

# Benchmarking your ICU's feeding performance: How early is early?

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# Overview

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- Review major ICU nutrition guidelines.
- Review the evidence behind the guidelines.
- Understand current practice.
- Summary.



## *Background: Review of the Guidelines*

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Five major clinical practice guidelines recommend *early* EN.



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# Evidence for EN < 24 h

Intensive Care Med (2009) 35:2018–2027  
DOI 10.1007/s00134-009-1664-4

SYSTEMATIC REVIEW

Gordon S. Doig  
Philippa T. Heighes  
Fiona Simpson  
Elizabeth A. Sweetman  
Andrew R. Davies

**Early enteral nutrition, provided within 24 h of injury or intensive care unit admission, significantly reduces mortality in critically ill patients: a meta-analysis of randomised controlled trials**

Doig GS, Heighes PT, Simpson F, Sweetman EA and Davies AR. Enteral nutrition within 24 h of ICU admission significantly reduces mortality: A meta-analysis of RCTs. *Intensive Care Medicine* 2009 Dec;35(Issue 12):2018-2027.



# Meta-analysis of early EN in critical illness

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## Comprehensive Literature search

- MEDLINE (<http://www.PubMed.org>) and EMBASE (<http://www.EMBASE.com>)
- Academic and industry experts were contacted,
- Reference lists of identified systematic reviews and evidence-based guidelines were hand searched by at least two authors.
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## Primary outcome

- clinically meaningful patient oriented outcomes: (mortality / physical function / quality of life)



## *On topic, included in primary analysis*

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Chiarelli, 1990: 20 pts, burns

Kompan, 1999: 36 pts, trauma

Kompan, 2004: 52 pts, trauma

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

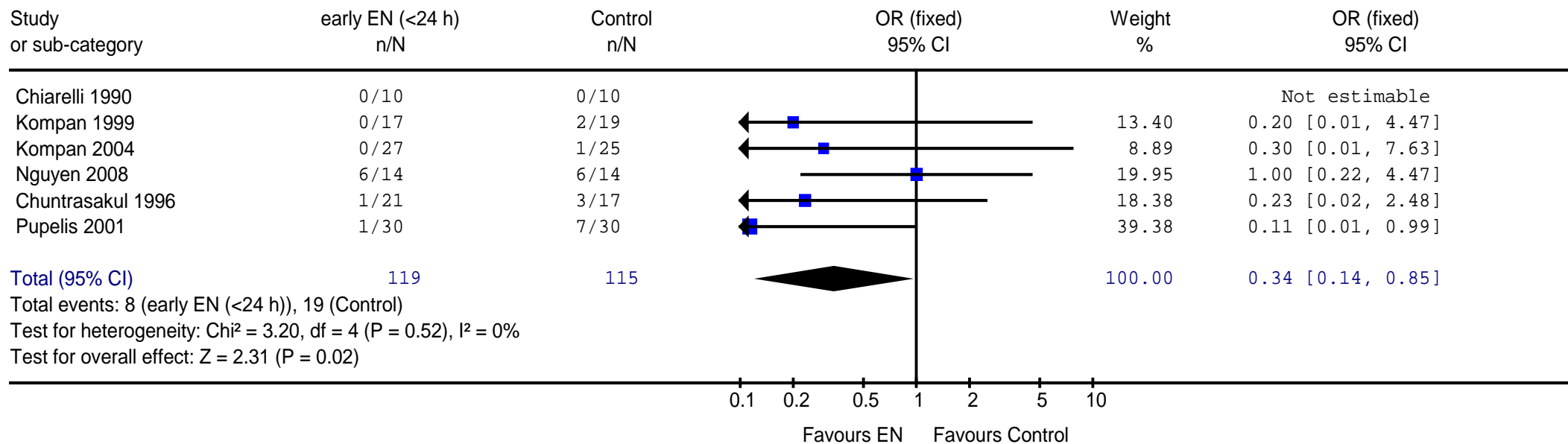
Chuntrasakul, 1996: 38 pts, trauma

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



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

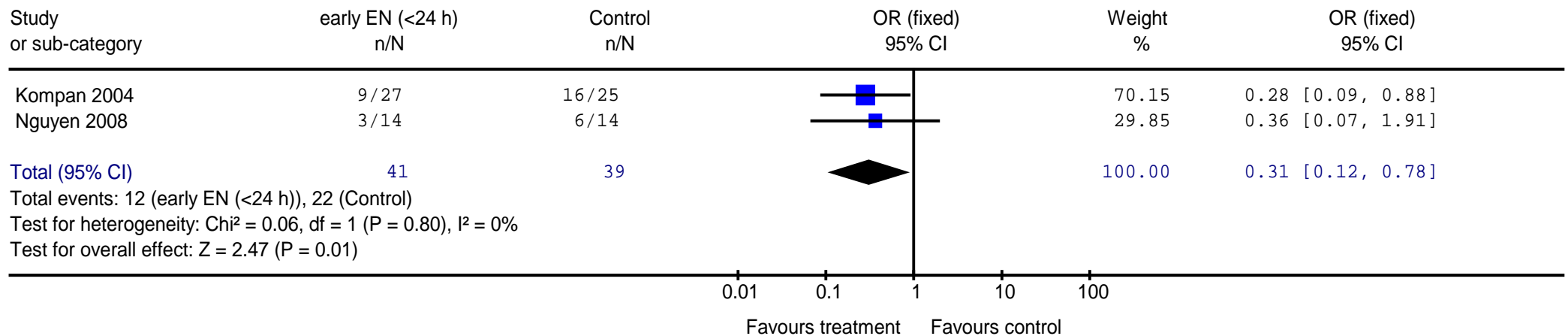
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# early (< 24 h) EN in critical illness: pneumonia

