

## 8.0 Parenteral Nutrition vs. Standard care

*There were no new randomized controlled trials since the 2015 but changes to included articles and outcomes have been made to this summary of evidence.*

**Question:** Compared to standard care (IV fluids, oral diet, etc. but not EN), does parenteral nutrition (PN) result in improved clinical outcomes in critically ill patients with an intact GI tract?

**Summary of Evidence:** There are three level 2 studies included in this topic. Two studies compared PN with lipids vs IVF (Sax 1987, Xian-Li 2005) and 1 study compared early PN with lipids vs standard care in which the physician chose the nutrition plan (Doig 2013). Three articles (Abel 1976, Reilly 1990 and Sandstrom 1993) were previously included in this topic for our CPGs, but have been excluded from this review since they were in elective surgery patients.

**Mortality:** When the 3 studies were aggregated, compared to IVF/standard care, PN had no effect on mortality (RR 0.72, 0.37, 1.43,  $p=0.35$ ; figure 1).

**Infections:** Two studies (Sax 1987, Doig 2013) reported the number of patients with infectious complications and parenteral nutrition was not associated with an increase in infectious complications (RR 1.20, 95% CI 0.45, 3.21,  $p=0.72$ ,  $I^2=32\%$ ; figure 2).

**LOS:** Based on 2 studies (Sax 1987, Xian-Li 2005) that reported hospital length of stay, the use of parenteral nutrition had no effect (weighted mean difference, WMD -2.55, 95% CI -17.73, 12.64,  $p=0.74$ ; figure 3).

**Ventilator Days:** Doig et al reported fewer days of invasive ventilation in the patients receiving PN vs standard care: mean (95% CI) days per 10 patients x ICU days: 7.26 (7.09-7.44) vs 7.73 (7.55-7.92),  $p=0.01$ .

**Quality of Life and Physical Function:** Doig et al conducted 3 questionnaires at study day 60 to assess quality of life and physical function. The use of parenteral nutrition resulted in significantly higher quality of life scores (RAND-36 general health status,  $p=0.01$ ) but had no effect on physical function scores (ECOG performance status,  $p=0.70$ , and RAND-36 physical functions,  $p=0.33$ ). The day-60 quality of life score was also statistically higher in the PN Group, but this was not clinically meaningful ( $p=0.01$ ).

### Conclusions:

#### Compared to standard of care,

- 1) Parenteral nutrition has no effect on mortality in critically ill patients.
- 2) Parenteral nutrition has no effect on infectious complications in critically ill patients.

- 3) Parenteral nutrition has no effect on hospital stay.
- 4) Parenteral nutrition may be associated with decreased time on the ventilator.
- 5) Parenteral nutrition is associated with improved quality of life following critical illness but has no effect on physical function.

*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 parenteral nutrition vs. standard care in critically ill patients**

Study	Population	Methods (score)	Intervention	Mortality # (%)†		Infections # (%)‡	
				PN	Control	PN	Control
1) Sax 1987	Acute pancreatitis N=54	C.Random: not sure ITT: yes Blinding: no (8)	PN with lipids after admission vs IV fluids	1/29 (3)	1/26 (4)	Total 4/29 (14) Infected catheters per group 28/29	Total 1/26 (4) Infected catheters per group 13/26
2) Xian-Li 2005*	Severe acute pancreatitis N=69	C.Random: yes ITT: yes Blinding: no	PN with lipids vs IV fluids	3/21 (14)	10/23 (44)	Infectious complications** 21	Infectious complications** 11
3) Doig 2013	Multicenter mixed ICUs N=1372	C.Random: yes ITT: yes Blinding: no (12)	PN 3-in-1 bag (Kabiven G19%) goal to reach target on day 3 as per protocol vs Standard care (attending clinician selected the route, starting rate, metabolic targets, and composition of nutrition to be provided)	ICU 81/678 (11.89) Hospital 140/678 (20.6) Day 60 146/678 (21.5)	ICU 100/680 (14.66) Hospital 151/680 (22.1) Day 60 155/680 (22.8)	Any major infection 74/678 (10.9) P=0.80 Catheter 31/678 (4.55) p>0.99 Bloodstream 39/678 (5.73) P=0.47 Airway/lung 101/678 (14.83) P=0.12 Pneumonia 43/678 (6.31) P=0.91	Any major infection 78/680 (10.9) Catheter 32/680 (4.55) Bloodstream 33/680 (5.73) Airway/lung 123/680 (14.83) Pneumonia 45/680 (6.31)

