Early enteral nutrition in the major trauma patient requiring intensive care:
An overview of the evidence.

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Summary of this talk

- Provide a context.
- Review the most recent clinical evidence.
- Generate concise clinical recommendations.
- Summarize.
Background: Review of the Guidelines

- The concept of ‘early’ enteral feeding was popularized in the mid ‘80s.

Moore EE, Jones TN. Benefits of immediate jejunostomy feeding after major abdominal trauma—a prospective, randomized study. 
*J Trauma* 1986;26:874–881
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  - *Canadian guideline*,
  - *ACCEPT guideline (also Canadian)*,
  - *Australian and New Zealand guideline*,
  - *European (ESPEN) guideline and*
  - *American (ASPEN and SCCM) guideline*


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Early EN in trauma: Direct evidence
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Early enteral nutrition reduces mortality in trauma patients requiring intensive care: A meta-analysis of randomised controlled trials

Gordon S. Doig a,*, Philippa T. Heighes b, Fiona Simpson a, Elizabeth A. Sweetman b

a Intensive Care, Northern Clinical School, University of Sydney, Sydney, NSW 2006, Australia
b Royal North Shore Hospital, Intensive Care Unit, St. Leonards, NSW 2065, Australia

ABSTRACT

Introduction: To determine whether the provision of early standard enteral nutrition (EN) confers treatment benefits to adult trauma patients who require intensive care.

Materials and methods: MEDLINE and EMBASE were searched. Hand citation review of retrieved guidelines and systematic reviews was undertaken and academic and industry experts were contacted. Methodologically sound randomised controlled trials (RCTs) conducted in adult trauma patients requiring intensive care that compared the delivery of standard EN, provided within 24 h of injury, to standard care were included.

Early EN in trauma: Direct evidence

- RCT’s conducted in:
  - adult trauma patients requiring intensive care and;
  - standard EN begun within 24hrs of injury compared to standard care (oral intake upon return of bowel sounds, TPN, or TPN + delayed EN);
  - conducted an extensive electronic literature search

**Early EN in trauma: Direct evidence**

**Table 2**

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  - We do not know which group these 12 patients were randomised to.
  - Excessive loss to follow-up is a major validity flaw.


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Primary analysis: RCTs without major flaws

Mortality reduced by 8.3%, p=0.04

Sensitivity analysis: Including Moore et al.

### Review
- Early EN (<24h) vs Standard Care (TRAUMA - Sensitivity)

### Comparison
- 01 Early (<24h) EN vs Standard Care

### Outcome
- 01 Mortality, Sensitivity Analysis

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<tr>
<th>Study or sub-category</th>
<th>Early EN (&lt;24 h) n/N</th>
<th>Standard Care n/N</th>
<th>Peto OR 95% CI</th>
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<td>0/17</td>
<td>2/19</td>
<td>20.45</td>
<td>0.14 [0.01, 2.38]</td>
<td></td>
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<tr>
<td>Kompan 2004</td>
<td>0/27</td>
<td>1/25</td>
<td>10.54</td>
<td>0.12 [0.00, 6.31]</td>
<td></td>
</tr>
<tr>
<td>Moore 1986 (16% IIF)</td>
<td>1/32</td>
<td>2/31</td>
<td>30.64</td>
<td>0.49 [0.05, 4.85]</td>
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<tr>
<td>Chuntrasakul 1996</td>
<td>1/21</td>
<td>3/17</td>
<td>38.37</td>
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<tr>
<td>Total (95% CI)</td>
<td>97</td>
<td>92</td>
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Total events: 2 (Early EN (<24 h)), 8 (Standard Care)
Test for heterogeneity: $\chi^2 = 0.59$, df = 3 ($P = 0.90$), $I^2 = 0$
Test for overall effect: $Z = 2.08$ ($P = 0.04$)

Mortality reduced by 6.7%, $p = 0.04$

Early EN in trauma: Direct evidence

- Early EN also resulted in:
  - Reduced incidence of pneumonia (33% eEN vs 64%, p=0.050)
  - A trend towards a reduction in the severity of MODS (2.5 vs 3.1 organ failures per patient, p=0.057)
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There were no signs of any harms.
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- Early feeding was not associated with any harms:
  - Wound infections (7.1% eEN vs 9.3%, p=0.26)
  - Anastomotic dehiscence (2.8% eEN vs 4.3%, p=0.27)
  - Pneumonia (2.3% eEN vs 3.3%, p=0.46)

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“There is no obvious benefit for keeping patients “nil by mouth” after gastrointestinal surgery”

A special case: The Open Abdomen

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- **Planned re-operation**: Damage control surgery or management of severe abdominal infection
- **Decompression of intra-abdominal hypertension**: Repair of a ruptured abdominal aortic aneurysm or decompressive laparotomy for abdominal compartment syndrome
- **Less commonly**: septic dehiscence of a laparotomy incision or partial loss of the abdominal wall prohibit definitive closure, resulting in an open abdomen
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Therefore many open abdomen patients receive no nutrition until fascial closure.

Should we fear enteral nutrition?
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Observational study reviewing 597 trauma patients from 11 US trauma centres who were managed with open abdomen.

- average age 38, 77% male
- 72% blunt trauma, ISS 31
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39% (232/597) received EN before first attempt at closure of the abdomen

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  - Significantly lower mortality (OR 0.4, p=0.01).

Receiving EN before first attempt at closure resulted in significant improvements in outcome.

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- 3 other smaller observational studies in open abdomen patients, comparing EN started prior to fascial closure with delayed nutrition.


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- Compared with delayed feeding, EN started prior to fascial closure was associated with:
  - Reduced rates of pneumonia
  - Higher rates of primary fascia closure
  - Lower rates of fistula
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There were no reported adverse events with the use of EN started prior to fascial closure

Physiology: Why should patients benefit?

Trauma, including isolated head trauma, triggers a hypermetabolic and catabolic state, severely impairing nitrogen (protein) balance.
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Characterized by disproportional pro-inflammatory cytokine production (e.g., tumor necrosis factor-α, interleukin-1 and interleukin-6) and release that is associated with increased counter-regulatory hormones (e.g., cortisol, glucagon and catecholamines) release.
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This process leads to increased nutrient needs, which begins early and may persist throughout recovery and rehabilitation.
The gut as the motor of MODs

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- Loss of functional and structural integrity of the intestinal epithelium.

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- Gut stasis, bacterial overgrowth and loss of structural integrity leads to bacterial translocation (even more bacterial cross intestinal barrier!!!).

- Gut neutrophils become ‘primed’ and release cytokines into lymphatic drainage and also may travel to distant sites
  - Increases overall oxidative stress, predisposing to infection and MODs

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  - Significant reduction in mortality, VAP and severity of MODs
- EN should begin within 24 h of injury, as soon as shock is stabilised:

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<td>Within 12–18 h of surgery: EN (Vivonex HN at 1/4 strength) via NJT at 50 ml/h. Rate and concentration increased at 8 h intervals to target (full strength solution 125ml/h) at 72 h</td>
<td>5% dextrose (approx. 100 g/day) during first 5 days post-op and then TPN if not tolerating oral diet at that time.</td>
</tr>
</tbody>
</table>
Summary

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  • Significant reduction in mortality, VAP and severity of MODs

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  • SBP > 100 mmHg without need for increasing doses of vasoactive agents for one hour.

Stable shock is not defined by weaning or removing all vasoactive agents.

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Key papers


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- **Extensive search and systematic review of best available evidence for early EN in trauma.**


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