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



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

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# Evidence for EN < 48 h

JPEN J Parenter Enteral Nutr. 2003 Sep-Oct;27(5):355-73.

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

Heyland DK<sup>1</sup>, Dhaliwal R, Drover JW, Gramlich L, Dodek P; Canadian Critical Care Clinical Practice Guidelines Committee.

### **+ Author information**

#### **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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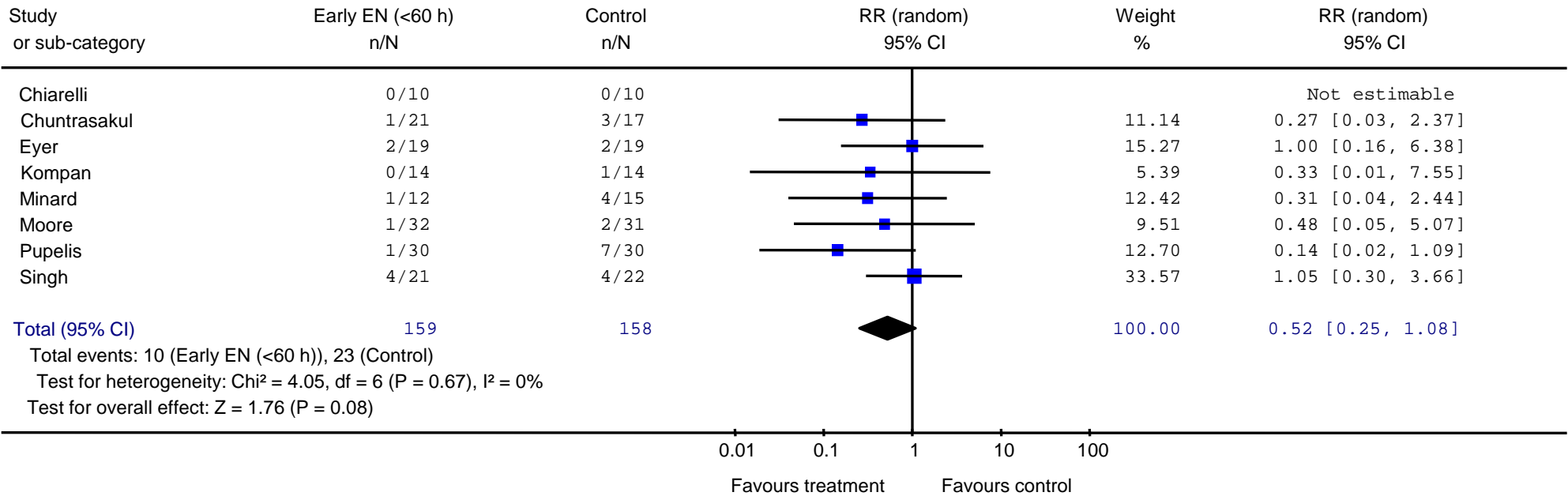
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- clinically meaningful patient oriented outcomes: (mortality / physical function / quality of life)



