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Original Research Article

Evidence based – Enteral feeding algorithm for Neurosurgery ICU/Ward

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ABSTRACT

Enteral feeding and Nurses: Enteral feeding is a procedure that is in practice internationally by nurses. Providing enteral feeding to the patients is an art and science of nursing that follows careful steps and principles. Nurses role is not only confined to administering enteral feed but also of educating, giving instructions to the family members, directing caregivers and significant others regarding initiating and maintaining enteral feeding, so that continuity of nutritional care is maintained even in the home setting.

Admission of patient in Neurosurgery ICU/Ward: Once the patient is admitted in neurosurgical ICU, hemodynamic stability of the patient is utmost important, as hemodynamic instability of the patient may preclude the safe initiation of EN in the critical care patients. Initial stabilization is the key for patient survival followed by maintenance therapy like drugs, mobilization, position, continuous monitoring and nutrition.

Determine the need for enteral feeding: For determining the need of enteral feeding especially for neurosurgical and neurological patients three things should be given utmost importance i.e. Swallowing deficit, Unconsciousness (Level of consciousness) and Nutritional requirement. Can be easily remembered as pneumonic SUN.

Enteral tube insertion and confirming tube position: Confirming tube position is one of the critical step in effective enteral feeding practice in spite of that it has given least importance. It is recommended to confirm the tube position immediately after ryles' tube insertion through radiologic methods which may be not feasible sometimes, therefore bedside methods can also be adopted Auscultation methods and Aspiration method are the most widely used method among all the bed side methods for confirming tube placement.

Managing high gastric residual volume: Gastric residual volume is the amount aspirated from the stomach following administration of the enteral feed. An aspirate among of less than 500ml in 4-6 hours or less than 50% of last enteral feed is safe and indicates that GIT is functioning. Most patients nicely tolerate enteral feeding via gastric tube while few patients has delayed gastric emptying and high GRVs as a result of sedation, pain medications, hypothermia, decreased movement and the effect of being critically ill. Intolerance of enteral feeding is defined as more than 500ml or more than 50% of last enteral feeding.

Conclusion: Though enteral feeding is the most popular procedure for ICU Nursing officer, but it is the most crucial in terms of deciding patient outcome. Effective enteral feeding requires through knowledge of initiation and maintenance of enteral feeding. Thus, this article propose simple algorithm to follow. Effectively delivering nutrition to the patient requires the help of dietitian and physician/surgeon to deal with its challenges that comes along with this golden feeding technique.

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1. Introduction

There is a large body of evidence showing that intensive care patients are at the risk of malnutrition during hospital stay.[1,2] Malnutrition is associated with increase length of hospital stay, high chances of noso-comial infection, more ventilator days and increase rate of hospital mortality.[3–5] Several factors contribute to malnutrition among critically ill patients such as underfeeding,[4] bodily stress, catabolic activities, self-care capabilities, and patho-physiological factors. Among the factors, underfeeding, self-care capabilities and inappropriate dietary protocol are modifiable factors in which nurses play a very important role.

Critical care providers are still failing to meet patients' nutritional demands particularly during the first few days of intensive care stay. Enteral feeding is a procedure that is in practice internationally by nurses. Providing enteral feeding to the patients is an art and science of nursing that follows careful steps and principles.[1] Nurses role is not only confined to administering enteral feed but also of educating, giving instructions to the family members, directing caregivers and significant others regarding initiating and maintaining enteral feeding, so that continuity of nutritional care is maintained even in the home setting. Enteral feeding is the preferred technique to meet the nutritional requirement of patients who are unable to meet nutritional demands. However, the literature reported that considerable numbers of patients who receive enteral feeding were under-fed and undernourished. Nursing practices may be associated with underfeeding and eventually malnutrition. Unfortunately, only limited studies examine the relationship between nurses' practice and malnutrition.[5]

2. Admission of Patient in Neurosurgery ICU

Once the patient is admitted in neurosurgical ICU, hemodynamic stability of the patient is utmost important, as hemodynamic instability of the patient may preclude the safe initiation of EN in the critical care patients. Initial stabilization is the key for patient survival followed by maintenance therapy like drugs, mobilization, position, continuous monitoring and nutrition. In the initial phase itself determine the patient condition, disease process, impact of surgical procedure. Etc.[6]

