2.0 Early vs. Delayed Nutrient Intake

Question: Does early enteral nutrition compared to delayed nutrient intake result in better outcomes in the critically ill adult patient?

Summary of evidence: There were 17 randomized controlled trials (level 2 studies) comparing early enteral nutrition vs. delayed nutrient intake (i.e. delayed enteral nutrition, parenteral nutrition or oral diet). In all the trials except one, enteral nutrition in the intervention group was started within 24-48 hours of admission/resuscitation. There were 10 studies comparing early vs. delayed EN and 7 studies where early EN was compared to no EN/IV fluids.

Mortality: When the data from the 17 studies that looked at the effect of early EN on mortality were aggregated, when compared to delayed nutrient intake, early enteral nutrition was associated with a trend towards a reduction in mortality (RR 0.73, 95% CI 0.51, 1.04, p=0.08, heterogeneity I^2=0%; figure 1). In a subgroup analysis, early EN vs. no EN/IV fluids was associated with a trend towards a reduction in mortality (RR 0.62, 95% CI 0.37, 1.05, p =0.08, heterogeneity I^2=0%; figure 1), whereas early vs. delayed EN had no effect on mortality (RR 0.84, 95% CI 0.51, 1.37, p=0.47, heterogeneity I^2=0%; figure 1). The difference between the two subgroups was not significant (p=0.41; figure 1).

Infections: Eleven studies reported on infections and of these only 9 studies reported on the number of patients with infections and when these were aggregated, early enteral nutrition when compared to delayed nutrient intake was associated with a significant reduction in infectious complications (RR 0.81, 95% CI 0.68, 0.97, p=0.02, heterogeneity I^2=14%; figure 2). In a subgroup analysis, early EN vs. no EN/IV fluids was associated with a trend towards a reduction in infections (RR 0.70, 95% CI 0.48, 1.02, p= 0.06, heterogeneity I^2=26%; figure 2), whereas early vs. delayed EN had no effect on infections (RR 0.86, 95% CI 0.69, 1.08, p=0.20, heterogeneity I^2=12%; figure 2). The difference between the two subgroups was not significant (p=0.36; figure 2).

LOS and Ventilator days: Sixteen studies looked at LOS (6 reported on ICU LOS only, 4 reported on hospital LOS only and 6 reported on both ICU and hospital LOS). When the results were meta-analyzed, early enteral nutrition had no effect on ICU stay (WMD -0.78, 95% CI -3.56, 2.00, p=0.58, heterogeneity I^2=46%; figure 3) or hospital length of stay (WMD -1.34, 95% CI -7.69, 5.02 p = 0.68, heterogeneity I^2=51%; figure 4). A total of 8 studies reported on ventilator days and all showed no significant differences between the early vs. delayed fed groups (WMD 0.03, 95% CI -3.01, 3.06 p=0.99, heterogeneity I^2=42.6%; figure 5).

Other: All fifteen studies that reported nutritional endpoints showed a significant improvement in the groups receiving early enteral nutrition (calorie intake, protein intake, % goal achieved, faster nitrogen balance achieved). There were no differences in other complications between the groups.

Conclusions:

1) Early enteral nutrition compared to delayed nutrient intake may be associated with a trend towards a reduction in mortality in critically ill patients.
2) Early enteral nutrition compared to delayed nutrient intake is associated with a in infectious complications.

3) Early enteral nutrition compared to delayed nutrient intake has no effect on ICU or hospital length of stay.
4) Early enteral nutrition compared to delayed nutrient intake is associated with improved nutritional intake.

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 early EN vs. delayed nutrient intake in critically ill patients

Study	Population	Methods (score)	Intervention	Mortality # (%)† Early EN	Mortality # (%)† Delayed	Infections # (%)‡ Early EN	Infections # (%)‡ Delayed
1) Moore 1986	Trauma with abdominal trauma index > 15 N=43	C.Random: not sure ITT: no Blinding: no (6)	Vivonex post op (< 24 hrs) via jejunostomy vs. D5W then progressed to parenteral nutrition if not on regular diet (both groups got PN)	1/32 (3)	2/31 (6)	3/32 (9)	9/31 (29)
2) Chiarelli 1990	Burns N=20	C.Random: not sure ITT: yes Blinding: no (6)	Immediate EN (4.4 ± 0.49 hrs) vs > 48 hrs (57.7 ± 2.6 hrs) (gastric feeding)	0/10 (0)	0/10 (0)	3/10 (30) positive blood cultures	7/10 (70) positive blood cultures
3) Eyer 1993	Trauma, ICU N=52	C.Random: not sure ITT: no Blinding: no (8)	EN < 24 hrs (31 ± 13 hrs from ICU admission) vs > 72 hrs (82 ± 11 hrs from ICU admission) (small bowel feeding)	2/19 (11)	2/19 (11)	29/19 per group	14/19 per group
4) Chuntrasakul 1996	Trauma patients with injury severity score 20-40 N=38	C.Random: not sure ITT: yes Blinding: no (6)	Traumacal via gastric route (early i.e. immediately after resuscitation) + PN if needed vs IV fluids and oral diet when bowel function detected	1/21 (5)	3/17 (18)	NR	NR
5) Singh 1998	Non traumatic intestinal perforation and peritonitis BMI 21-22 N=37	C.Random: no ITT: yes Blinding: no (8)	Low residue blenderized diet via jejunostomy 12-24 hrs post laporotomy vs. IV fluids/lytes, oral diet started once bowel activity resumed	4/21 (19)	4/22 (18)	7/21 (33)	12/22 (55)
6) Kompan 1999	Multiple trauma in shock N=28	C.Random: yes ITT: no Blinding: no (9)	EN ~4.4 hrs after admission to ICU, 9.2 hrs after trauma vs ~ 36.5 hrs from ICU admission, 41.4 hrs after trauma. Gastric feeding, both groups got PN	ICU 0/14 (0) Hospital 0/14 (0)	ICU 0/14 (0) Hospital 1/14 (7)	NR	NR
7) Minard 2000	Closed head injuries N=27	C.Random: not sure ITT: no Blinding: no (7)	EN < 60 hrs (33 ± 15 hrs) (small bowel) vs late (84 ± 41 hrs) (gastric)	1/12 (8)	4/15(27)	6/12 (50)	7/15 (47)

