5.4 Strategies to optimize delivery and minimize risks of Enteral Nutrition: Body position January 31st, 2009

Recommendation:

Based on 1 level 1 and 1 level 2 study, we recommend that critically ill patients receiving enteral nutrition have the head of the bed elevated to 45 degrees. Where this is not possible, attempts to raise the head of the bed as much as possible should be considered.

Discussion: On the basis of 1 level 1 and 1 level 2 trials, we conclude that semi-recumbent positioning is associated with a decreased incidence of VAP. The lack of treatment effect seen in the Nieuwenhoven study may be due to the inability to achieve the intended elevation of 45 degrees. This study raises concern about the feasibility of achieving 45 degrees of semi-recumbency and the long term safety concerns of this position are not known (especially skin care). Semi-recumbent positioning may also require resource utilization for implementation and maintenance Reports from observational data show that head of the bed elevation degrees less than 30 degrees was a significant risk factor for aspiration ([1]), therefore attempts to raise the head of the bed, even if not to 45 degrees may be worthwhile.

[1] Metheny NA, Clouse RE, Chang YH, Stewart BJ, Oliver DA, Kollef MH. Crit Care Med. 2006 Apr;34(4):1007-15. Tracheobronchial aspiration of gastric contents in critically ill tube-fed patients: frequency, outcomes, and risk factors.

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	2
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	3
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 represented standard of care (large dissimilarities = 1, minor dissimilarities=2, usual care=3)	2
Biological plausibility	Consistent with understanding of mechanistic and previous clinical work (large inconsistencies =1, minimal inconsistencies =2, very consistent =3)	2
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, heterogeneous patients, diverse practice settings =3.	2
Cost	Estimated cost of implementing the intervention listed--a higher score indicates a lower cost to implement the intervention in an average ICU	3
Feasible	Ease of implementing the intervention listed--a higher score indicates greater ease of implementing the intervention in an average ICU	1
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	2

5.4 Strategies to optimize benefits and minimize risks of Enteral Nutrition: Body position January 31st, 2009

Question: Do alterations in body position result in better outcomes in the critically ill adult patient?

Summary of evidence: There was 1 level 1 study and 1 level 2 study that compared the frequency of pneumonia in critically ill patients assigned to semi-recumbent or supine position. In one study (Nieuwenhoven 2006) the target of the intervention (45 degrees head of the bed elevation) was never achieved hence a meta-analysis of the two studies was not done.

Mortality: There was no significant difference between the groups in either study.

Infections: There was a significant reduction in the incidence of pneumonia in patients in the semi recumbent vs. supine position (p = 0.018, RR =0.22, 95% CI 0.05,0.9) in one study (Drakulovic 1999) but no effect on pneumonia in the other study that did not achieve the target intervention (Nieuwenhoven 2006, 13/112 vs. 8/109, p =NS).

LOS, Ventilator days: There were no statistically significant differences between the groups in either study.

Conclusions:
1) Semirecument position may be associated with a significant reduction in pneumonia in critically ill patients.
2) Semirecument position has no effect on mortality, ICU length of stay or duration of mechanical ventilation.

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 body position in critically ill patients

Study	Population	Methods (score)	Intervention	Mortality # (%) Semi Recumbent	Mortality # (%) Supine	Pneumonia # (%) Semi Recumbent	Pneumonia # (%) Supine	Length of stay (days) Semi Recumbent	Length of stay (days) Supine	Other outcomes Semi Recumbent	Other outcomes Supine
1) Drakulovic 1999	Mechanically ventilated Mixed ICU patients N = 90	C.Random: yes ITT: no Blinding: no (10)	Semirecumbent vs. supine	ICU 7/39* (18)	ICU 13/47* (28)	2/39 (5)	11/47 (23)	ICU 9.7 ± 7.8*	ICU 9.3 ± 7.2*	t Body position independent risk factor for VAP in multivariate analysis- major risk factor was duration of ventilation. Ventilator Days 7.1 ± 6.9*	6.0 ± 6.2*
2) Nieuwenhoven 2006	ICU patients from 4 ICUs incubated within 24 hrs of admission and expected to be intubated > 48 hrs N = 221	C.Random: yes ITT: yes Blinding: Yes (13)	45degrees vs. Standard head of the bed elevation	ICU 33/112 (29) Hospital 44/112 (39)	ICU 33/109 (30) Hospital 41/109 (38)	13/112 (12)	8/109 (7)	ICU 9 (0-281) Hospital 27 (2-301)	ICU 10 (9-91) Hospital 24 (0-186)	Ventilator Days 6 (0-64)	6 (0-281)

C.Random: Concealed randomization
ITT: Intent to treat
NR: Not reported

± ( ) : Mean ± Standard deviation (number)
‡ Refers to the # of patients with infections unless specified
** RR= Relative risk, CI= Confidence intervals

TOPIC: 5.4 Body position

Article inclusion log

Criteria for study selection

Type of study: RCT or Meta-analysis
Population: critically ill, ventilated patients (no elective surgery patients)
Intervention: TPN and /or 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.	Gentilello	Crit Care Med 1988		√	Rotational therapy
2.	Summer	J Crit Care 1989		√	Rotational therapy
3.	Fink	Chest 1990		√	Rotational therapy
4.	Ibanez	JPEN 1992		√	No clinical outcomes
5.	deBoisblanc	Chest 1993		√	Rotational therapy
6.	Orozco-Levi	Am J Resp CCM 1995		√	No clinical outcomes
7.	Traver	J Crit Care 1995		√	Rotational therapy
8.	Whiteman	Am J Crit Care 1995		√	Rotational therapy
9.	Drakulovic	Lancet 1999	√		
10.	Ibanez	JPEN 2000		√	Compares nasogastric tubes, not different body positions
11.	MacIntyre	Respir Care 1999		√	Rotational therapy
12.	Van der Voort	Critical Care 2001		√	Not RCT
13.	Ahrens	Am J Crit Care 2004		√	Not all ICU pts, Rotational therapy
14.	van Nieuwenhoven	CC Medicine 2006	√		

I = included, E = excluded

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