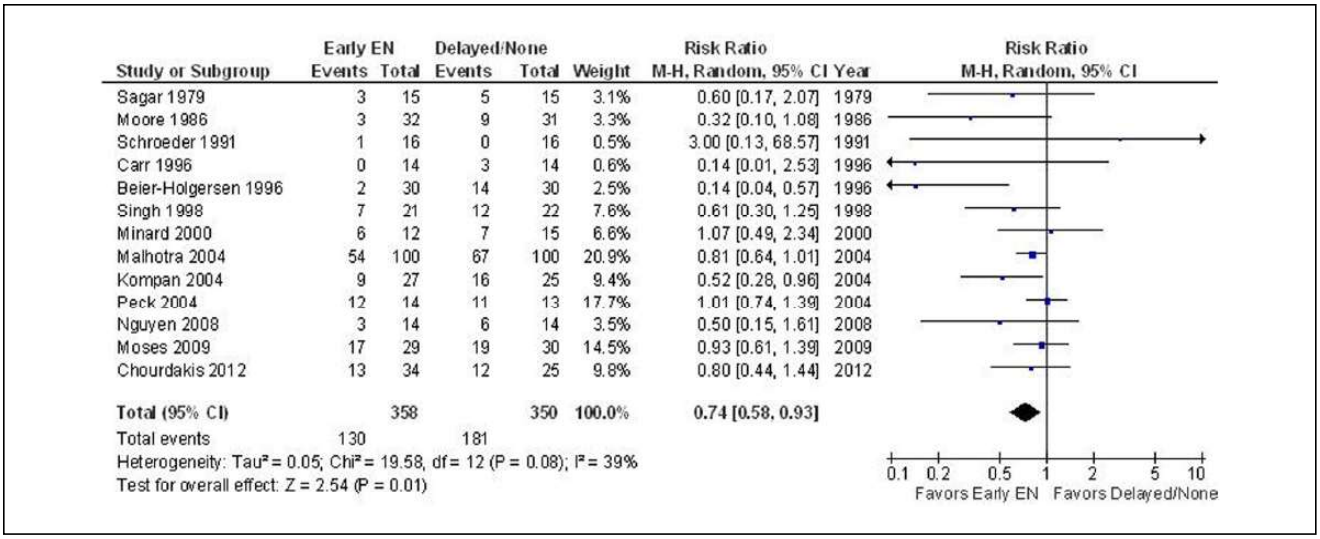

Figure 2. Early enteral nutrition (EN) vs delayed EN, infectious complications.