ASPEN has discussed selected clinical criteria that should be considered in admission of the patient which may affect enteral feeding which includes: Trauma and critically ill patients have altered metabolism and varying needs during the different phases of illness, Critically ill patients with traumatic brain injury have higher frequency if GI disorders, Such as gastroparesis and subsequent enteral feeding intolerance. Some patients has altered GI Anatomy also poses the patient at risk of anastomotic leak, Malabsorbtion leading to diarrhea, and subsequent loss of nutrients leads to metabolic derangements. Dysmotility conditions associated with gastroschisis or scleroderma can also have an impact on the ability to tolerate EN. Other neuromuscular diseases such as myasthenia gravis, GBS, and Amyotrophic lateral sclerosis can results in dysphagia. Dysphagia or silent aspiration is one of the most common complication seen in neurosurgical clients, upto 67% of patients with stroke has dysphagia. And it can also be secondary to cervical spine stabilization vest like halo type or other restrictive devices including tracheostomy tube and nerve palsies requires parenteral or enteral nutritional support.[7]

After the 24 hours of stabilization of critically ill patient and post-operative patients through physical examination and biochemical parameters need to be determined. Patients history including clinical diagnosis, past and current medical surgical interventions, medications, nutritional history (food allergy), religion background, potential and mental status challenges should be determined. Physical examination includes gastrointestinal assessment, including bowel sounds, anthropometric assessment included height, weight, and BMI. Gold standard biochemical parameters for nutritional assessment are albumin, transferrin, prealbumin. (Prealbumin is the most valued biochemical parameter for nutrition).[8]

In conclusion, maintain the hemodynamic stability of the patient, determining the need for immediate life saving surgery, disease process, initial medical treatment and patient response is the immediate action required followed by through history taking, physical and anthropometric assessment of the patient to guide in planning nutritional support to the patient.

3. Determine the Need for Enteral Feeding (Swallowing, Unconsciousness, and Nutritional Requirement)

Meeting the nutritional needs of Neurosurgical clients are challenging as most of them are unconscious, lost their ability to swallow, paralyzed, extremely weak, and having a higher risk for infections. The common approach towards Neurosurgical patients to meet the nutritional needs is enteral and parenteral nutrition; it is not the same as the natural way of feeding and eating. Enteral feeding considered as cost-effective method than parenteral nutrition and commonly used in Neurosurgical patients. (1) For determining the need of enteral feeding especially for neurosurgical and neurological patients three things should be given utmost importance i.e. Swallowing deficit, Unconsciousness (Level of consciousness) and Nutritional requirement. Can be easily remembered as pneumonic SUN.[9]

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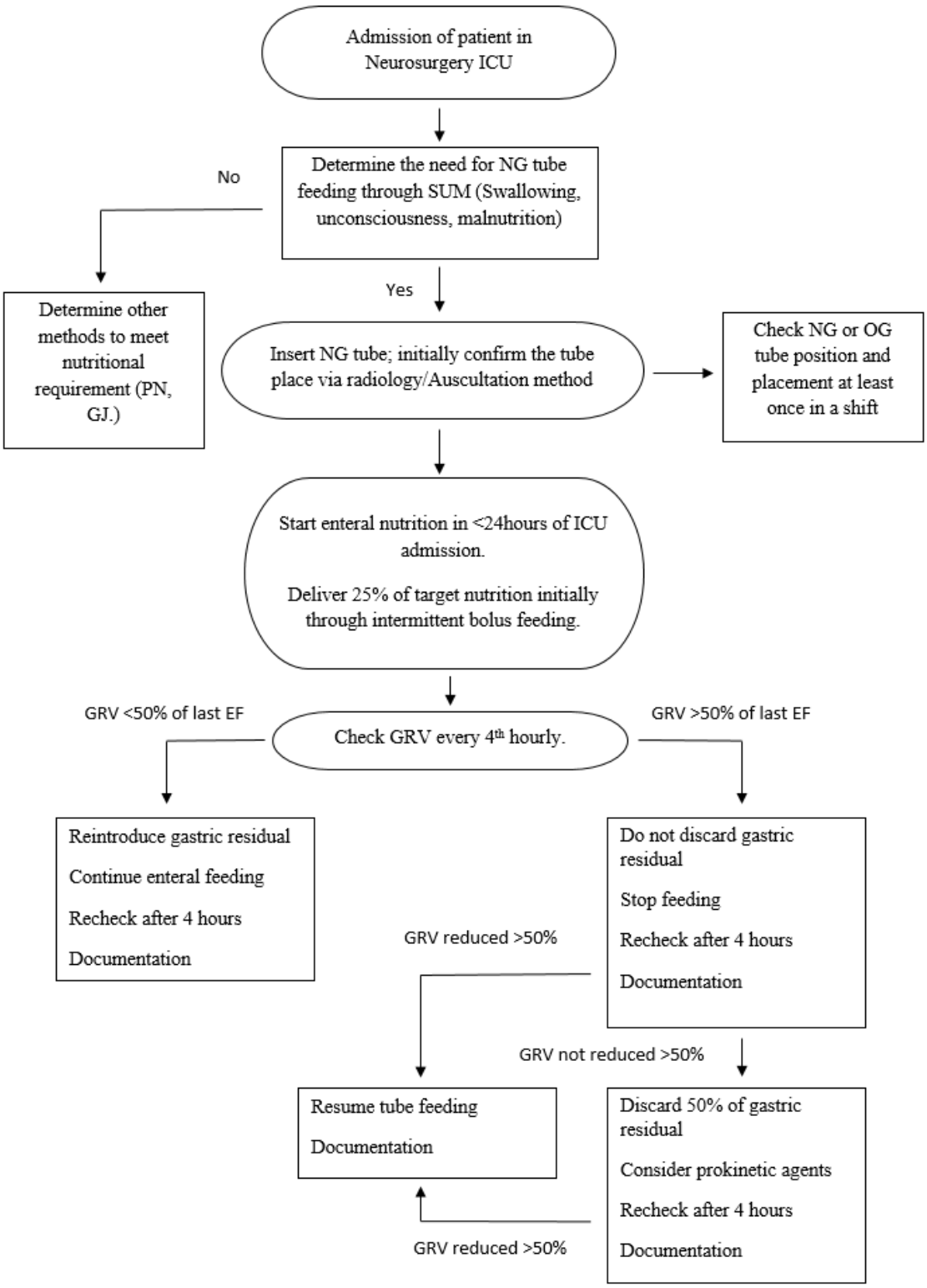