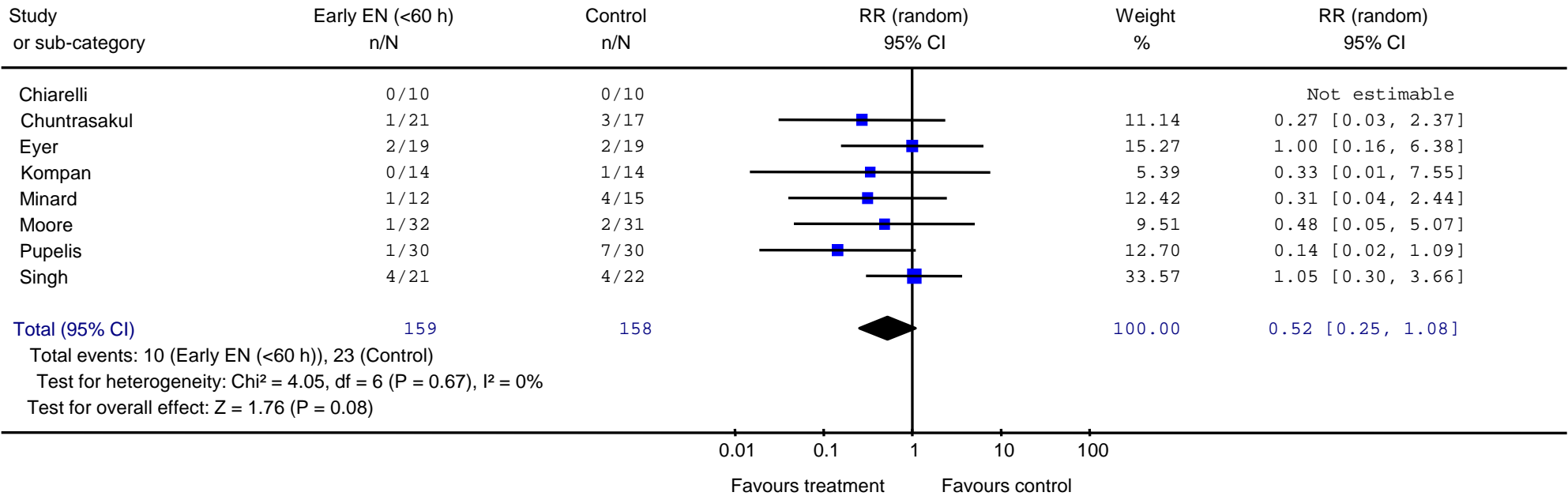
Review: Heyland Early EN  
 Comparison: 01 Mortality  
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Review: Heyland Early EN  
 Comparison: 01 Mortality  
 Outcome: 01 Mortality



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

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| < 24 h | – <i>ACCEPT guideline (also Canadian),</i>     | Significant evidence. |
| < 24 h | – <i>Australian and New Zealand guideline,</i> | Significant evidence. |
| < 24 h | – <i>European (ESPEN) guideline and</i>        | Significant evidence. |
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# *Global practice: Do we deliver early EN?*

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  - *Active implementation: Education, posters, audit and feedback, reminders*
  - **65.1%** of patients who received EN were started within 24 h

Heyland DK, Heyland RD, Cahill NE, Dhaliwal R, Day AG, Jiang X, Morrison S, Davies AR. Creating a culture of clinical excellence in critical care nutrition: the 2008 "Best of the Best" award. *JPEN* 2010 Nov-Dec;34(6):707-15.

Doig GS. Nutrition Guidelines: Do we need them? 31<sup>st</sup> Australian and New Zealand Annual Scientific Meeting on Intensive Care, Hobart, October 12-15, 2006.

Doig GS, Simpson F, Finfer S, et al. Effect of evidence-based feeding guidelines on mortality of critically ill patients: a cluster randomized controlled trial. *JAMA* 2008 Dec 17;300(23):2731-41.



# Summary

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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
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How is your ICU performing?




*We would like to invite you to participate:*

The screenshot shows a web browser window with the URL <http://research.evidencebased.net/cgi/nutrition>. The browser's address bar, menu bar (File, Edit, View, Favorites, Tools, Help), and toolbar are visible. The website content includes the Northern Clinical School Intensive Care Research Unit logo on the left and the University of Sydney logo on the right. The main heading is 'Nutrition Support in Critical Illness'. Below the heading is a paragraph of text explaining the audit's purpose and providing contact information for Gordon S. Doig or Philippa T. Heighes. A red warning message states: 'This is a secure, password protected web site. Access is restricted to participating hospitals only.' Below this is a blue link '[ Login to secure site ]' and a 'Visitor Globe' icon. A note at the bottom left says: '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.' The 'Endorsed by:' section lists 'icnarc' and four sponsors: Baxter (USA), Nestlé (South Africa), Baxter (Australia), and Baxter (New Zealand). At the bottom, there is a footer with contact information for Gordon S. Doig, the page's last modification date (18 May 2012), and browser compatibility information for Microsoft Internet Explorer (MSIE Version 7) and Netscape/Mozilla (Version 4 or higher). The browser's status bar at the bottom right shows '125%' zoom.


http://research.evidencebased.net/cgi/nutrition

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## 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. Heighes](#).