8) Pupelis 2000	Severe pancreatitis patients undergoing emergency surgery N=29	C.Random: not sure ITT: yes Blinding: no (6)	EN < 24 hrs post-op via jejunum + IV fluids vs. IV fluids until reintroduction of normal diet	1/11 (9)	5/18 (28)	NR	NR
9) Pupelis 2001	Post laporotomy for severe pancreatitis and peritonitis N=60	C.Random: not sure ITT: yes Blinding: no (6)	EN < 12 hrs post-op via jejunum + IV fluids vs. IV fluids until reintroduction of normal diet	1/30 (3)	7/30 (23)	Unresolved Peritonitis 1/30 (3) 8/30 (27) Wound Septic Complications 10/30 (33) 8/30 (27)	
10) Kompan 2004	Multiple trauma patients, ICU N=52	C.Random: not sure ITT: yes Blinding: no (6)	EN ~10.6 hrs after injury vs ~ 36.5 hrs from ICU admission. Gastric feeding, both groups got PN	0/27 (0)	1/25 (4)	9/27 (33)	16/25 (64)
11) Malhotra 2004	Post-op for peritonitis N=200	C.Random: not sure ITT: yes Blinding: no (6)	EN post-op < 48 hrs via nasoogastric+ IV fluids (oral feeds if ready by day 8 post-op) vs. IV fluids for 7 days (oral feeds if ready on day 5 post-op)	12/100 (12)	16/100 (16)	54/100 (54)	67/100 (67)
12) Peck 2004	Burns N=27	C.Random: not sure ITT: no Blinding: no (6)	Crucial < 24 hrs from burn injury vs. 7 days. Both groups received oral diet as tolerated (4-9% calories) (gastric feeding)	4/14 (28)	5/13 (38)	12/14 (86)	11/13 (85)
13) Dvorak 2004	Acute spinal cord injury patients BMI=26-29 N=17	C.Random: yes ITT: yes Blinding: no (10)	Continuous enteral feeding via nasogastric route within 72 hours of injury vs. after 120 hrs of injury. Both groups followed feeding protocol (head of bed, starting rate 25 ml/hr, gastric residual volumes checked, etc).	0/7 (0)	0/10 (0)	2.4 ± 1.5 per group	1.7 ± 1.1 per group
14) Nguyen 2008	Mixed ICU BMI=27-28 N=28	C.Random: no ITT: yes Blinding: no (9)	EN < 24 hrs of ICU admission vs. after day 4. No motility agents given	ICU 4/14 (29) Hospital 6/14 (43)	ICU 4/14 (29) Hospital 6/14 (43)	Pneumonia 3/14 (21)	Pneumonia 6/14 (43)
15) Moses 2009	Organophosphate poisoned, mechanically ventilated ICU patients N=59	C.Random: No ITT: No Blinding: No (5)	Hypocaloric EN within 48hr of intubation + IV glucose (Day 1 20 ml/hr (0.5 kcal/ml), day 2 20 ml/hr (1 kcal/ml) day 3 40 ml/hr (1 kcal/ml) feeds), max 1000 kcals/day vs.EN post tracheostomy placement + IV glucose	3/29 (10)	3/30 (10)	14/29 (48)	15/30 (50)

