

3.1 Nutritional Prescription (dose) of Enteral Nutrition: Use of indirect calorimetry vs. predictive equations

June 28th, 2005

Recommendation:

There are insufficient data to make a recommendation on the use of indirect calorimetry vs. predictive equations for determining energy needs for enteral nutrition in critically ill patients.

Discussion: The committee noted the paucity of data and given the lack of treatment effect and the high costs associated with the use of indirect calorimetry (metabolic carts), despite no safety concerns, no recommendation was put forward.

| Values | definition | Score : +, ++, +++ |
|---------------------|---|--------------------|
| Effect size | magnitude of the absolute risk reduction attributable to the intervention listed--a higher score indicates a larger effect size | 0 |
| 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 | similar direction of findings among trials--a higher score indicates greater similarity of direction of findings among trials | 0 |
| Safe | 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+ |
| Feasible | ease of implementing the intervention listed--a higher score indicates greater ease of implementing the intervention in an average ICU | 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 | 1+ |

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Question: Does the use of indirect calorimetry vs. a predictive equation for determining energy needs (enteral nutrition) result in better outcomes critically ill adult patients?

Summary of evidence: There was only one study that answered the above question. Saffle et al compared the effectiveness of indirect calorimetry (IC) guided enteral nutrition to that guided by Curreri formula in burn patients (level 2 study).

Mortality: no difference in mortality between the two groups

Infections: not reported

LOS: no difference between the two groups.

Ventilator days: not reported

Other complications: diarrhea, hyperglycemia, electrolyte imbalance did not differ between the two groups. Actual protein intake was significantly higher in the group receiving enteral nutrition via indirect calorimetry ($p < 0.01$).

Conclusion:

There is no difference in mortality or other outcomes between enteral nutrition provided by the Curreri formula and enteral nutrition provided by indirect calorimetry in the early postburn period.

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 indirect calorimetry vs. predictive equation in critically ill patients

| Study | Population | Methods (score) | Intervention | Mortality # (%)† | | RR (CI)** | Infections # (%) | | RR (CI)** |
|------------------------|--------------------|---|--|------------------|----------|------------------|------------------|---------|-----------|
| | | | | IC | Curreri | | IC | Curreri | |
| ID # 40 Saffle 1990 | Burns 47 % TSBA | C.Random: not sure ITT: yes Blinding: no (7) | EN via Indirect calorimetry (IC) vs. Curreri formula | 3/26 (12) | 2/23 (9) | 1.33 (0.24-7.26) | NA | NA | NA |

| Study | LOS days | | Ventilator days | | Cost | | Other | |
|------------------------|----------------------|------------------|----------------------|---------|----------------------|---------|--|------------|
| | Indirect Calorimetry | Curreri | Indirect Calorimetry | Curreri | Indirect Calorimetry | Curreri | Indirect Calorimetry | Curreri |
| ID # 40 Saffle 1990 | 48.8 ± 22.9 (26) | 48.5 ± 24.9 (23) | NA | NA | NA | NA | Diarrhea 34.6 % | 34.8 % |
| | | | | | | | hyperglycemia 38.5 % | 43.5 % |
| | | | | | | | nausea 26.9 % | 34.8 % |
| | | | | | | | electrolyte imbalance 30.8 % | 39.1 % |
| | | | | | | | actual calories intake (Kcals) 3530 ± 134 | 3490 ± 132 |
| | | | | | | | actual protein intake (gms) 153 ± 7.1 | 116 ± 6.7 |

C.Random: concealed randomization
 ** RR= relative risk, CI= Confidence intervals
 ITT: intent to treat
 NA: not available

(): mean ± standard deviation (number)
 † presumed hospital mortality unless otherwise specified
 IC: indirect calorimetry

TOPIC: 3.1 Indirect calorimetry vs. predictive equations (enteral nutrition)

(Reviewers: Sabrina Martin & Rupinder Dhaliwal)

Article inclusion log

Criteria for study selection

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

| ID # | | Author | Journal | I | E | why rejected |
|------|----|--|------------------------------|---|---|--------------|
| 40. | 1. | Saffle (Indirect calorimetry vs. Curreri formula) | J Trauma 1990 | √ | | |
| | 2 | Brandi | Nutrition 1997 | | √ | Not RCT |
| | 3 | Osborne | NCPractice 1994 | | √ | Not RCT |
| | 4 | Liggett | Chest 1990 | | √ | Not RCT |
| | 5. | Cutts | Am J Clin Nutr 1997 | | √ | Not RCT |
| | 6. | McClave | Curr Opin Clin Met Nutr 1999 | | √ | Not RCT |
| | 7. | Cheng | Clinical Nutrition 2002 | | √ | Not RCT |
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I = included, E = excluded