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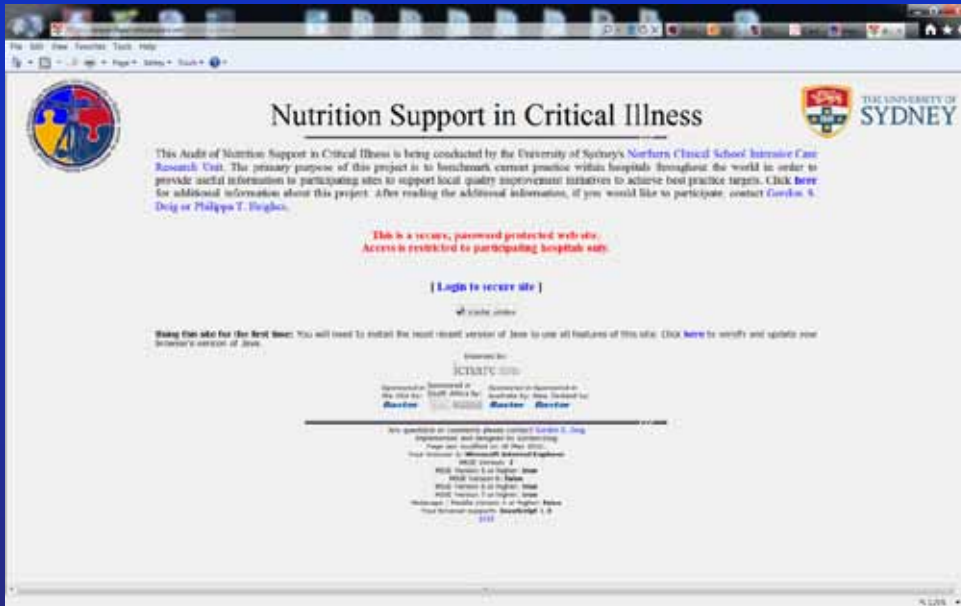
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# www.EvidenceBased.net/Nutrition

How is your ICU performing?

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

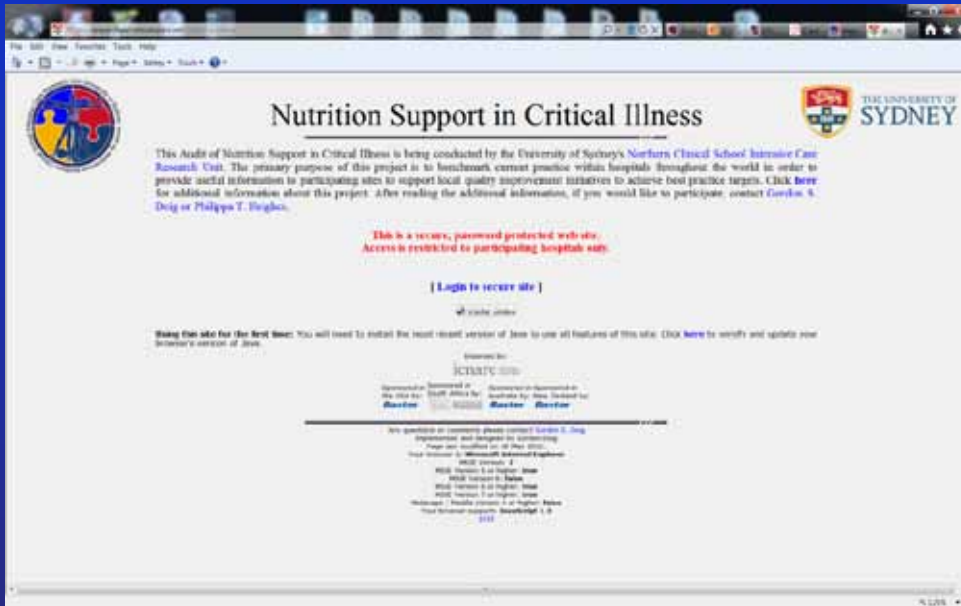




# www.EvidenceBased.net/Nutrition

How is your ICU performing?

- A Global audit of time from ICU admission to commencing nutrition therapy.
- Very simple data collection.







www

## Hospital Name Here ICU Nutrition Audit Home Page

Welcome to your hospital's secure data submission and feedback page for the ICU Nutrition Audit Project. Choose a link from below:

- [Data Input](#)
- [Graphical Feedback](#)

https://www.academichealthscience.net/um/hys/hospAA/DataInput...

Convert Select

### ICU Nutrition Audit Data Submission Form

Hospital ID	AA	Region	SA			
HELP Patient No.	<input type="text"/>					
ICU Feeding Process Measures						
HELP ICU Admission date	2012	Nov	26	Time:	<input type="text"/>	24h clock
HELP Outcome type:	<input type="text"/>					
HELP Outcome date:	<input type="text"/>	<input type="text"/>	<input type="text"/>	Time:	<input type="text"/>	24h clock

EN start date  
PN start date

**Check data before submitting**      **This will reset ALL the fields**

**All submissions are FINAL**

[\[Close this window\]](#)