16) Chourdakis 2012	Traumatic brain injury requiring mechanical ventilation in ICU N=59	C.Random: No ITT: Yes Blinding: No (6)	Early enteral feed within 24-48 hrs post ICU admission (hrs in ICU prior to first feeding: 31.2 ± 11.2 hrs) vs.delayed enteral feed within 48-120hrs post ICU admission (hrs in ICU prior to first feeding: 76.5 ± 22.6 hrs)	3/34 (9)	2/25 (8)	VAP 13/34 (38)	VAP 12/25 (43)
17) Ostadrahimi 2016	Burn pts with TBSA 20-90% N=41	C.Random: No ITT: No Blinding: No (6)	Early enteral feeding within the first hour of admission, reaching goal EN by day 3 vs hospital routine diet ad libitum (liquid food for 2 days after injury followed by chow diet)	2-days (excluded from analysis in publication) 3/21	2-days (excluded from analysis in publication) 3/20	NR	NR

Table 1. Randomized studies evaluating early EN vs. delayed nutrient intake in critically ill patients (continued)

Study	LOS days		Ventilator days		Cost		Other	
	Early EN	Delayed	Early EN	Delayed	Early EN	Delayed	Early EN	Delayed
1) Moore 1986	NR	NR	NR	NR	$16,280 ± 2146	$19,636 ± 3396	Complications 14/32 (44)	15/31 (48) Feed Intolerance 12/32 (38) NR
2) Chiarelli 1990	Hospital 69.2 ± 10.4 (10)	Hospital 89 ± 18.9 (10)	NR	NR	NR	NR	Days to positive Nitrogen Balance 8.8 ± 4.1	24.1 ± 6.9 p<0.05 Intestinal Complications 2/10 (20) 2/10 (20)
3) Eyer 1993	ICU 11.8 ± 7.9 (19)	ICU 9.9 ± 6.7 (19)	10.2 ± 8.1 (19)	8.1 ± 6.8 (19)	NR	NR	Calorie Intake (kcal/kg/day) 30 ± 6	19 ± 5 p<0.001 Protein Intake (gm/kg/day) 1.3 ± 0.3 0.9 ± 0.2 p<0.001 Organ System Failure 2/19 (10.5) 2/19 (10.5)
4) Chuntrasakul 1996	ICU 8.1 ± 6.3 (21)	ICU 8.35 ± 4.8 (17)	5.29 ± 6.3 (21)	6.12 ± 5.3 (17)	NR	NR	Calories Received in Week 1 1885.2 ± 38.3	633.4 ± 83.7 Calories Received in Week 2 1850.3 ± 248.4 717.31 ± 142

5) Singh 1998	Hospital 14 ± 6.9 (19)	Hospital 13 ± 7.0 (18)	NR	NR	NR	NR	Complications 11/21 (52) 13/22 (59) Calorie Intake by Day 7 2610 ± 337 516 ± 156 Nitrogen Balance by Day 7 5.1 ± 0.7 10.8 ± 3.1
6) Kompan 1999	ICU 11 (10.5-24.7)	ICU 14 (10.5-24.7)	13 (6.7-18)	11.9 (6-7.7)	NR	NR	EN Received on Day 4 (mls) 1340 ± 473 703 ± 701 p=0.009
7) Minard 2000	ICU 18.5 ± 8.8 (12) Hospital 30 ± 14.7 (12)	ICU 11.3 ± 6.1 (15) Hospital 21.3 ± 13.7 (15)	15.1 ± 7.5 (12)	10.4 ± 6.1 (15)	NR	NR	Calorie Intake 1509 ± 45 1174 ± 425 p< 0.02 Feed Infusion Complications 22/12 28/15
8) Pupelis 2000	ICU 7 ± 41 (11) Hospital 45 ± 96 (11)	ICU 6 ± 34 (18) Hospital 29 ± 103 (18)	NR	NR	NR	NR	NR
9) Pupelis 2001	ICU 13.9 ± 14.6 (30) Hospital 35.3 ± 22.9 (30)	ICU 16 ± 20.5 (30) Hospital 35.8 ± 32.5 (30)	NR	NR	NR	NR	Total kcals After Surgery 1295 ± 327 473 ± 156
10) Kompan 2004	ICU 15.9 ± 9.7 (27)	ICU 20.6 ± 18.5 (25)	12.9 ± 8.1 (27)	15.6 ± 16.1 (25)	NR	NR	EN Received on Day 4 (mls) 1175 ± 485 803 ± 545 p=0.012
11) Malhotra 2004	ICU 1.59 (mean) Hospital 10.59 (mean)	ICU 2.10 (mean) Hospital 10.70 (mean)	NR	NR	NR	NR	Patients Receiving > 1500 cals Post-op Day 4 65% 0% p<0.001 Patients Receiving > 2500 cals Post-op Day 8 84% 0% p<0.001