**Table 1. Randomized studies evaluating parenteral nutrition vs. standard care in critically ill patients (continued)**

Study	LOS days		Ventilator days		Cost		Other	
	PN	Control	PN	Control	PN	Control	PN	Control
1) Sax 1987	Hospital 15 ± 4	Hospital 10 ± 3	NR	NR	NR	NR		
2) Xian-Li 2005*	Hospital 28.6 ± 6.9	Hospital 39.1 ± 10.6	NR	NR	NR	NR	ARDS 2/21	5/23
3) Doig 2013	ICU 8.6 (8.2-9)	ICU 9.3 (8.9-9.7)	7.26 (7.09 - 7.44)	7.73 (7.55 - 7.92)	NR	NR	Muscle wasting increase in SGA score 0.27	0.43 (p=0.01)

	Hospital 25.4 (24.4-26.6)	Hospital 24.7 (23.7-25.8)					Fat Loss increase in SGA score 0.31 0.44 (p=0.04) Renal failure, mean, days per 10 pt x ICU days 1.65 (1.51-1.81) 1.66 (1.51-1.82) P=0.98 Pulmonary failure, mean, days per 10 pt x ICU days 8.54 (8.37-8.71) 8.51 (8.34-8.69) P=0.88
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\* Only data comparing the groups receiving standard PN and IV fluids reported here.

\*\* Not included in meta-analysis as not reported as number of patients with infections.

C.Random: concealed randomization

‡ refers to the # of patients with infections unless specified

ITT: intent to treat

† hospital mortality unless otherwise specified

NR: not reported

± ( ) : mean ± Standard deviation (number)

PN: parenteral nutrition

ICU: intensive care unit

SGA: subjective global assessment

NS: not significant

**Table 2. Quality of Life (QOL) and Physical Function Outcomes**

Study	QOL		Physical Function	
	PN	Control	PN	Control
3) Doig 2013	RAND-36 general health status (n) at study day 60 49.8 ± 27.6 (525) 45.5 ± 26.8 (516) P=0.01 ECOG performance status (n) at study day 60 1.51 ± 1.1 (525) 1.53 ± 1.1 (516) P=0.70 RAND-36 physical functions (n) at study day 60 42.5 ± 30.8 (524) 40.7 ± 29.6 (513) P=0.33		NR	

Figure 1. Mortality

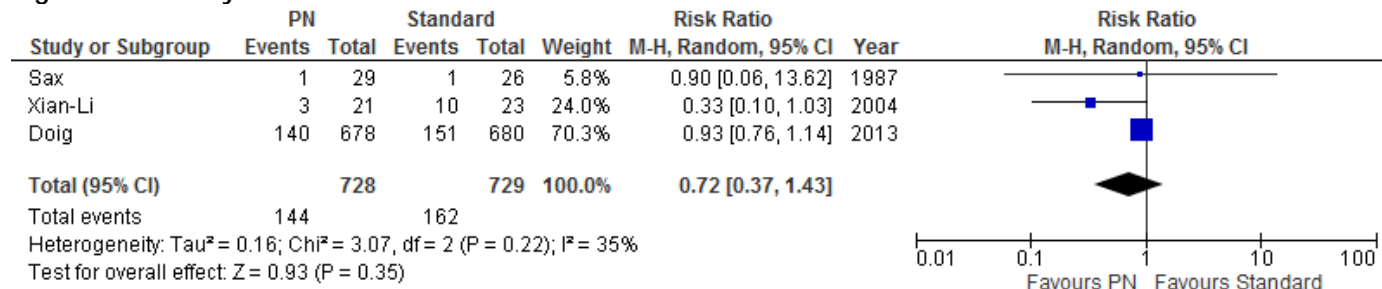


Figure 2. Infections

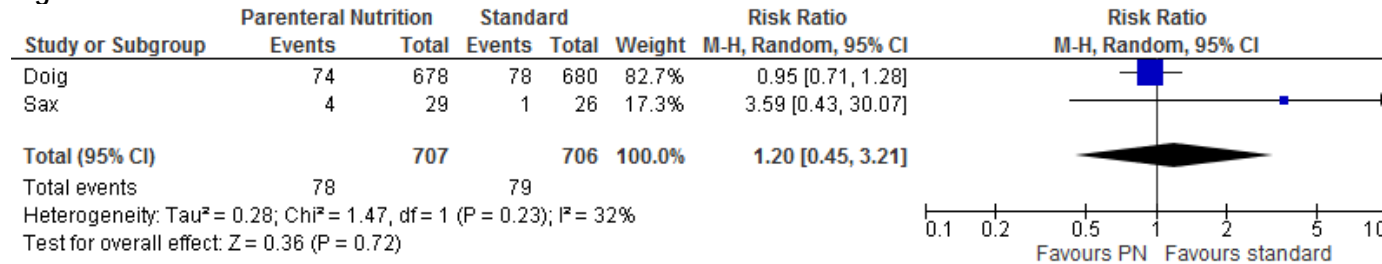


Figure 3. Hospital LOS