Fig. 1: Evidence based algorithm for initiation of tube feeding

Table 1: Interpretation of albumin, transferrin and prealbumin levels in peripheral blood in relation to the nutritional status.

Nutrition status	Albumin (g/dl)	Transferrin (mg/dl)	Prealbumin (mg/dl)
Correct	3.5-5.0	176-315	18-45
Light malnutrition	3.0-3.4	134-175	10-17
Medium malnutrition	2.1-2.9	117-133	5-9
Severe malnutrition	<2.1	<117	<5

Swallowing assessment is the essential task to be performed by the nurses to prevent the risk of silent aspiration. Swallowing safety must be evaluated as soon as possible after admission by trained personnel. Usually, small volume of water is administered and a judgment is made based on patient coughs, change in voice quality, respiratory patterns, pooling of water from oral cavity. Videofluroscopy (VF) is one of the gold standard procedure for the detection of aspiration and its underlying pathophysiology.[10]

Unconsciousness is a state where ability to maintain awareness of self and environment is lost, which makes it an absolute indication for enteral feeding. Patients who are unconscious from long period of time are at the risk for several complications, malnutrition is one of it. secondary to this disuse atrophy, muscle wasting, anaemia, pressure ulcer can occur.

One of the standard methods to determine level of conscious is through Glasgow coma scale. Categorizing the patient into conscious, semiconscious and unconscious makes difference in their caloric and nutritional requirements.

Nutritional requirement of the critically ill patients including neurosurgical patients is one of the most discussed topic. Several factors that hamper the metabolic demands of the patients need to be considered including febrile events, ventilator support, infectious state etc. increases the metabolic demand of the patients. Most of the time thumb rule is used to plan diet for patients based on patients' requirements and level of tolerance, Protein requirement for critically ill is recommended as 1.2-2.0g/kg ideal body weight, Calories should be in range of 25-30 Kcal/kg body weight per day. Based on research evidences there are several methods and equations to determine the caloric requirement of the patients, few of them discussed are: The American college of chest physician (ACCP) designed equation to calculate nutritional requirement for critically ill patients, Mifflin-St Jeor equation, Penn State equation and one of the widely used equation i.e. Harris Benedict equation are used for calculating caloric requirement of the patients.[11–13]Clinical nutritionist plays a major role in determining the metabolic needs of the client and adequately measure and provide diet plan for the patients by using standardized equation and methods.