12) Peck 2004	ICU 40 ± 32 (14) Hospital 60 ± 44 (14)	ICU 37 ± 33 (13) Hospital 60 ± 38 (13)	32 ± 27 (14)	23 ± 26 (13)	NR	NR	Mean Calorie Intake 2234 2207 Mean Calorie Intake Change/Week 156 166
13) Dvorak 2004	Hospital 53 ± 34.4	Hospital 37.9 ± 14.6	31.8 ± 35	20.9 ± 14.4	NR	NR	Number of Feeding Complications 39 59 Hours to Reach Energy Goals 113 166 Energy Intake 1938 ± 1100 1588 ± 983 Protein Intake 86.8 ± 59 67.6 ± 54
14) Nguyen 2008	ICU 11.3 ± 3.0	ICU 15.9 ± 7.1	9.2 ± 3.4 (14)	13.7 ± 7.1 (14)	NR	NR	Mean Calorie Intake from Day 0-4 2894 ± 198 0
15) Moses 2009	ICU 10.6 (6-13) Hospital 15 (9.5-20)	ICU 8 (5-17.5) Hospital 12 (7.5-15)	12 (5.5-14)	10 (4-12)	NR	NR	Total Calories 604 (500-713) 447 (424-484) p<0.0001
16) Chourdakis 2012	ICU 24.8 ± 7.6 (34)	ICU 28.5 ± 8.9 (25)	NR	NR	NR	NR	Hyperglycemia 5/34 (15) 4/25 (16) Feed Intolerance 3/34 (9) 3/25 (12) Diarrhea 4/34 (12) 3/25 (12) Constipation 1/34 (3) 1/25 (4) Day 10 of Intake (kcal/day) 1432.0 ± 156.3 813.0 ± 235.1
17) Ostadrahimi 2016	Hospital 17.64±8.2 (15)	Hospital 23.07±11.89 (15)	NR	NR	NR	NR	NR

C.Random: Concealed randomization
ITT: Intent to treat
NR: Not reported
‡ Refers to the # of patients with infections unless specified
† Presumed hospital mortality unless otherwise specified
± ( ) : Mean ± SD =Standard deviation (number); (-) : mean (range) * SEM converted to SD

Figure 1. Studies comparing early EN vs delayed nutrient intake: Mortality

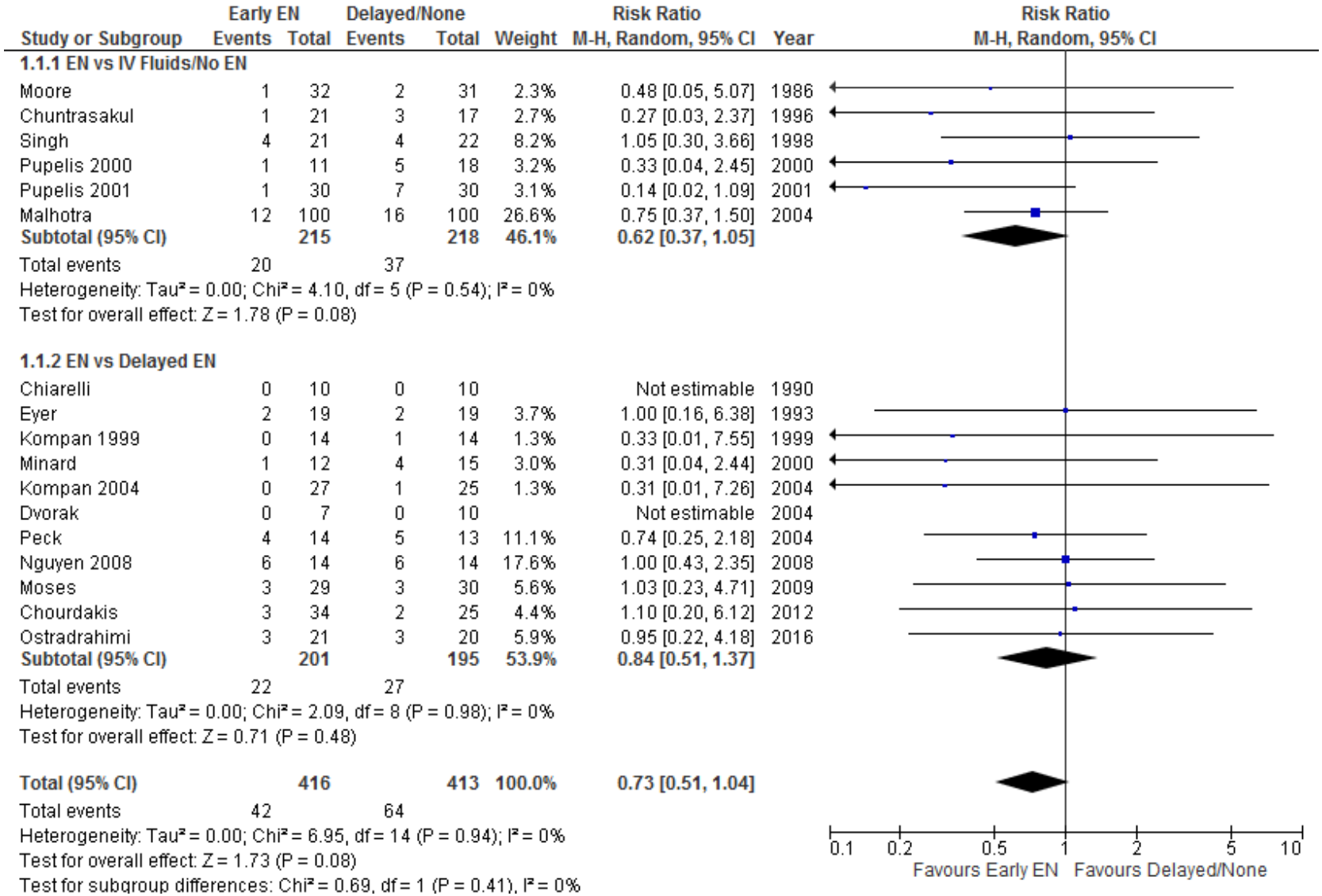

Figure 2. Studies comparing early EN vs delayed nutrient intake: Infectious complications

