

DISCLAIMER: These guidelines were prepared by the Department of Surgical Education, Orlando Regional Medical Center. They are intended to serve as a general statement regarding appropriate patient care practices based upon the available medical literature and clinical expertise at the time of development. They should not be considered to be accepted protocol or policy, nor are intended to replace clinical judgment or dictate care of individual patients.

NUTRITIONAL SUPPORT: ROUTE OF ADMINISTRATION

SUMMARY

Early nutrition support is an essential component of critical care management. The benefits of early enteral nutrition are well established. Total parenteral nutrition (TPN) increases intensive care unit (ICU) and hospital length of stay and increases the risk of infection, but may be necessary if adequate enteral nutrition support cannot be achieved in a timely manner. Gastric tube feedings are safe; enteral nutrition should not be delayed by attempts to achieve post-pyloric feeding access.

RECOMMENDATIONS

- **Level I**
 - When feasible, nutrition support using the enteral as opposed to parenteral route is preferable due to its lower cost, lower incidence of infectious complications and shorter intensive care unit and hospital length of stay.
- **Level II**
 - Surgical and trauma patients should have enteral feedings initiated as soon as clinically reasonable (preferably within 24 hours of injury / operation).
 - Head injured and burn patients should receive enteral nutrition within 18 hours of injury due to their increased risk for gastric emptying complications.
 - Initial attempts at enteral feedings should be via the gastric route. However, post-pyloric/duodenal feeding access should be used if gastric feedings are met with persistently high residuals.

INTRODUCTION

The benefits of early, goal-directed nutrition support in the critically ill are well-recognized. Nutrition support improves wound healing, immune function, and resistance to infection. The optimal route of nutrition support remains controversial. Enteral nutrition is simpler, less expensive, and potentially superior to parenteral nutrition, but may not be tolerated sufficiently by all patients. Parenteral nutrition is more expensive, requires central venous access, and is associated with increased infectious complications compared to enteral nutrition, but does not depend upon an intact and functioning gastrointestinal tract for success. An aggressive strategy to initiate early, cost-effective, goal-directed nutrition support using the route most effective for the individual patient is what is important.

LITERATURE REVIEW

In 1986, Moore and Jones reported one of the first prospective randomized studies comparing enteral nutrition vs. total parenteral nutrition (TPN) in patients with severe abdominal trauma requiring laparotomy (1). They noted a statistically higher rate of septic infections among TPN patients. In 1989, in a follow-up

EVIDENCE DEFINITIONS

- **Class I:** Prospective randomized controlled trial.
- **Class II:** Prospective clinical study or retrospective analysis of reliable data. Includes observational, cohort, prevalence, or case control studies.
- **Class III:** Retrospective study. Includes database or registry reviews, large series of case reports, expert opinion.
- **Technology assessment:** A technology study which does not lend itself to classification in the above-mentioned format. Devices are evaluated in terms of their accuracy, reliability, therapeutic potential, or cost effectiveness.

LEVEL OF RECOMMENDATION DEFINITIONS

- **Level 1:** Convincingly justifiable based on available scientific information alone. Usually based on Class I data or strong Class II evidence if randomized testing is inappropriate. Conversely, low quality or contradictory Class I data may be insufficient to support a Level I recommendation.
- **Level 2:** Reasonably justifiable based on available scientific evidence and strongly supported by expert opinion. Usually supported by Class II data or a preponderance of Class III evidence.
- **Level 3:** Supported by available data, but scientific evidence is lacking. Generally supported by Class III data. Useful for educational purposes and in guiding future clinical research.

study of patients with major abdominal trauma, they again found reduced septic complications in the patients fed enterally (2). In 1992, Feliciano and Moore performed a meta-analysis of eight prospective randomized trials suggesting that early enteral feeding reduces postoperative septic complications (3). In 1992 and 1994, Kudsk provided further evidence that septic complications including pneumonia, intra-abdominal abscess, and central venous catheter-related sepsis were significantly reduced in enterally compared to parenterally fed patients (4,5). A recent meta-analysis of 30 randomized studies comparing enteral nutrition to TPN concluded that although there is no difference in mortality, enterally fed patients have a significantly lower incidence of infectious complications, and significantly shorter intensive care unit and hospital length of stay (6). Another recent meta-analysis, based upon an intent-to-treat principle, has suggested that patients in whom enteral feedings are delayed greater than 24 hours from the time of admission have a higher mortality compared to those that were fed immediately with TPN (7). This meta-analysis has significant methodologic flaws, however, that raise concern over the validity of its conclusions.

In head injured patients, the optimal route of nutrition support remains controversial. This may be due, in part, to the impaired gastric emptying that can occur in such patients. Ott et al. demonstrated that significant delays in gastric emptying are present during the first week after head injury, but that this has resolved in 50% of patients by the second week post-injury. All patients in their study tolerated full volume enteral feedings by day 16 (8). Haussman et al. found that head injured patients with impaired gastric function, as evidenced by high gastric residuals, were better treated with parenteral feedings (9). Furthermore, the previously identified significant increase in septic infections with the parenteral route was not encountered in their study. Hadley et al. demonstrated equal effectiveness with parenteral and enteral routes in patients with head injury with no significant difference in serum albumin levels, weight loss, infection risk, nitrogen balance, or final outcome (10). In a prospective randomized study evaluating parenteral vs. enteral nutritional support in head injured patients, Young et al. found that parenterally fed patients had better outcomes at 3, 6, and 12 months, and that the enterally fed patients had a statistically higher risk of septic complications (11,12). In this study, however, the enterally fed group did not tolerate feedings until a mean of 9 days. In the head injured patient, early, continuous enteral feedings appear to be critical to counteracting early gastric emptying dysfunction and maintaining nutritional support. Parenteral support should be added when the enteral route is ineffective in providing critically necessary nutrition.

Montecalvo et al. performed a prospective, randomized study on a mixed population of 88 medical, surgical, and trauma patients comparing gastric versus distal duodenal feedings (13). They concluded that patients fed by the distal duodenal route received a significantly higher proportion of their daily goal caloric intake and had a lower rate of pneumonia than patients fed by continuous gastric tube feeding. A more recent randomized trial, limited to mechanically ventilated blunt trauma patients, compared duodenal versus gastric feeding and found that length of stay and ventilator days were not significantly different between the two groups (14). Duodenal feedings did significantly reduce the time required to achieve target enteral nutrition rates. Although the difference was not statistically significant, there was a trend toward increased pneumonia (42% vs. 27%) in the gastric group as compared to the distal duodenal fed group. Patients with persistent, high gastric residuals should have their gastric tube replaced by a distal duodenal tube to improve enteral feeding.

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