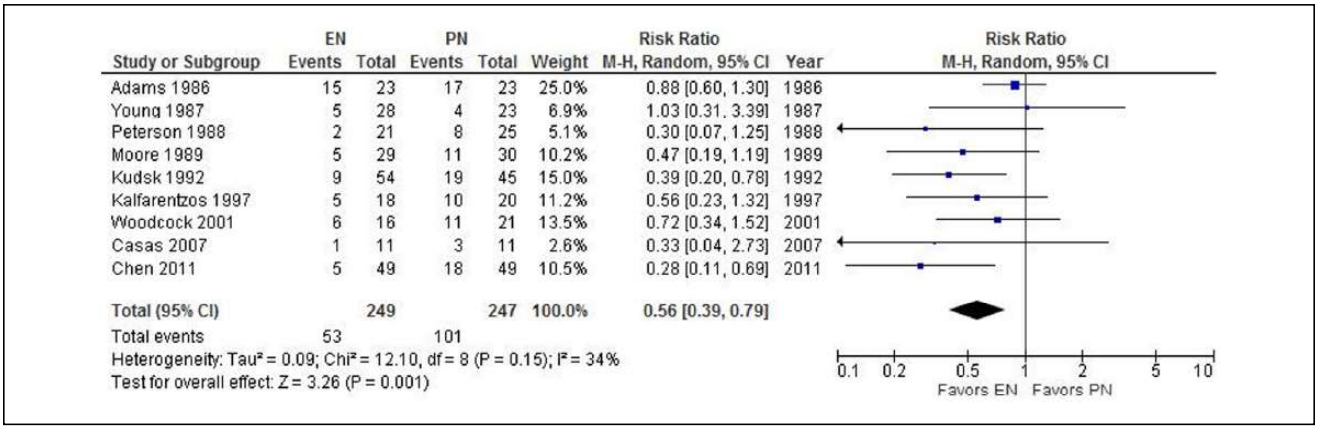

Figure 3. Enteral nutrition (EN) vs parenteral nutrition (PN), infectious complications.

Question: Is there a difference in outcome between the use of EN or PN for adult critically ill patients?

B2. We suggest the use of EN over PN in critically ill patients who require nutrition support therapy.

[Quality of Evidence: Low to Very Low]

Rationale: In the majority of critically ill patients, it is practical and safe to use EN instead of PN. The beneficial effects of EN compared with PN are well documented in numerous RCTs involving a variety of patient populations in critical illness, including trauma, burns, head injury, major surgery, and acute pancreatitis.[47,49,52–54] While few studies have shown a differential effect on mortality, the most consistent outcome effect from EN is a reduction in infectious morbidity (generally, pneumonia and central line infections in most patient populations; specifically, abdominal abscess in trauma patients) and ICU LOS.

Six previous meta-analyses comparing EN with PN showed significant reductions in infectious morbidity with use of EN.[49,55–59] Noninfective complications (risk difference = 4.9; 95% CI, 0.3–9.5; $P = .04$) and reduced hospital LOS (weighted mean difference [WMD] = 1.20 days; 95% CI, 0.38–2.03; $P = .004$) were seen with use of EN compared with PN in one of the meta-analyses by Peter et al.[57] Five of the meta-analyses showed no difference in mortality between the 2 routes of nutrition support therapy.[49,55–59] One meta-analysis by Simpson and Doig showed a significantly lower mortality (RR = 0.51; 95% CI, 0.27–0.97; $P = .04$) despite a significantly higher incidence of infectious complications (RR = 1.66; 95% CI, 1.09–2.51; $P = .02$) with use of PN compared with EN.[59]

In 12 studies[53,58,60–69] representing 618 patients that met our inclusion criteria, 9 reported on infection (Figure 3), which was shown to be significantly less with EN than PN (RR = 0.56; 95% CI, 0.39–0.79; $P < .00001$). ICU LOS also was shorter with EN compared with PN by nearly 1 full day (WMD =

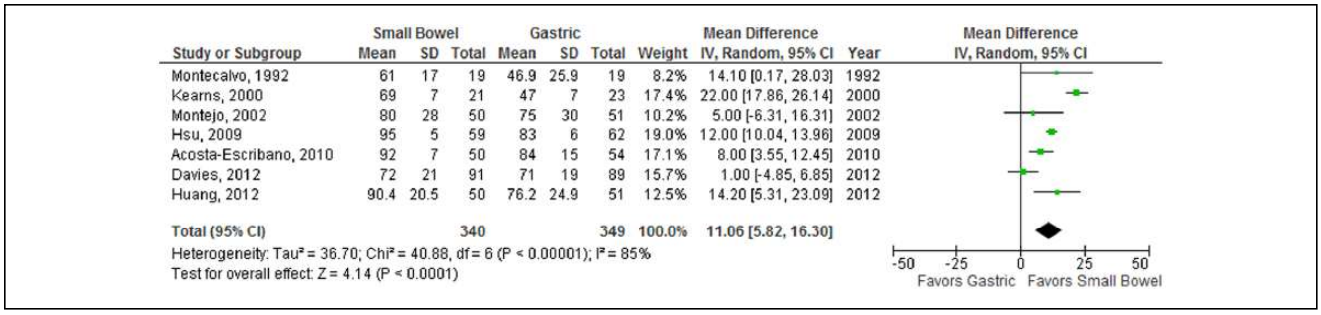

Figure 4. Small bowel vs gastric feedings, nutrition efficiency.