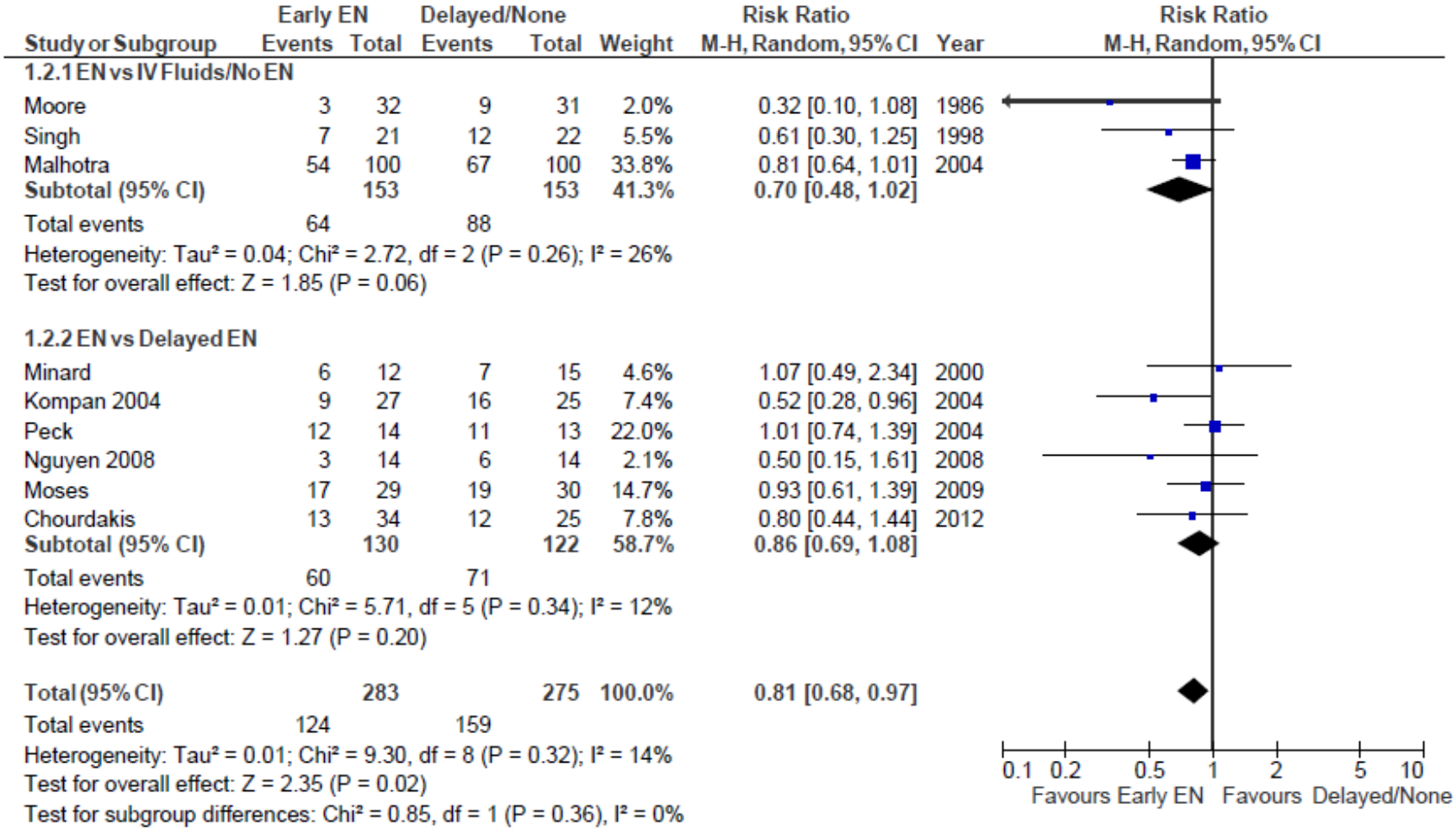

Figure 3. Studies comparing early EN vs delayed nutrient intake: ICU LOS

Study or Subgroup	Early EN Mean	SD	Total	Delayed/None Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI	Year
Eyer	11.8	7.9	19	9.9	6.7	19	15.8%	1.90 [-2.76, 6.56]	1993
Chuntrasakul	8.1	6.3	21	8.35	4.8	17	19.5%	-0.25 [-3.78, 3.28]	1996
Pupelis 2000	7	41	11	6	34	18	0.9%	1.00 [-27.87, 29.87]	2000
Minard	18.5	8.8	12	11.3	6.1	15	12.6%	7.20 [1.34, 13.06]	2000
Pupelis 2001	13.9	14.6	30	16	20.5	30	7.1%	-2.10 [-11.11, 6.91]	2001
Kompan 2004	15.9	9.7	27	20.6	18.5	25	8.3%	-4.70 [-12.82, 3.42]	2004
Peck	40	32	14	37	33	13	1.2%	3.00 [-21.55, 27.55]	2004
Nguyen 2008	11.3	3	14	15.9	7.1	14	17.8%	-4.60 [-8.64, -0.56]	2008
Chourdakis	24.8	7.6	34	28.5	8.9	25	16.8%	-3.70 [-8.02, 0.62]	2012
Total (95% CI)			**182**			**176**	**100.0%**	**-0.78 [-3.56, 2.00]**	

Heterogeneity: Tau² = 7.11; Chi² = 14.71, df = 8 (P = 0.06); I² = 46%
