

3.3a Intentional Underfeeding: Trophic Feeds vs. Full Feeds

There were no new randomized controlled trials since the 2015 update and hence there are no changes to the following summary of evidence.

Question: Does the use of trophic vs full feeding result in better outcomes in the critically ill adult patient?

Summary of evidence: There were two level 2 studies reviewed that compared trophic enteral feedings to feeding at full rate. Both studies compared starting at 10 ml/hr for the first 5-6 days to full feeds within 1-2 days (Rice 2011, Rice 2012). In the Rice 2012 study, the first 272 patients also received 240 mls/day of an omega-3 fatty acid supplement or control supplement (Rice 2011), refer to section 4.1 b Enteral Fish Oils for data pertaining to the omega-3 fatty acid vs control groups. Needham et al (2013 Crit Care Med, 2013 Am J Resp Care) further analysed the EDEN trial results (Rice 2011) with respect to patients' long term physical and cognitive performance.

Mortality: When the 2 studies by Rice were aggregated, trophic feeds had no effect on mortality (RR 1.06, 95% CI 0.86, 1.31, $p=0.57$; figure 1).

Infections, LOS & ventilator days: Both studies reported ventilator associated pneumonia (VAP) rates and when the data from these 2 studies were aggregated, trophic feeds had no effect on the incidence of VAP (RR 0.98, 95% CI 0.68, 1.43, $p=0.94$; figure 2). Both studies reported ICU free, hospital free and ventilator free days as medians and interquartile ranges instead of means and standard deviations, hence a meta-analysis was not possible. There were no significant differences in any of these outcomes between the 2 groups in Rice 2011 and Rice 2012 studies.

Other: Due to the study design, both studies reported a significant difference in calories between the trophic feeds and full feeds group. Trophic feeds were also associated with better gastrointestinal tolerance i.e. significantly lower % feedings days with diarrhea and high gastric residual volumes. Trophic vs full feeds may have no effect on long-term physical or cognitive function or survival. Results from the Needham et al analyses show EDEN trial survivors had substantial physical, psychological, and cognitive impairments, reduced quality of life, and impaired return to work. Trophic vs full feeds had no effect on physical or cognitive function at 6 and 12 months and no effect on 12-month survival yet Mental Health and mental health summary scores were higher in trophic feeding than full feeding ($p=0.02$ and 0.01 , respectively). There was a worse 6 minute walk test ($p=0.136$) and 4 meter timed walk speed ($p=0.125$) in the trophic group.

Conclusions:

1. The use of trophic vs full feeds has no effect on mortality in critically ill patients
2. The use of trophic vs full feeds has no effect on VAP in critically ill patients
3. The use of trophic vs full feeds may be associated with underfeeding but better gastrointestinal tolerance in critically ill patients.

4. The use of trophic vs full feeds has no effect on long-term physical or cognitive function or survival but may be associated with poorer functional outcome at 12 months.

Level 1 study: if all of the following are fulfilled: concealed randomization, blinded outcome adjudication and an intention to treat analysis.

Level 2 study: If any one of the above characteristics are unfulfilled.

Table 1. Randomized studies evaluating trophic vs full feeding in critically ill patients

Study	Population	Methods (score)	Intervention	Mortality # (%)†		Infections # (%)‡	
				Trophic Feeds	Full Feeds	Trophic Feeds	Full Feeds
1) Rice 2011	Mechanically ventilated with acute respiratory failure N=200	C.Random: Yes ITT: Yes Blinding: No (10)	Underfed: 10ml/hr for first 5 days vs. full feed: increased by 25 mls q6h, received 74.8% target. Non isocaloric, non-isonitrogenous	Hospital 22/98 (22)	Hospital 20/102 (17)	30/98 (31) VAP 14/98 (14)	33/102 (32) VAP 18/102 (18)
2) Rice 2012**:	Acute Lung Injury patients from 44 ICUs N=1000	C.Random: Yes ITT: Yes Blinding: No (12)	Underfed 10ml/hr ~400kcal/day x 6 days vs. Full feed: ~1300kcal/day, 90% reached goal in 1.3 days; 25ml/hr advanced q6h Non isocaloric, non isonitrogenous	60 Day 118/508 (23)	60 Day 109/492 (27)	VAP 37/508 (7)	VAP 33/492 (7)

Table 1. Randomized studies evaluating trophic vs full feeding in critically ill patients (continued)

Study	LOS days		Ventilator days		Cost		Other	
	Trophic Feeds	Full Feeds	Trophic Feeds	Full Feeds	Trophic Feeds	Full Feeds	Trophic Feeds	Full Feeds
2) Rice 2011	ICU-free Days 21.0 (6.5-24) Hospital-free Days 12.0 (0-21)	ICU-free Days 21.0 (9.3-24) Hospital-free Days 16.5 (0-21)	Vent-free Days 23 (10.5-26)	Vent-free Days 23 (9.3-26)	NR	NR	Kcal/day 300 ± 149 1481 ± 686 p<0.001 Diarrhea (% feeding days) 19% 24% p 0.08 High Gastric Residuals (% feeding days) 2% 8% p<0.001	