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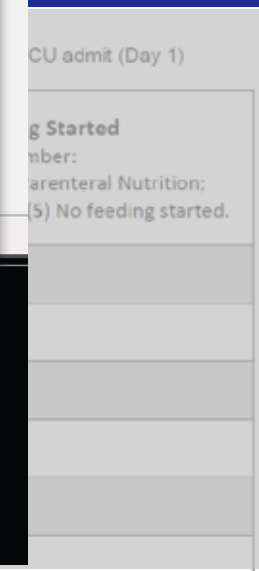
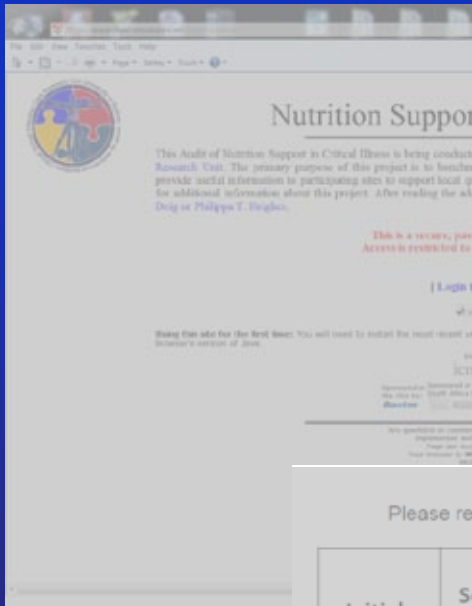
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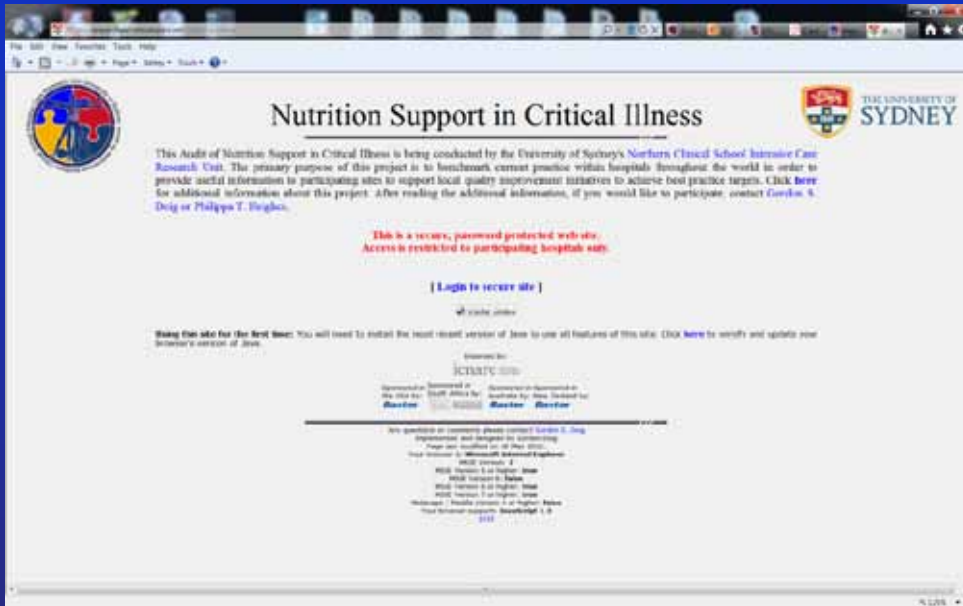




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How is your ICU performing?

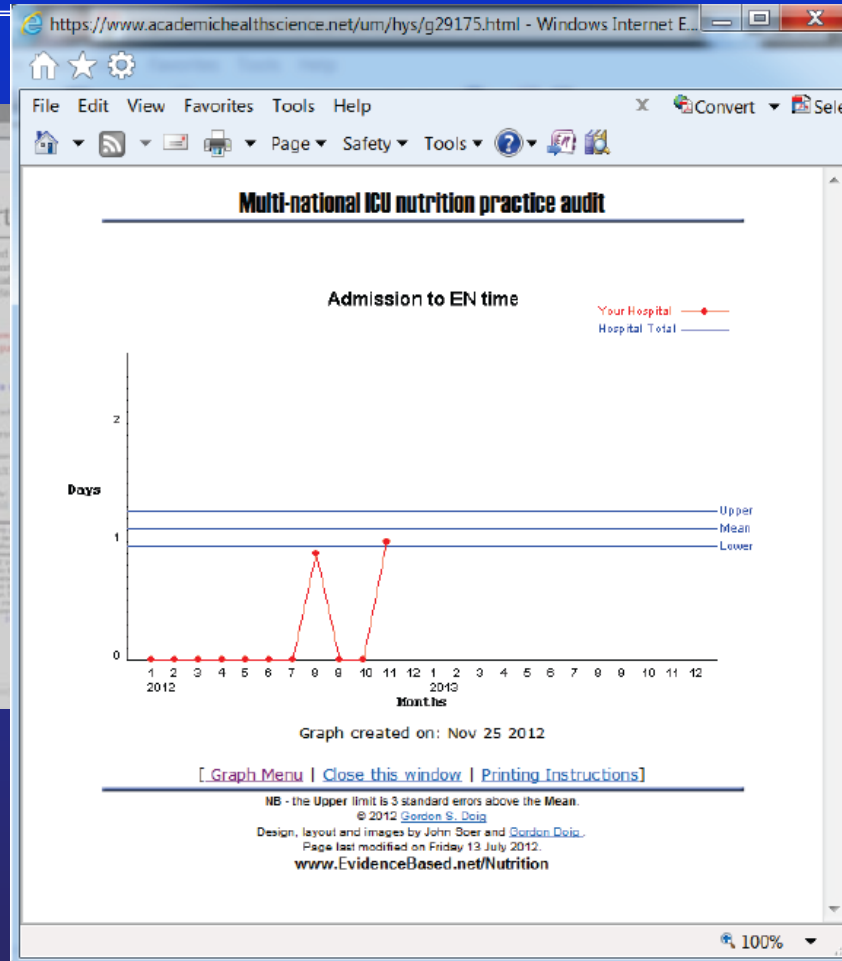
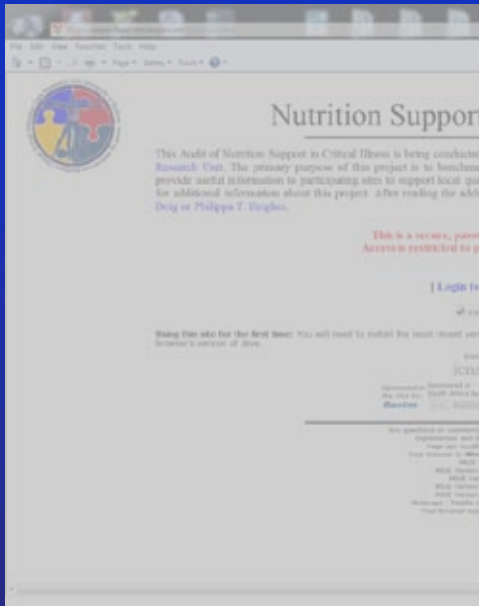
- A Global audit of time from ICU admission to commencing nutrition therapy.
- Very simple data collection.
- Graphical feedback comparisons to other sites.







