros and cons of type of nutrition, different formulas for accessing malnutrition and spread awareness about shortcomings in our ICU practice. Also the recent ASPEN guidelines were discussed in brief including pathophysiology of nutrition and metabolism in ICU.

Discussion
The predominant reason for enteral nutrition (EN) is functional gut with adequate length for absorption and when oral feed is either not possible or feasible. Enteral nutrition helps maintain tight junctions inbetween the cells, thus structural and functional integrity is maintained. There is a particular ‘window of time frame’ when gut permeability in ICU patients is increased (usually starts immediately after trauma or burns) and thus translocation of bacteria occurs. EN helps to maintains an intact mucosa and gut immunity and thus leads to reduced infections, ileus, length of stay and overall morbidity and mortality. Also feeding if started within a short time frame (within 6-8 hours), before damage to IgA producing immunocytes, B cells, plasma cells that compose gut associated lymphoid tissue (GALT) have occurred, contributes to modulate stress and systemic immune response that presents as multiple organ dysfunction later on. These have a prominent role in mucosal lymphoid tissue in vital organs such as liver, kidney and lungs.

Early parenteral nutrition (PN) also has its own benefits in terms of adequacy of nutrition transferred without potential harm or may be benefits to gastrointestinal tract. There are chances of gut gangrene when nutrition is started in early post ileus phase. But PN is associated with central line infections, chances of ‘refeeding syndrome’ along with loss of gut mucosal function. EN has also been associated with higher rates of infection, emesis, diarrhoea and acute colonic pseudo obstruction.

Studying the pros and cons, PN is no longer inferior to EN. These findings are expected to diminish in future when more advances in glycemic control, protocol based approach in ICU with emphasis on newer lipid emulsions and exact calculated formulas are followed. We must understand that there are ‘2 sides to a coin’. With increasing complexities of modern healthcare and increasing patient burden in hospitals, decreasing staff: patient ratio, the complications associated with each type of nutrition (esp. EN) is bound to increase and many human and technical factors come into play.

There are various formulas to calculate malnutrition in ICU like NUTRIC score and modified NUTRIC score. Many of these formulas may be difficult to apply since patients are usually on mechanical ventilation or sedation associated with multiple complex physiology and comorbidities. One type of diet, nutrition plan or formula may not apply to other type and need to be modified according to special patient condition and type of ICU (medical, respiratory, surgical or trauma). Knowledge of score is useful but not an absolute requirement as traditional tools do not consider inflammatory status which is universal in all patients in ICU and responsible for catabolic state and muscle wasting.

According to ASPEN guidelines 2019, presence of bowel sounds or passage of flatus indicate contractility of gut and may not guarantee gut integrity, presence of a normally functioning GALT and normal absorptive capacity of gut. It supports starting EN as early as 24-36 hours of admission irrespective of presence of gut sounds or passage of flatus. The awareness of this fact was negligible may be because of a relatively newer concept. Also the supporting studies are very few at this point of time. But here is a catch: absence of bowel sounds may indicate a dismal prognosis and worsened disease severity. Thus checking for presence of bowel sounds or passage of flatus may be given ‘benefit of doubt’ and vigilance is warranted. Further clinical evaluation must be made.

There was 100% awareness of prokinetic agents such as metoclopramide, erythromycin in our ICU. These are known to improve tolerance of enteral nutrition and escalating gastric emptying but are known to be associated with side effects of own. Metoclopramide is known to cause tardive dyskinesia, cardiac arrhythmias more so in elderly. Similiarly erythromycin also associated with cardiac toxicity. These need to be given in supervision. A standard type of EN based on isotonic 1-1.5 kcal/ml is generally well tolerated and recommended for all ICU patients esp. in trauma ICU and medical ICU. There is growing evidence that no clear benefit is seen for speciality formulas like disease specific (diabetes) or pulmonary, renal diet. Exceptions are there in septic ICU setting. Though 20/30 agreed to use of specific diet, but literature does not support this. There are general guidelines for using proteins (1-1.2 g/kg actual body wt/day) and energy requirements 25-30 kcal/ kg/ day in all ICU patients with a few modifications like altering electrolytes in acute kidney injury patients and decreasing amount of fluids in paediatric patients.

