

## 6.1 Enteral Nutrition (Other): Closed vs. open system

January 31<sup>st</sup>, 2009

### Recommendation:

*There are insufficient data to make a recommendation on the administration of EN via closed vs. open system in the critically ill.*

**Discussion:** The committee noted that despite favourable safety and feasibility considerations, there was a small effect size of aseptic techniques of enteral nutrition on diarrhea, based on the results of one small study (n = 36 patients). The merits of a closed system (aseptic) i.e. less bacterial contamination/enteritis/diarrhea when compared to an open (non-septic) were discussed.

Values	Definition	Score: 0, 1, 2, 3
Effect size	Magnitude of the absolute risk reduction attributable to the intervention listed--a higher score indicates a larger effect size	1 (diarrhea)
Confidence interval	95% confidence interval around the point estimate of the absolute risk reduction, or the pooled estimate (if more than one trial)--a higher score indicates a smaller confidence interval	1
Validity	Refers to internal validity of the study (or studies) as measured by the presence of concealed randomization, blinded outcome adjudication, an intention to treat analysis, and an explicit definition of outcomes--a higher score indicates presence of more of these features in the trials appraised	2
Homogeneity or Reproducibility	Similar direction of findings among trials--a higher score indicates greater similarity of direction of findings among trials	0
Adequacy of control group	Extent to which the control group presented standard of care (large dissimilarities=1, minor dissimilarities=2, usual care=3)	3
Biological Plausibility	Consistent with understanding of mechanistic and previous clinical work (large inconsistencies=1, minimal consistencies=2, very consistent=3)	1
Generalizability	Likelihood of trial findings being replicated in other settings (low likelihood i.e. single centre=1, moderate likelihood i.e. multicentre with limited patient population or practice setting=2, high likelihood i.e. multicentre, heterogenous patients, diverse practice settings=3)	1
Low cost	Estimated cost of implementing the intervention listed--a higher score indicates a lower cost to implement the intervention in an average ICU	2
Feasible	Ease of implementing the intervention listed--a higher score indicates greater ease of implementing the intervention in an average ICU	3
Safety	Estimated probability of avoiding any significant harm that may be associated with the intervention listed--a higher score indicates a lower probability of harm	3

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January 31<sup>st</sup> 2009

**Question:** Does the use of a closed system for enteral feeding result in better outcomes when compared to an open system in the critically ill adult patient?

**Summary of evidence:** There was one level 2 study that compared the incidence of bacterial contamination and diarrhea using a closed system i.e. aseptic techniques (ready to use bags, aseptic insertion of feeding tubes, tube changes every 24 hours) vs. an open system i.e. routine technique of enteral nutrition administration (open system).

**Mortality:** Not reported.

**Infections, LOS, ventilator days:** Not reported.

**Diarrhea:** The use of a closed system/aseptic technique of enteral nutrition administration vs. open system/routine resulted in less bacterial contamination and the incidence of diarrhea was lower in the group receiving aseptic vs routine enteral feeds ( $p = 0.06$ ).

### **Conclusion:**

Closed system/aseptic techniques of enteral nutrition compared to open/routine are associated with a trend towards a reduction in diarrhea in critically ill patients.

*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 a closed vs. open system in critically ill patients

Study	Population	Methods (score)	Intervention	Other	RR (CI)**										
1) Mickschl 1990	ICU N = 36	C.Random: not sure ITT: yes Blinding: no (7)	Aseptic EN vs routine EN	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Aseptic</td> <td style="text-align: center;">routine</td> </tr> <tr> <td colspan="2" style="text-align: center;"># contaminated feeds</td> </tr> <tr> <td style="text-align: center;">1/18 (6)</td> <td style="text-align: center;">7/18 (39)</td> </tr> <tr> <td colspan="2" style="text-align: center;">diarrhea</td> </tr> <tr> <td style="text-align: center;">5/18 (28)</td> <td style="text-align: center;">10/18 (57)</td> </tr> </table>	Aseptic	routine	# contaminated feeds		1/18 (6)	7/18 (39)	diarrhea		5/18 (28)	10/18 (57)	<p style="text-align: center;">NA</p> <p style="text-align: center;">0.50 (0.21-1.17)</p>
Aseptic	routine														
# contaminated feeds															
1/18 (6)	7/18 (39)														
diarrhea															
5/18 (28)	10/18 (57)														

C.Random: concealed randomization

ITT: intent to treat

NA: not available

Mortality, Infections, LOS days, Ventilator days and Cost: not reported

\*\* RR= relative risk, CI= Confidence intervals

TOPIC: 6.1 Closed vs. Open system

Article inclusion log

Criteria for study selection

Type of study: RCT or Meta-analysis
Population: critically ill, ventilated patients (no elective surgery patients)
Intervention: EN
Outcomes: mortality, LOS, QOL, functional recovery, complications, cost. Exclude studies with only biochemical, metabolic or nutritional outcomes.

	Author	Journal	I	E	Why rejected
1	Mickschl	Heart & Lung 1990	√		
2	Levinson	Anaesth Int Care 1993		√	No clinical outcomes
3	Wagner	JPEN 1994		√	No clinical outcomes
4	Herlick	Nutrition in Clinical Practice 2000		√	Not ICU patients
5	Mathus-Vliegen	JPEN 2006		√	No clinical outcomes

I = included, E = excluded

## Reference List

1. Mickschl DB, Davidson LJ, Flournoy DJ, Parker DE. Contamination of enteral feedings and diarrhea in patients in intensive care units. *Heart Lung*. 1990 Jul;19(4):362-70.
2. Levinson M, Bryce A. Enteral feeding, gastric colonisation and diarrhoea in the critically ill patient: is there a relationship? *Anaesth Intensive Care*. 1993 Feb;21(1):85-8.
3. Wagner DR, Elmore MF, Knoll DM. Evaluation of "closed" vs "open" systems for the delivery of peptide-based enteral diets. *JPEN J Parenter Enteral Nutr*. 1994 Sep-Oct;18(5):453-7.
4. Herlick SJ, Vogt C, Pangman V, Fallis W. Comparison of open versus closed systems of intermittent enteral feeding in two long-term care facilities. *Nutrition in Clinical Practice*. 2000 15:287-298
5. Mathus-Vliegen EM, Bredius MW, Binnekade JM. Analysis of sites of bacterial contamination in an enteral feeding system. *JPEN J Parenter Enteral Nutr*. 2006 Nov-Dec;30(6):519-25.