3) Rice 2012	ICU-free Days 14.4 (13.5-15.3)	ICU-free Days 14.7 (13.8-15.6)	Vent-free Days 14.9 (13.9-15.8)	Vent-free Days 15.0 (14.9-15.8)	NR	NR	<p style="text-align: center;">Kcal/day</p> <p>400 (25) 1300 (82), p=0.001</p> <p style="text-align: center;">Time to goal rate (days)</p> <p>6.7 ± 1.8 1.3 ± 1.2, p=0.001</p> <p style="text-align: center;">Diarrhea (% feeding days)</p> <p>16.5% 18.7%, p=0.16</p> <p style="text-align: center;">High Gastric Residuals (% feeding days)</p> <p>2.2% 4.9%, p<0.001</p> <p style="text-align: center;">Vomiting (% feeding days)</p> <p>1.7% 2.2%, p=0.05</p> <p style="text-align: center;">Quality of Life, Physical function – SF-36</p> <p>55 (33) 55(31), p=0.54</p> <p style="text-align: center;">Quality of Life, mental health – SF-36</p> <p>67 (25) 63 (26), p=0.02</p> <p style="text-align: center;">Quality of Life, mental health summary-SF-36</p> <p>46 (15) 43 (15), p=0.01</p> <p style="text-align: center;">Functional Activities – functional performance inventory</p> <p>2.0 (0.7) 2.1 (0.7), p=0.28</p> <p style="text-align: center;">Fatigue – FACIT</p> <p>63(19) 61 (17), p=0.16</p> <p style="text-align: center;">Mini Mental Score</p> <p>25 (2) 26 (2), p=0.45</p> <p style="text-align: center;">6 min walk test @ 12 months</p> <p>63 (25) 70 (24), p=0.136</p> <p style="text-align: center;">4 min timed walk speed</p> <p>0.98 (0.29) 1.08 (0.29), p=0.125</p> <p style="text-align: center;">Hand grip strength</p> <p>82 (27) 85 (26), p=0.462</p> <p style="text-align: center;">Max inspiratory pressure</p> <p>97 (33) 99(31), p=0.421</p> <p style="text-align: center;">Cognitive Impairment, no. (%)</p> <p>22 (29) 15 (20), p=0.311</p>
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C.Random: concealed randomization

† presumed hospital mortality unless otherwise specified

± () : mean ± Standard deviation (number)

VAP: ventilator associated pneumonia

* Data shown here for underfed group and full fed groups include patients randomized to the intensive insulin and conventional insulin therapy within these 2 groups. Refer to the intensive insulin therapy section for data on intensive insulin vs conventional groups.

** Includes 272 patients that also randomized to an experimental arm of omega 3fatty acids arm.

ITT: intent to treat; NA: not available

‡ refers to the # of patients with infections unless specified

ICU: intensive care unit

Figure 1. Mortality

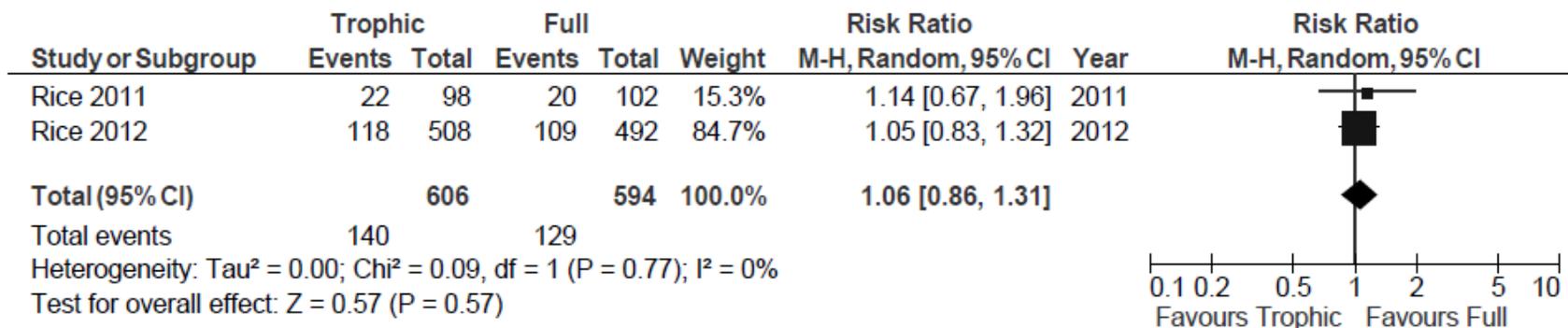


Figure 2. Ventilator Associated Pneumonia



Table 2. Excluded Articles

#	Reason excluded	Citation
1	Secondary analysis of Rice et al	Bastarache JA, Ware LB, Girard TD, Wheeler AP, Rice TW. Markers of inflammation and coagulation may be modulated by enteral feeding strategy. JPEN J Parenter Enteral Nutr. 2012 Nov;36(6):732-40.