−0.82 days; 95% CI, −1.29 to −0.34; $P = .0007$). Hospital LOS and mortality were not significantly different. These differences in outcome from the separate routes of feeding largely reflect findings from older studies and may diminish in the future with improvements in glycemic control, protocolized medical management, and new lipid emulsions.

Question: Is the clinical evidence of contractility (bowel sounds, flatus) required prior to initiating EN in critically ill adult patients?

B3. Based on expert consensus, we suggest that, in the majority of MICU and SICU patient populations, while GI contractility factors should be evaluated when initiating EN, overt signs of contractility should not be required prior to initiation of EN.

Rationale: The literature supports the concept that bowel sounds and evidence of bowel function (ie, passing flatus or stool) are not required for initiation of EN. GI dysfunction in the ICU setting occurs in 30%–70% of patients, depending on the diagnosis, premorbid condition, ventilation mode, medications, and metabolic state.[70]

Proposed mechanisms of ICU and postoperative GI dysfunction are related to mucosal barrier disruption, altered motility, atrophy of the mucosa, and reduced mass of GALT. GI intolerance has been variably defined (eg, absence or abnormal bowel sounds, vomiting, bowel dilatation, diarrhea, GI bleeding, high gastric residual volumes [GRVs]) and appears to occur in up to 50% of patients on mechanical ventilation. Bowel sounds are indicative only of contractility and do not necessarily relate to mucosal integrity, barrier function, or absorptive capacity.

The argument for initiating EN regardless of the extent of audible bowel sounds is based on studies (most of which involve critically ill surgical patients) reporting the feasibility and safety of EN within the initial 36–48 hours of admission to the ICU.

Nonetheless, reduced or absent bowel sounds may reflect greater disease severity and worsened prognosis. Patients with normal bowel sounds have been shown to have lower ICU mortality than those with hypoactive or absent bowel sounds (11.3% vs 22.6% vs 36.0%, respectively).[71] ICU LOS has been shown to increase with greater number of symptoms of GI intolerance (2.9 days when asymptomatic vs up to 16.8 days with 4 symptoms of intolerance).[72] Not surprising, success of EN delivery is reduced with a greater number of symptoms of GI intolerance. A greater number of signs of intolerance may warrant increased vigilance as EN is started and may necessitate further clinical evaluation.

Question: What is the preferred level of infusion of EN within the GI tract for critically ill patients? How does the level of infusion of EN affect patient outcomes?

B4a. We recommend that the level of infusion be diverted lower in the GI tract in those critically ill patients at high risk for aspiration (see section D4) or those who have shown intolerance to gastric EN.

[Quality of Evidence: Moderate to High]

B4b. Based on expert consensus we suggest that, in most critically ill patients, it is acceptable to initiate EN in the stomach.

Rationale: Initiating EN therapy in the stomach is technically easier and may decrease the time to initiation of EN. The choice of level of infusion within the GI tract (ie, whether the tip of the feeding tube is in the stomach, different segments of the duodenum [D1, D2, D3, or D4], or the jejunum) may be determined by patient selection within ICU practitioners' institutional framework (ease and feasibility of placing small bowel enteral access devices, institutional policies, and protocols).

In the largest multicenter RCT to compare gastric versus small bowel EN in critically ill patients, Davies et al found no difference in clinical outcomes between groups, including LOS, mortality, nutrient delivery, and incidence of pneumonia.[73] Aggregating the data from the RCTs that met our inclusion criteria, 6 trials reported on improved nutrient delivery with small bowel feedings (WMD = 11.06%; 95% CI, 5.82–16.30%; $P < .00001$) (Figure 4),[73-78] and 12 trials demonstrated a reduced risk of pneumonia compared with gastric EN (RR = 0.75; 95%