4. Enteral Tube Insertion

Enteral tube can be inserted via Nasal and oral routes. Enteral tube insertion via nasal and oral routes is usually intended for short period of time, not more than 4-6 weeks in the hospitalized patient. Before enteral tube insertion absolute and relative contraindications should be kept in mind and critically risk benefit for enteral tube insertion and feeding should be analyzed. Several contraindications for ryles' tube insertion are recent nasal, throat or esophageal surgery, basilar skull fracture that may lead to misplacement of ryles' tube in the intracranial space. Nurses and physicians are responsible for effective insertion of ryles' tube. Securing ryles tube is also a major concern, Nasal tube are sometimes taped to the nose, which then may be pinned to patient gown or clothing. The tube typically hangs from the patients nose. Improper taping can cause pressure injury in the nose. Therefore taping must be done in a manner to prevent pressure against nasal surrounding tissues and routinely pressure related injury must be monitored by the nurses.[14]

5. Confirming Tube Position

Confirming tube position is one of the critical step in effective enteral feeding practice in spite of that it has given least importance. It is recommended to confirm the tube position immediately after ryles' tube insertion through radiologic methods which may be not feasible sometimes, therefore bedside methods can also be adopted Auscultation methods and Aspiration method are the most widely used method among all the bed side methods for confirming tube placement. It is recommended to check NG or OG tube position each time before delivering intermittent bolus feeding or at least once in every shift. Checking gastric residual volume is an indicator for gastric intolerance and to plan desired volume of feed to deliver through NG tube, The small practice of confirming tube placement and checking gastric residual volume before feeding can prevent major risk of aspiration.[14,15]

6. Documentation

Documentation of enteral feeding is essential for patients safety, documentation of enteral feeding works as clinical data to rule out, GRV, intolerance to particular group of food, meeting goal volume per day etc. Based on ASPEN guidelines and clinical observation suggested key points in

the documentation of enteral feeding are, Labeling of NG tube or OG tube including date of insertion and length of tube inserted. Documentation related to enteral feed comprise of enteral feeding name for example: "Standard feed", "High protein", "Low salt" etc. to minimize the confusion among providers. Mention the type and volume of feed delivered including plain water flush. Record gastric residual volume which will help to rule out intolerance. And other NG or OG tube feeding related complications should also be documented. Including all those things including, Nursing officers name, date, time of delivering enteral feeding is also mandatory.[16]

7. Managing High Gastric Residual Volume

Gastric residual volume is the amount aspirated from the stomach following administration of the enteral feed. An aspirate among of less than 500ml in 4-6 hours or less than 50% of last enteral feed is safe and indicates that GIT is functioning. Most patients nicely tolerate enteral feeding via gastric tube while few patients has delayed gastric emptying and high GRVs as a result of sedation, pain medications, hypothermia, decreased movement and the effect of being critically ill. Intolerance of enteral feeding is defined as more than 500ml or more than 50% of last enteral feeding. GRVs correlate with aspiration and that continuing the enteral feeding in high GRV above designated level may leads to pneumonia and adverse outcome. Aspirates should be returned in full if it is less than 500ml. Discontinuing enteral tube feeding and administering prokinetics as prescribed is the recommended solution for high gastric residuals that is metoclopramide IV 10mg q6h together with erythromycin IV 200mg bd for 24 – 72 hours.[17–19]

There are certain limitations of monitoring Gastric residual volume such as, GRVs are the poor predictor of aspiration, measuring GRV takes time and delivering enteral feed based on GRVS increases nurses workload, High GRVs delays delivery of enteral feeding without having clear evidence of benefit, repeated removal of gastric contents may clog the tube.

8. Administration of Medication via NG or OG tube

It is recommended to do not add medications directly to an enteral feeding formula, administer each medication separately through an appropriate access. Avoid mixing together different medications in the feed that may cause risk for physical and chemical incompatibilities, tube obstruction and altered therapeutic drug response.[20]

Proper ways of administering medications via NG or OG tube includes, Crush tablet to fine powder and mix it with purified water. Open hard gelatin capsules and mix powder containing the immediate release medications with purified powder. Prior to the administration of medications stop the feeding and flush the tube with at least 15ml water. Administer using a clean enteral syringe. Flush the tube again with at least 15ml water, consider patients' fluid status and repeat the same process for next medications. Restart the enteral feeding in timely manner.[21]

9. Conclusion

Though enteral feeding is the most popular procedure for ICU Nursing officer, but it is the most crucial in terms of deciding patient outcome. Effective enteral feeding requires through knowledge of initiation and maintenance of enteral feeding. Thus, this article propose simple algorithm to follow. Effectively delivering nutrition to the patient requires the help of dietitian and physician/surgeon to deal with its challenges that comes along with this golden feeding technique.

10. Conflict of Interest

None.

11. Source of Funding

None.

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