# www.EvidenceBased.net/Nutrition



... performing?

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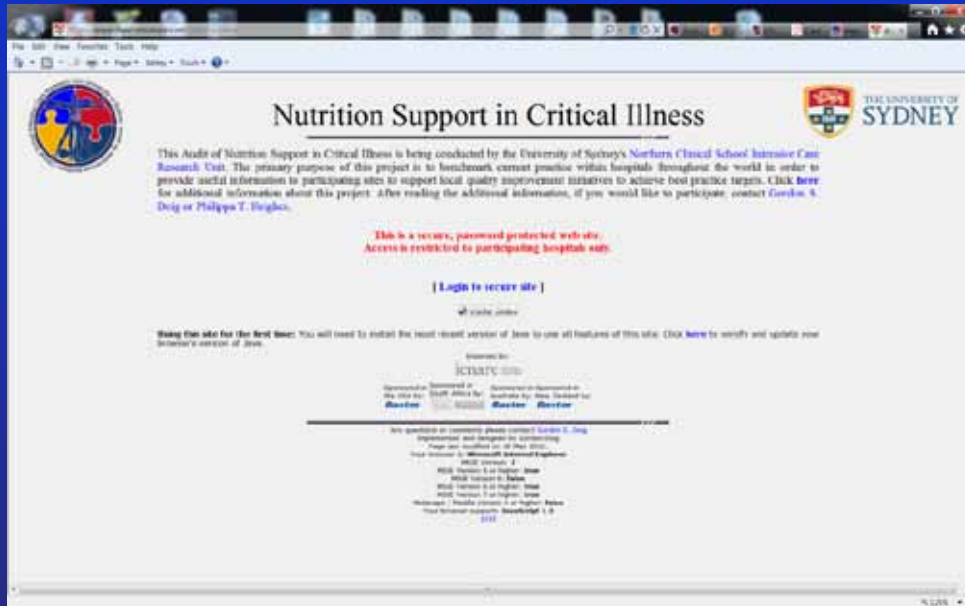
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- If your data suggests you could improve practice, Phase II of the project will help you improve by providing you with a comprehensive change management strategy to focus on the aspect of nutrition therapy that needs change.



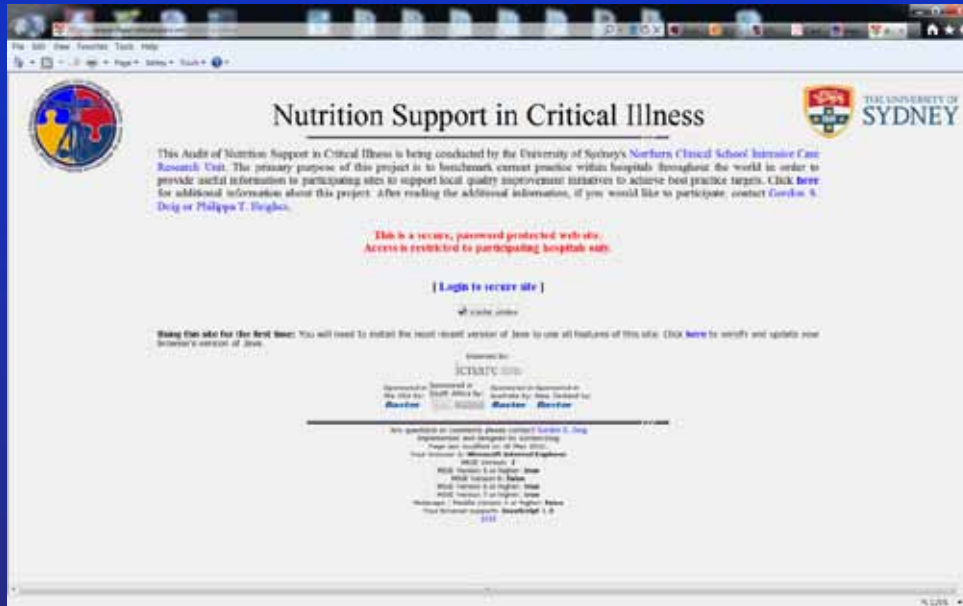
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- No costs involved (to you or your hospital).




