Benchmarking your ICU’s feeding performance: How early is early?

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Overview

- Review major ICU nutrition guidelines.
- Review the evidence behind the guidelines.
- Understand current practice.
- Summary.
Background: Review of the Guidelines

Five major clinical practice guidelines recommend *early* EN.
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- Canadian guideline,

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- *Canadian guideline*,
- *ACCEPT guideline (also Canadian)*,
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- Australian and New Zealand guideline,


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Evidence for EN < 24 h

Meta-analysis of early EN in critical illness

Comprehensive Literature search

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- Included only methodologically sound RCTs.

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Primary outcome
- Clinically meaningful patient oriented outcomes: (mortality / physical function / quality of life)

On topic, included in primary analysis

Chiarelli, 1990: 20 pts, burns

Kompan, 1999: 36 pts, trauma

Kompan, 2004: 52 pts, trauma

Nguyen, 2008: 28 pts, med/surg critically ill

Chuntrasakul, 1996: 38 pts, trauma

Pupelis, 2001: 60 pts, severe pancreatitis and peritonitis

### Early (< 24 h) EN in Critical Illness: Mortality

**Review:** Early EN (<24h) vs Control (Primary Analysis)

**Comparison:** 01 early EN vs Control

**Outcome:** 01 Mortality, Intention to treat analysis

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>early EN (&lt;24 h) n/N</th>
<th>Control n/N</th>
<th>OR (fixed) 95% CI</th>
<th>Weight %</th>
<th>OR (fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiarelli 1990</td>
<td>0/10</td>
<td>0/10</td>
<td>Not estimable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kompan 1999</td>
<td>0/17</td>
<td>2/19</td>
<td>13.40 0.20 [0.01, 4.47]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kompan 2004</td>
<td>0/27</td>
<td>1/25</td>
<td>8.89 0.30 [0.01, 7.63]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nguyen 2008</td>
<td>6/14</td>
<td>6/14</td>
<td>19.95 1.00 [0.22, 4.47]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuntasakul 1996</td>
<td>1/21</td>
<td>3/17</td>
<td>18.38 0.23 [0.02, 2.48]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupelis 2001</td>
<td>1/30</td>
<td>7/30</td>
<td>39.38 0.11 [0.01, 0.99]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td>119</td>
<td>115</td>
<td>100.00 0.34 [0.14, 0.85]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 8 (early EN (<24 h)), 19 (Control)

Test for heterogeneity: Chi² = 3.20, df = 4 (P = 0.52), I² = 0%

Test for overall effect: Z = 2.31 (P = 0.02)

- **Significant reduction in mortality (10% absolute reduction, P=0.02)**

Review: Early EN (<24h) vs Control (Primary Analysis)
Comparison: 01 early EN vs Control
Outcome: 02 Pneumonia, Intention to treat analysis

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>early EN (&lt;24 h)</th>
<th>Control</th>
<th>OR (fixed) 95% CI</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Kompan 2004</td>
<td>9/27</td>
<td>16/25</td>
<td>70.15 0.28 [0.09, 0.88]</td>
<td>70.15</td>
<td>0.28 [0.09, 0.88]</td>
</tr>
<tr>
<td>Nguyen 2008</td>
<td>3/14</td>
<td>6/14</td>
<td>29.85 0.36 [0.07, 1.91]</td>
<td>29.85</td>
<td>0.36 [0.07, 1.91]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>41</td>
<td>39</td>
<td>100.00 0.31 [0.12, 0.78]</td>
<td>100.00</td>
<td>0.31 [0.12, 0.78]</td>
</tr>
</tbody>
</table>

Total events: 12 (early EN (<24 h)), 22 (Control)
Test for heterogeneity: Chi² = 0.06, df = 1 (P = 0.80), I² = 0%
Test for overall effect: Z = 2.47 (P = 0.01)

• Significant reduction in pneumonia (27% absolute reduction, P=0.01)

Evidence for EN < 48 h

Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients.


Abstract

OBJECTIVE: This study was conducted to develop evidence-based clinical practice guidelines for nutrition support (ie, enteral and parenteral nutrition) in mechanically ventilated critically ill adults.