Test for overall effect: Z = 0.55 (P = 0.58)

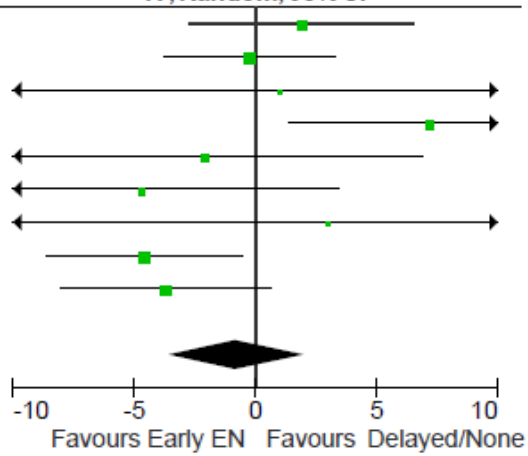

Figure 4. Studies comparing early EN vs delayed nutrient intake: Hospital LOS

Study or Subgroup	Early EN Mean	SD	Total	Delayed/None Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI	Year
Chiarelli	69.2	10.4	10	89	18.9	10	13.1%	-19.80 [-33.17, -6.43]	1990
Singh	14	6.9	19	13	7	18	27.1%	1.00 [-3.48, 5.48]	1998
Minard	30	14.7	12	21.3	13.7	15	16.4%	8.70 [-2.13, 19.53]	2000
Pupelis 2000	45	96	11	29	103	18	0.7%	16.00 [-58.04, 90.04]	2000
Pupelis 2001	35.3	22.9	30	35.8	32.5	30	12.2%	-0.50 [-14.73, 13.73]	2001
Peck	60	44	14	60	38	13	3.7%	0.00 [-30.95, 30.95]	2004
Dvorak	53	34.4	7	37.9	14.6	10	4.7%	15.10 [-11.94, 42.14]	2004
Ostradrahimi	17.64	8.2	15	23.07	11.89	15	22.1%	-5.43 [-12.74, 1.88]	2016
Total (95% CI)			**118**			**129**	**100.0%**	**-1.34 [-7.69, 5.02]**	

Heterogeneity: Tau² = 33.62; Chi² = 14.40, df = 7 (P = 0.04); I² = 51%
Test for overall effect: Z = 0.41 (P = 0.68)