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As far as type of feed i.e. premixed or blendarized kitchen preparation is concerned- the kitchen meal is more physiological and economical provided caution is exercised at all stages of preparation, mixing, feeding to prevent infection and consequently diarrhoea etc. Premixed feeds have advantages of their own in terms of provision of exact amounts of proteins, fats, carbohydrates but chances of refeeding syndrome are high. This can be prevented by giving only 25-50% of required amount initially and advancing later on. The sterile liquid EN formulas are preferred than powdered ones that need reconstitution later on. It also depends on the amount of dilution made, also on ambient temperature, storage conditions, light and oxygen storage in ICU settings. Usually a time of 4 hours is recommended up to which prepared feed can be stored at room temperature and 24 hours at refrigeration temperature (4°C). After this changes in the stability of fatty acids, carbohydrates and proteins have been reported. About 10/30 had this knowledge in our study. Also clostridium difficile diarrhoea has been reported from using perished feed.  

Ryles tube or any other enteral access device (EAD) used are perfect growth media esp. for gram negative organisms. Retrograde pathogen movement from the stomach or gut has vbeen suggested as possible cause. Thus all sterile precautions need to be exercised in handling these. Sterile gloves are highly recommended. Disinfection at connection site with isopropyl alcohol should be done. RT should be changes ideally after 24 hours which may not be economical and feasible in our patients. Thus 1 week is usually the accepted norm. Raising head end of the bed is practised by 100% of the ICU staff. Elevation upto 30°- 45° is recommended to prevent aspiration and pneumonia unless specific contraindications exist like haemodynamic unstability or unstable fracture.  

ICU patients are at higher risk of aspiration than general population and reasons are obvious- sedation, presence of nasogastric tube (NGT), chances of malposition of NGT or gastrostomy/ jejunostomy tubes, higher abdominal pressure buildup due to mechanical ventilation, bolus feeding, intestinal malabsorption/ ileus, geriatric age group and most important being supine position. 

4 hours initially at start of feed for 48 hours preferably via a large bore ‘sump tube’ using a 60 ml syringe. Gradually it can be replaced with a soft, small bore RT and feed checked every 6-8 hours in non critically ill patients. Presence of GRV > 250 ml at second check is an alert for considering a prokinetic agent but withholding feed is not advised. A GRV >500 ml call for withholding next feed and reaccessing position of NGT, glycemic control and minimizing sedation.

X ray has been the gold standard for confirming NGT position but not possible repeatedly due to high amount of radiation exposure. Nasogastric tube insufflations is being used routinely, but it does not guarantee 100 % surety of NGT position in stomach. Cases have reported when NGT was in lungs and feed given leading to catastrophe. Also the likelihood of tube migration proximally into the oesophagus or distally into the small intestine, cannot be confirmed by insufflation method. For this external markings and X ray are confirmatory.

**Limitations**

There are a few limitations in our study. The first is number of subjects were limited and thus we cannot generalize our results to a larger subset of ICUs. Finally always more is less as far as improvements in our knowledge is concerned. Various aspects need to be covered like long term nutrition therapy such as with gastrostomy/ jejunostomy, immunomodulators and specific micronutrients like vitamins, minerals, fish oil, selenium etc. Importance of fibres and specific dietary supplements could not be covered but we are hopeful that this study will definitely prove monumental to involve our staff and residents in general nutrition care of patients and put more insights into already acquired cognizance. As has rightly been said ‘knowledge has no value unless put into practice’. Finally we did not take into account the amount of experience of participants in ICU. More the experience more the knowledge and awareness of protocols and also importance of timely interventions. This may have biased our results to some extent.

**Conclusion**

Assessment of patients on admission to ICU for malnutrition, calculation of energy and protein required, determining the exact goals of therapy and
being flexible enough to change these on a timely basis, while taking care to reduce catabolic stress is required. Prevention of infection and aspiration, regular monitoring with vigilance is the key to success.

Early starting of EN, within 24-48 hours esp. in patients with high energy demands (trauma, burns) and advancing gradually should be the goal. GRV should not be a routine care practice but definitely required to prevent aspiration. PN should be started only when EN is not feasible or enough to meet the requirements esp. in poorly nourished patients. Strict adherence to nursing practices for taming of infection or cross contamination is required. Such types of questionnaire based studies put a light on the awareness and shortcomings in our own practice and thus improving our knowledge, attitude and practice towards patient care.

References