OPTIONS: The following interventions were systematically reviewed for inclusion in the guidelines: enteral nutrition (EN) versus parenteral nutrition (PN), early versus late EN, dose of EN, composition of EN (protein, carbohydrates, lipids, immune-enhancing additives), strategies to optimize delivery of EN and minimize risks (ie, rate of advancement, checking residuals, use of bedside algorithms, motility agents, small bowel versus gastric feedings, elevation of the head of the bed, closed delivery systems, probiotics, bolus administration), enteral nutrition in combination with supplemental PN, use of PN versus standard care in patients with an intact gastrointestinal tract, dose of PN and composition of PN (protein, carbohydrates, IV lipids, additives, vitamins, trace elements, immune enhancing substances), and the use of intensive insulin therapy.
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### Review: Heyland Early EN
### Comparison: 01 Mortality
### Outcome: 01 Mortality

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Early EN (&lt;60 h) n/N</th>
<th>Control n/N</th>
<th>RR (random) 95% CI</th>
<th>Weight %</th>
<th>RR (random) 95% CI</th>
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<td>Chiarelli</td>
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<td>Minard</td>
<td>1/12</td>
<td>4/15</td>
<td>12.42 0.31 [0.04, 2.44]</td>
<td></td>
<td></td>
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<tr>
<td>Moore</td>
<td>1/32</td>
<td>2/31</td>
<td>9.51 0.48 [0.05, 5.07]</td>
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<tr>
<td>Singh</td>
<td>4/21</td>
<td>4/22</td>
<td>33.57 1.05 [0.30, 3.66]</td>
<td></td>
<td></td>
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<tr>
<td><strong>Total (95% CI)</strong></td>
<td>159</td>
<td>158</td>
<td>100.00 0.52 [0.25, 1.08]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 10 (Early EN (<60 h)), 23 (Control)
Test for heterogeneity: Chi² = 4.05, df = 6 (P = 0.67), I² = 0%
Test for overall effect: Z = 1.76 (P = 0.08)

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**Trend** towards a reduction in mortality (8% absolute reduction, \(P=0.08\))

Background: Review of the Guidelines

Five major clinical practice guidelines recommend early EN.

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- ACCEPT guideline (also Canadian), < 24 h
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- European (ESPEN) guideline and < 24 h
- American (ASPEN and SCCM) guideline, < 48 h

Significant evidence.


Background: Review of the Guidelines

Five major clinical practice guidelines recommend early EN.

- **Canadian guideline**, < 48 h  
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- **American (ASPEN and SCCM) guideline**, < 48 h  
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Global practice: Do we deliver early EN?
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Survey of 1,637 patients from 81 ICUs in 18 countries

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Summary

The evidence supporting patient benefits from the provision of Early EN is robust.

- Meta-analyses demonstrate early EN improves survival
- 3 out of 5 major guidelines recommend commencing EN within 24 h
- The remaining 2 major guidelines recommend commencing EN within 24 to 48 h
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How is your ICU performing?
We would like to invite you to participate:

Nutrition Support in Critical Illness

This Audit of Nutrition Support in Critical Illness is being conducted by the University of Sydney’s Northern Clinical School Intensive Care Research Unit. The primary purpose of this project is to benchmark current practice within hospitals throughout the world in order to provide useful information to participating sites to support local quality improvement initiatives to achieve best practice targets. Click here for additional information about this project. After reading the additional information, if you would like to participate, contact Gordon S. Doig or Philippa T. Hughes.

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[ Login to secure site ]

Using this site for the first time: You will need to install the most recent version of Java to use all features of this site. Click here to verify and update your browser’s version of Java.
www.EvidenceBased.net/Nutrition

How is your ICU performing?

- A Global audit of time from ICU admission to commencing nutrition therapy.
How is your ICU performing?

• A Global audit of time from ICU admission to commencing nutrition therapy.

• Very simple data collection.
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- Very simple data collection.
- Graphical feedback comparisons to other sites.
- If your data suggests you could improve practice, Phase II of the project will help you improve by providing you with a comprehensive change management strategy to focus on the aspect of nutrition therapy that needs change.
How is your ICU performing?

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- Very simple data collection.
- Graphical feedback comparisons to other sites.

- If your data suggests you could improve practice, Phase II of the project will help you improve by providing you with a comprehensive change management strategy to focus on the aspect of nutrition therapy that needs change.

- No costs involved (to you or your hospital).
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Questions?

www.EvidenceBased.net/Nutrition
Questions?
Immediately after resuscitation:

Stable shock can be defined as:

Shock Index ≤ 1 (heart rate ÷ systolic blood pressure = Shock Index)

or

Systolic blood pressure > 90 mmHg or mean blood pressure > 70 mmHg for at least one hour.

Evidence-based ICU feeding algorithm

At ICU admission: Should this patient be fed?