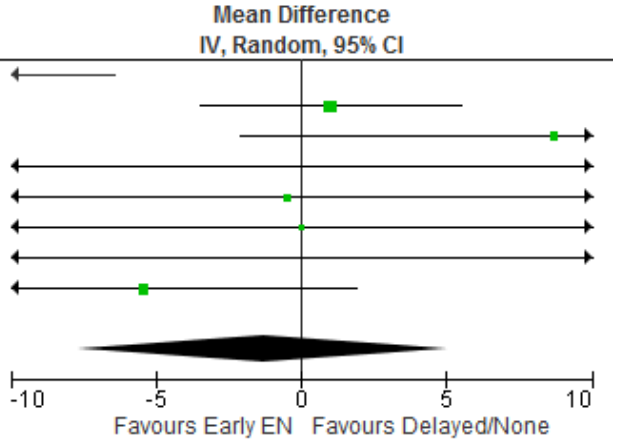

Figure 5. Studies comparing early EN vs delayed nutrient intake: Ventilator days

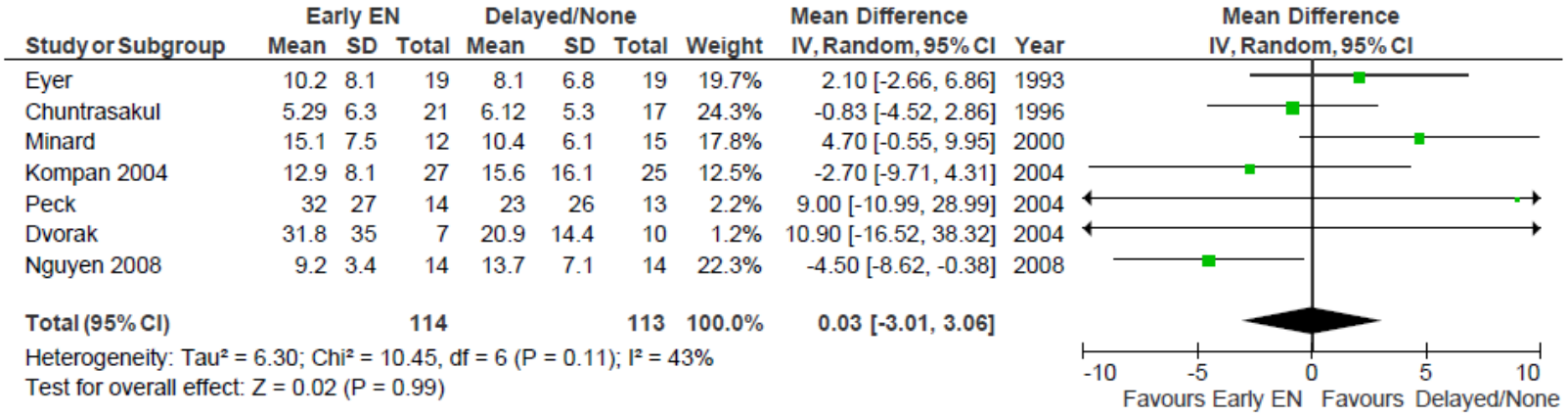

Table 2. Excluded Articles

#	Reason excluded	Citation
1	Elective surgery pts	Ryan JA Jr, Page CP, Babcock L. Early postoperative jejunal feeding of elemental diet in gastrointestinal surgery. Am Surg. 1981 Sep;47(9):393-403.
2	Not ICU pts	Seri S, Aquilio E. Effects of early nutritional support in patients with abdominal trauma. Ital J Surg Sci. 1984;14(3):223-7.
3	Pseudo-randomized	Grahm TW, Zadrozny DB, Harrington T. The benefits of early jejunal hyperalimentation in the head-injured patient. Neurosurgery 1989 Nov;25(5):729-35.
4	No clinical outcomes	Jones TN, Moore FA, Moore EE, McCroskey BL. Gastrointestinal symptoms attributed to jejunostomy feeding after major abdominal trauma – a critical analysis. Crit Care Med 1989 Nov;17(11):1146-50.
5	Elective surgery pts	Moore FA, Moore EE, Jones TN, McCroskey BL, Peterson VM. TEN versus TPN following major abdominal trauma--reduced septic morbidity. J Trauma. 1989 Jul;29(7):916-22; discussion 922-3.
6	Elective surgery pts	Schroeder D, Gillanders L, Mahr K, Hill GL. Effects of immediate postoperative enteral nutrition on body composition, muscle function, and wound healing. JPEN J Parenter Enteral Nutr. 1991 Jul-Aug;15(4):376-83.
7	Elective surgery pts	The Veterans Affairs Total Parenteral Nutrition Cooperative Study Group. Perioperative total parenteral nutrition in surgical patients. N Engl J Med. 1991 Aug 22;325(8):525-32.
8	Elective surgery pts	Binderow SR, Cohen SM, Wexner SD, Nogueras JJ. Must early postoperative oral intake be limited to laparoscopy? Dis Colon Rectum. 1994 Jun;37(6):584-9.
9	Paediatric population	Jenkins ME, Gottschlich MM, Warden GD. Enteral feeding during operative procedures in thermal injuries. J Burn Care Rehabil 1994 Mar-Apr;15(2):199-205.
10	Elective surgery pts	Braga M, Vignali A, Gianotti L, Cestari A, Profili M, Di Carlo V. Benefits of early postoperative enteral feeding in cancer patients. Infusionsther Transfusionsmed 1995 Oct;22(5):280-4.