[www.EvidenceBased.net/Nutrition](http://www.EvidenceBased.net/Nutrition)


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## Nutrition Support in Critical Illness



THE UNIVERSITY OF SYDNEY

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# Questions?

[www.EvidenceBased.net/Nutrition](http://www.EvidenceBased.net/Nutrition)

**Nutrition Support in Critical Illness**

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*Questions?*

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## *Immediately after resuscitation:*

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Stable shock can be defined as:

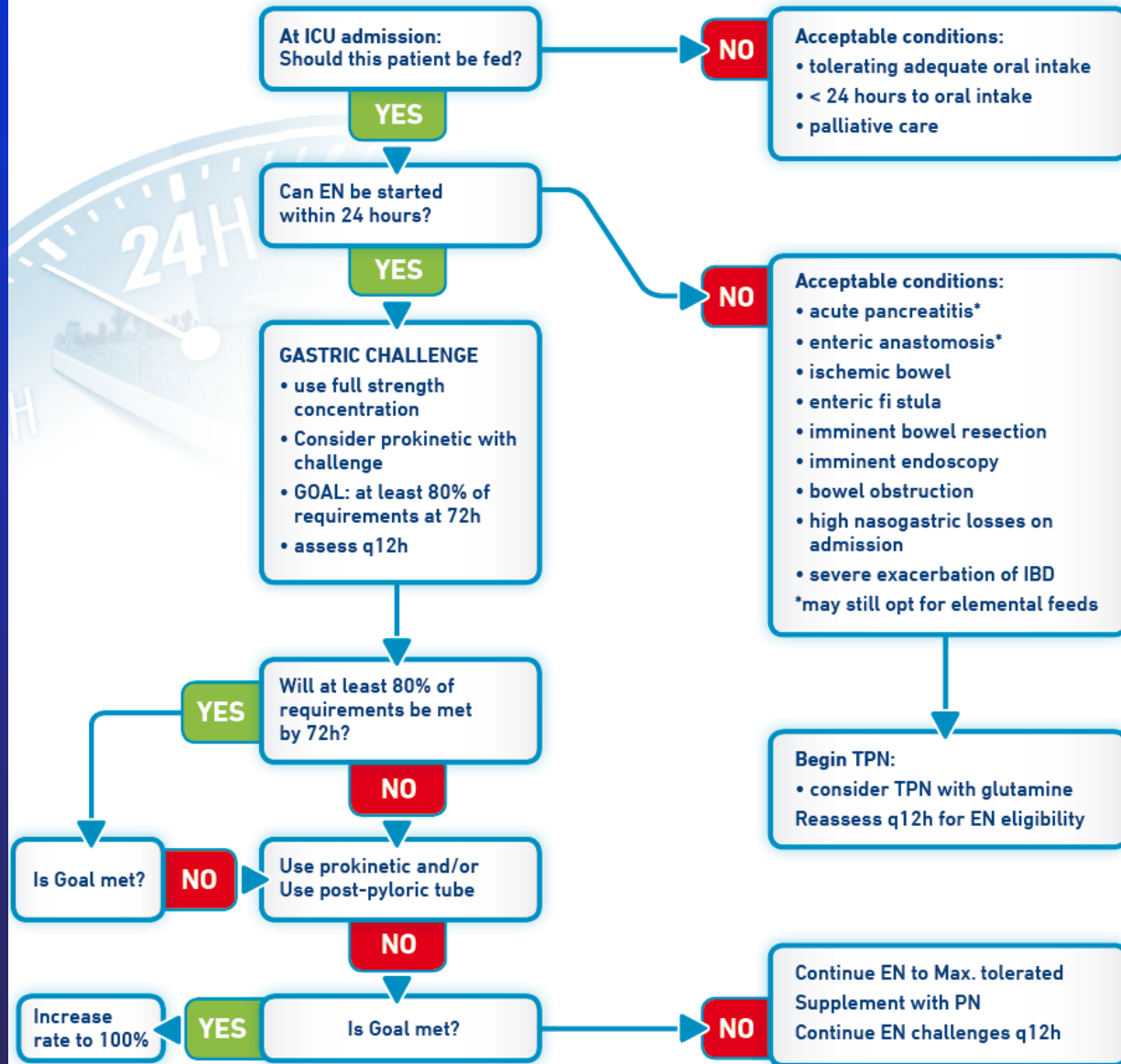
Shock Index  $\leq 1$  (heart rate  $\div$  systolic blood pressure = Shock Index)

