

A. Gavage feedings.

1. Enteral feeding of infants born at less than 32 weeks' gestation and infants who are unable to feed orally with safety.
2. Orogastric versus nasogastric gavage feedings. Four studies suggest that the use of indwelling nasogastric tubes results in respiratory compromise in VLBW preterm infants (Greenspan et al., 1990; Shiao, 1997; Shiao et al., 1995; Van Someren et al., 1984). Shiao and colleagues (1995) reported lower minute ventilation and tidal volume, in addition to lower oxygen saturation, pulse rate, and less forceful sucking during attempts at oral feedings with the tube in place.
3. PN, if necessary, to supplement enteral intake when feedings are being initiated.
4. Intermittent intragastric gavage feeding routine.
 - a. A size 5F to 8F feeding tube is inserted by a standard measuring technique: from the nose to the ear to the lower end of the sternum and adding 1 cm, or from the ear to the nose to a point midway between the xiphoid process and the umbilicus (Weibley et al., 1987). Orogastric tube measurement is from the mouth to the ear to the lower end of the sternum (Anderson et al., 2002). Size 5F is desirable for nasally placed tubes (Lefrak-Okikawa and Meier, 1993)
 - b. The tube should be secured in place with tape.
 - c. Proper placement should be assessed after insertion and before each feeding, or at predetermined intervals for infants receiving continuous feedings.
 - d. A polyvinyl chloride (PVC) tube may be left in place for 24 to 72 hours or may be removed after each feeding, depending on clinical preferences and manufacturers' recommendations. Long-term polyurethane nasal feeding tubes should be discarded/replaced after 4 weeks or as per manufacturer's instructions (Anderson et al., 2002), or if placed nasally, changed to the opposite nare weekly.
 - e. Most nurses check for residual before each feeding; however, practice regarding refeeding or not refeeding is inconsistent (Hill and Rath, 1993; Hodges and Vincent, 1993). Residuals of 2 to 4 ml/kg or a 1-hour volume if the infant is on continuous feedings are considered normal and should generally be returned to the infant (Anderson et al., 2002). If the residuals are routinely discarded, monitor the infant for signs and symptoms of electrolyte imbalance and metabolic complications (Premji, 1998).
 - f. Administer feedings by gravity or pump within 15 to 30 minutes; gravity allows for a natural "burg" through the tube and avoids direct, forceful pressure into the GI tract.
 - g. During a feeding the infant should be observed for intolerance and complications (e.g., oxygen desaturation, emesis, bradycardia, apnea).
 - h. Nonnutritive sucking on a pacifier should be offered during the feeding (Bernbaum et al., 1983; Measel and Anderson, 1979).
 - i. After a feeding the tube should be cleared with air or sterile water and then capped off to air. A tube that is to be removed after each feeding is removed by pinching it off and withdrawing it quickly.
5. Possible indications for continuous gavage feedings (at least one randomized controlled clinical trial has demonstrated that bolus feedings are associated with less feeding intolerance and better weight gain) (Schanler et al., 1999).
 - a. VLBW infants whose gastric capacity is limited, infants receiving minimal enteral feedings, and infants who require a steady influx of glucose (e.g., infant with severe hypoglycemia and diabetic mother).
 - b. Infants with malabsorptive syndromes (e.g., short bowel syndrome, post-NEC, neonatal abstinence syndrome).
 - c. Severe gastroesophageal reflux.

6. Continuous nasogastric feeding routine.
 - a. See previous discussion in section 4, "Intermittent intragastric gavage feeding routine," items a. through f; p. 226-227.
 - b. A 4-hour feeding volume should be aseptically prepared and purged through the appropriate infusion-pump tubing. (Syringe infusion pumps are recommended because of their low priming volume and low cost.) Nurses must be vigilant in avoiding inadvertent infusion into an IV site.
 - c. For human milk feedings, infusion-pump tubing should be changed every 4 hours (i.e., with each 4-hour feeding volume setup) to eliminate exponential bacterial growth in expressed mother's milk (Lefrak-Okikawa and Meier, 1993; Lemons et al., 1983; Meier and Brown, 1996). Placing the pump so that the syringe is vertical, with the tubing coming from the top and below level of the infant, will facilitate improved fat delivery because fat rises to the surface of the milk (Schanler, 1995).
 - d. After insertion, taping, and assessment for proper placement, the infant's feeding tube is connected to the infusion-pump tubing.
 - e. The infusion pump is programmed to deliver the appropriate volume to the infant at the appropriate rate.
 - f. Hourly enteral feeding intake should be recorded.
 - g. Assess every 2 to 4 hours (Norris and Steinhorn 1994):
 1. Gastric residuals may be normal if there are no other signs of feeding intolerance.
 2. Abdominal girth.
 3. Bowel sounds. Hyperactive bowel sounds may indicate intolerance.
 4. Infant's behavior. Agitation may indicate abdominal discomfort.
7. Advantages of gavage feedings. Infants who are unable to feed orally with safety are given the benefits of enteral nutrition (e.g., stimulation of bile flow and feeding-induced hormones, improved weight gain).
8. Disadvantages of gavage feedings.
 - a. Possible bacterial inoculation of the GI tract via feeding tube and milk.
 - b. Potential risks associated with improper placement of feeding tube.
 - c. No possibility of self-regulated feeding.
 - d. Limited parental involvement in some nursery settings.
9. Disadvantages of continuous (vs. intermittent) gavage feedings.
 - a. Higher risk of aspiration when infant is unattended.
 - b. Gastric readiness for bolus feedings not promoted (i.e., stomach capacity remains small).
 - c. Alteration of enteric gut hormone secretion because cyclic surges in gut hormones are not accommodated.
 - d. Takes longer to reach full feeds (Premji and Chesesell, 2001).
 - e. Higher incidence of feeding intolerance.
10. Possible disadvantages of intermittent bolus gavage feedings.
 - a. Impaired pulmonary function after feeding (Blondheim et al., 1993).
 - b. Decreased mean cerebral blood flow velocity (Nelle et al., 1997).
11. Note of caution: Infants must be observed individually for subtle physiologic changes during feedings.