- **YES**
  - Acceptable conditions:
    - tolerating adequate oral intake
    - < 24 hours to oral intake
    - palliative care

- **NO**
  - GASTRIC CHALLENGE
    - use full strength concentration
    - Consider prokinetic with challenge
    - GOAL: at least 80% of requirements at 72h
    - assess q12h

  - **YES**
    - Will at least 80% of requirements be met by 72h?

    - **YES**
      - Is Goal met?
      - Use prokinetic and/or Use post-pyloric tube

    - **NO**
      - Increase rate to 100%

  - **NO**
    - Is Goal met?

  - **NO**
    - Continue EN to Max. tolerated Supplement with PN
    - Continue EN challenges q12h

- **NO**
  - Can EN be started within 24 hours?

  - **YES**
    - Begin TPN:
      - consider TPN with glutamine
      - Reassess q12h for EN eligibility

  - **NO**
    - Acceptable conditions:
      - acute pancreatitis*
      - enteric anastomosis*
      - ischemic bowel
      - enteric fi stula
      - imminent bowel resection
      - imminent endoscopy
      - bowel obstruction
      - high nasogastric losses on admission
      - severe exacerbation of IBD
      - *may still opt for elemental feeds

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See http://www.evidencebased.net/rl01/EB/8/0/1/0/8/0/1/p91031.pdf for complete guideline.
How was early (< 24 h) EN initiation achieved?

<table>
<thead>
<tr>
<th>Study</th>
<th>Patient population</th>
<th>Early EN intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiarelli 1990</td>
<td>Thermal injury (25% to 60% TBSA). No inhalational injury. Mean survival probability 0.73±0.10.</td>
<td>Immediately after admission: 50 ml/h ‘homemade’ EN (1900kcal/L and 79 g protein/L) via NGT increasing over 3-4 days. Goals set with Curreri formula. Rate did not exceed 150 ml/h.</td>
</tr>
<tr>
<td>Chuntrasakul 1996</td>
<td>Trauma (ISS &gt; 20 and &lt; 40). Mean ISS 29±1.5</td>
<td>Immediately after resuscitation or surgery: 30 mls/h ¾-strength EN (Traumacal™) via NGT, concentration increased over time. Goals estimated using modified Harris-Benedict equation. TPN was added if goals were not met.</td>
</tr>
<tr>
<td>Kompan 1999</td>
<td>Trauma (ISS &gt; 25) Mean ISS 33.6±10 Mean APACHE II 11.5±5.8</td>
<td>Immediately after resuscitation: EN (Jevity™) started at 20 ml/h via NGT. Increased to 50% of estimated goal on Day 1, 75% of estimated goal on Day 2 and 100% of goal on Day 3. Estimated goal was set at 25-35 nonprotein kcal/kg per day and 0.2 – 0.3 g nitrogen / kg per day at 72 hours post ICU admission. TPN was added to meet estimated requirements.</td>
</tr>
<tr>
<td>Pupelis 2001</td>
<td>Severe pancreatitis and peritonitis Mean APACHE II 11.5±5.4</td>
<td>Within 12 h of surgery: EN (Nutrison Standard™ or Nutrison Pepti™) via NJT started at 20-25ml/h. Increase based in individual tolerance to 1 L per day by Day 3 post-op. Patients also received an average of 500kcals/day from IV dextrose.</td>
</tr>
<tr>
<td>Kompan 2004</td>
<td>Trauma (ISS &gt; 20). Mean APACHE II 11.3±4.8</td>
<td>Immediately after resuscitation: Same protocol as Kompan 1999 except goal set at an average of 25 nonprotein kcal/kg.</td>
</tr>
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<td>Nguyen 2008</td>
<td>Mechanically ventilated ICU patients APACHE II 22.4±1.2</td>
<td>Within 24 h of admission: EN via NGT at 40 ml/h and increased by 20ml/h q6h to goal, if tolerated (aspirates &lt;250mls). Goal was determined by a dietitian, based on patient’s BMI.</td>
</tr>
</tbody>
</table>
Multifaceted practice change strategy

1) Academic detailing
2) Educationally influential opinion leaders
3) Local consensus process
   • local champions
4) Reminders (manual or computerized)
   • active ongoing bedside reminder system
   • educational materials
5) Audit and feedback
   • computer generated, timely
   • should be delivered by peers or opinion leaders
6) Educational outreach process
   • didactic lecture based CME (conferences, lectures)
7) Unsolicited mail
   • educational materials