or

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



# Evidence-based ICU feeding algorithm

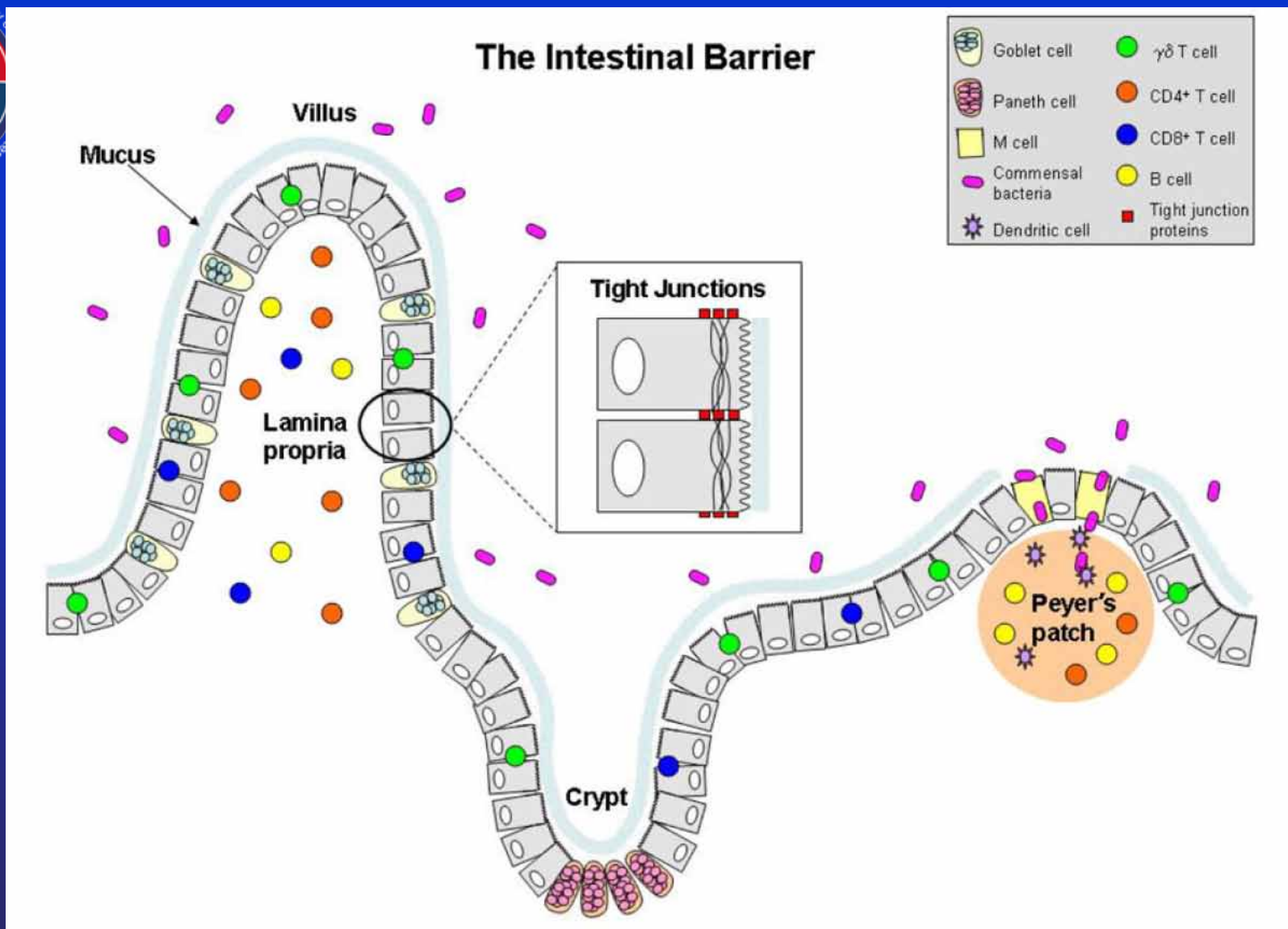






## How was early (< 24 h) EN initiation achieved?

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



Clark JA and Coopersmith CM. Intestinal crosstalk – a new paradigm for understanding the gut as the “motor” of critical illness. *Shock* 2007;28(4):384-393.



# *Multifaceted practice change strategy*

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- 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

Simpson F and Doig GS. The relative effectiveness of practice change interventions in overcoming common barriers to change: A survey of 14 hospitals with experience implementing evidence-based guidelines. *J Eval Clin Pract* 2007;13:709-715.