11	Elective surgery pts	Brown DN, Miedema BW, King PD, Marshall JB. Safety of early feeding after percutaneous endoscopic gastrostomy. J Clin Gastroenterol. 1995 Dec;21(4):330-1.
12	Elective surgery pts	Hasse JM, Blue LS, Liepa GU, Goldstein RM, Jennings LW, Mor E, Husberg BS, Levy MF, Gonwa TA, Klintmalm GB. Early enteral nutrition support in patients undergoing liver transplantation. JPEN J Parenter Enteral Nutr. 1995 Nov-Dec;19(6):437-43.
13	Elective surgery pts	Reissman P, Teoh TA, Cohen SM, Weiss EG, Nogueras JJ, Wexner SD. Is early oral feeding safe after elective colorectal surgery? A prospective randomized trial. Ann Surg. 1995 Jul;222(1):73-7.
14	Elective surgery pts	Seenu V, Goel AK. Early oral feeding after elective colorectal surgery: is it safe. Trop Gastroenterol. 1995 Oct-Dec;16(4):72-3.
15	Not ICU pts	Beier-Holgersen R, Boesby S. Influence of postoperative enteral nutrition on postsurgical infections. Gut 1996;39(6):833-5.
16	Elective surgery pts	Carr CS, Ling KD, Boulos P, Singer M. Randomised trial of safety and efficacy of immediate postoperative enteral feeding in patients undergoing gastrointestinal resection. BMJ. 1996 Apr 6;312(7035):869-71.
17	Elective surgery pts	Choudhry U, Barde CJ, Markert R, Gopalswamy N. Percutaneous endoscopicgastrostomy: a randomized prospective comparison of early and delayed feeding. Gastrointest Endosc. 1996 Aug;44(2):164-7. PubMed PMID: 8858322.
18	Elective surgery pts	Ortiz H, Armendariz P, Yarnoz C. Is early postoperative feeding feasible in elective colon and rectal surgery? Int J Colorectal Dis. 1996;11(3):119-21.
19	Elective surgery pts	Hartsell PA, Frazee RC, Harrison JB, Smith RW. Early postoperative feeding after elective colorectal surgery. Arch Surg. 1997 May;132(5):518-20; discussion 520-1.
20	Cancer pts	Heslin MJ, Latkany L, Leung D, Brooks AD, Hochwald SN, Pisters PW, Shike M, Brennan MF. A prospective, randomized trial of early enteral feeding after resection of upper gastrointestinal malignancy. Ann Surg. 1997 Oct;226(4):567-77.
21	Elective surgery pts	Schilder JM, Hurteau JA, Look KY, Moore DH, Raff G, Stehman FB, Sutton GP. A prospective controlled trial of early postoperative oral intake following major abdominal gynecologic surgery. Gynecol Oncol. 1997 Dec;67(3):235-40.
22	Unclear if ICU pts, no clinical outcomes	Wang S, Wang S, Li A. [A clinical study of early enteral feeding to protect the gut function in burned patients] [Article in Chinese]. Zhonghua Zheng Xing Shao Shang Wai Ke Za Zhi. 1997 Jul;13(4):267-71.
23	Elective surgery pts	Watters JM, Kirkpatrick SM, Norris SB, Shamji FM, Wells GA. Immediate postoperative enteral feeding results in impaired respiratory mechanics and decreased mobility. Ann Surg. 1997 Sep;226(3):369-77
24	Not ICU pts	McCarter TL, Condon SC, Aguilar RC, Gibson DJ, Chen YK. Randomized prospective trial of early versus delayed feeding after percutaneous endoscopic gastrostomy placement. Am J Gastroenterol. 1998 Mar;93(3):419-21.
25	Not ICU pts	Schulte-Bockholt A et al. Immediate versus next day PEG feeding: a randomized prospective study in ICU/intermediate care patients. Gastroenterology. Abstracts 1998: Growth Development & Nutrition. A907. Abstract number G3719
26	Elective surgery pts	Schwenk W, Böhm B, Haase O, Junghans T, Müller JM. Langenbecks. Laparoscopic versus conventional colorectal resection: a prospective randomised study of postoperative ileus and early postoperative feeding. Arch Surg. 1998 Mar;383(1):49-55.
27	Elective surgery pts	Stewart BT, Woods RJ, Collopy BT, Fink RJ, Mackay JR, Keck JO. Early feeding after elective open colorectal resections: a prospective randomized trial. Aust N Z J Surg. 1998 Feb;68(2):125-8.
28	Elective surgery pts	Beier-Holgersen R, Brandstrup B. Influence of early postoperative enteral nutrition versus placebo on cell-mediated immunity, as measured with the Multitest CMI. Scand J Gastroenterol. 1999 Jan;34(1):98-102. PubMed PMID: 10048740.
29	Not a RCT	Zaloga GP. Early enteral nutritional support improves outcome: hypothesis or fact? Crit Care Med 1999 Feb;27(2):259-61.
30	Elective surgery pts	Beattie AH, Prach AT, Baxter JP, Pennington CR. A randomised controlled trial evaluating the use of enteral nutritional supplements postoperatively in malnourished surgical patients. Gut. 2000 Jun;46(6):813-8.
31	EN vs. no nutrition	Powell JJ, Murchison JT, Fearon KC, Ross JA, Siriwardena AK. Randomized controlled trial of the effect of early enteral nutrition on markers of the inflammatory response in predicted severe acute pancreatitis. Br J Surg. 2000 Oct;87(10):1375-81.

32	Systematic review	Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding versus "nil by mouth" after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. BMJ. 2001 Oct 6;323(7316):773-6.
33	Meta-analysis	Marik PE, Zaloga GP. Early enteral nutrition in acutely ill patients: a systematic review. Crit Care Med 2001 Dec;29(12):2264-70.
34	No clinical outcomes	Peng YZ, Yuan ZQ, Xiao GX.Burns. Effects of early enteral feeding on the prevention of enterogenic infection in severely burned patients. 2001 Mar;27(2):145-9.
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