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

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Potential conflicts
Gordon S. Doig

Relevant financial relationships with a commercial interest:

- Fresenius Kabi, Academic Research Grants (Past), Consultant and Speaker's Honoraria (Current)
- Baxter Healthcare, Academic Research Grant (Current), Consultant and Speaker's Honoraria (Current)
- Nestle Healthcare, Academic Research Grant (Current), Consultant and Speaker's Honoraria (Current)

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Overview

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

JAMA®

Online article and related content current as of December 16, 2008.

Effect of Evidence-Based Feeding Guidelines on Mortality of Critically Ill Adults: A Cluster Randomized Controlled Trial

Gordon S. Doig; Fiona Simpson; Simon Finfer; et al.

JAMA. 2008;300(23):2731-2741 (doi:10.1001/jama.2008.826)

http://jama.ama-assn.org/cgi/content/full/300/23/2731

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The initial MEDLINE/EMBASE electronic search retrieved 2,287 abstracts. Hand-searching of abstracts and reference lists of all overviews and guidelines (GSD and FS) resulted in the retrieval of 465 papers. Of these 465 papers, 337 appeared to be primary nutritional support studies and were identified for detailed review (GSD, FS, and AD). On detailed review 103 studies were found not to report any clinically meaningful outcomes, 42 were not conducted in critically ill patients, 27 were not primary nutritional support studies (i.e., evaluations of recombinant human growth hormone, insulin), 15 were crossover studies, 12 evaluated preoperative interventions, 8 were true observational studies (not controlled trials), 7 were non-English-language studies, 6 were pseudo-randomized, 5 were based on subgroups of patients from a larger published trial, and 1 was a postoperative intervention (oral intake for 10 weeks postsurgery). The remaining 111 articles were found to be primary nutritional support studies reporting clinically meaningful outcomes (11) conducted in critically ill patient populations. A complete listing of all 111 articles is presented in Appendix A.

Doig GS, Simpson F, Finfer S, Delaney A, Davies AR, Mitchell I and Dobb G for the Nutrition Guidelines Investigators of the ANZICS Clinical Trials Group. 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.

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Box. Evidence-Based Recommendations Approved (Ratified) for Inclusion in the Guideline at the Consensus Conference

Grade B+

Recommendation favoring enteral nutrition over standard care (nothing by mouth)

5 Level II randomized controlled trials (RCTs). Supported by positive meta-analysis and validated evidence-based guideline (EBG) (Algorithms for Critical Care Enteral and Parenteral Therapy [ACCEPT] trial).

Recommendation favoring early parenteral nutrition (<24 hours) over delayed (>24 hours) enteral nutrition

5 Level II RCTs. Supported by positive meta-analysis and validated evidence-based guideline (ACCEPT).

Grade B

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3 Level II RCTs. Supported by validated evidence-based guideline (ACCEPT).

Recommendation favoring parenteral nutrition over standard care (intravenous glucose)

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Recommendation favoring postpyloric feeding when gastric feeding not tolerated

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Recommendation favoring prokinetics when gastric feeding not tolerated

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Recommendation favoring enteral nutrition supplemented with parenteral nutrition if 80% of goals not met by 72 hours with enteral nutrition alone (after consideration of postpyloric feeding, prokinetics, or both)

4 Level II RCTs. Supported by validated evidence-based guideline (ACCEPT).

Recommendation favoring protocolized management of diarrhea

Supported by validated evidence-based guideline (ACCEPT).

Recommendation favoring protocolized definition of intolerance of enteral nutrition, which includes gastric residual values >200 mL

Supported by validated evidence-based guideline (ACCEPT).

Grade B–

Consider parenteral nutrition with glutamine instead of standard parenteral nutrition

4 Level II RCTs. Supported by meta-analysis, heterogeneity present.

Glutamine may be beneficial in select patients. To identify which patients may benefit, each constituent RCT should be reviewed and clinical judgment should be exercised.

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early (< 24 h) EN in critical illness

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.

early (< 24 h) EN in critical illness

Primary analysis

- Included only methodologically sound RCTs.

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early (< 24 h) EN in critical illness

Primary analysis

- Included only methodologically sound RCTs.

Simulation analysis

- Daren Heyland's 2003 meta-analysis recommends EN within 48 h.
- We duplicated his selection and analysis process, but only included trials where EN was initiated within 24 h of injury or ICU admission.

Heyland DK, Dhaliwal R, Drover JW, Gramlich L, Dodek P. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. *JPEN* 2003;27(5):355-373.

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.

Potentially relevant papers identified and retrieved
(N = 675)

Papers excluded, with reasons
(N = 170)
Not RCTs (Letters, observational studies, systematic reviews, narrative reviews, previous meta-analyses)

RCTs identified for detailed evaluation
(N = 505)

RCTs excluded, with reasons
(N = 475)
329 Did not provide a primary comparison of timing of EN (includes 5 pseudo-randomised trials + 99 trials not reporting clinically meaningful outcomes)
72 Not adult critically ill population
46 Not primary nutritional support intervention (GH etc)
16 Cross-over trials
13 Pre-operative interventions

RCTs evaluating timing of EN
(N = 30)

Excluded RCTs
(N = 24)
7 - Early EN not started within 24 h of injury or ICU admission
4 - Patient oriented outcomes not reported (no mortality etc)
5 - Not critically ill patient population
2 - Early post-op oral intake, not early EN
2 - EN commenced at same time in both groups
1 - Immuno-enhanced EN (Impact)
2 - Excessive loss to follow-up
1 - Subgroup from a larger trial

Included in primary analysis
(N = 6)

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

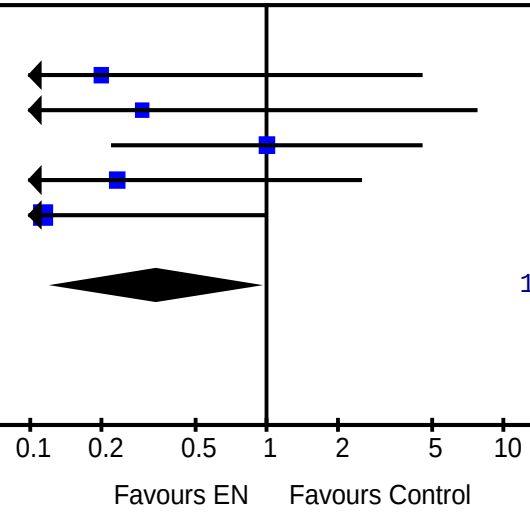
Doig GS, Heighes PT, Simpson F, Sweetman EA and Davies AR. Enteral nutrition within 24 h of ICU admission significantly reduces mortality: A meta-analysis of RCTs. *Intensive Care Medicine* 2009 Dec;35(Issue 12):2018-2027.

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

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

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)

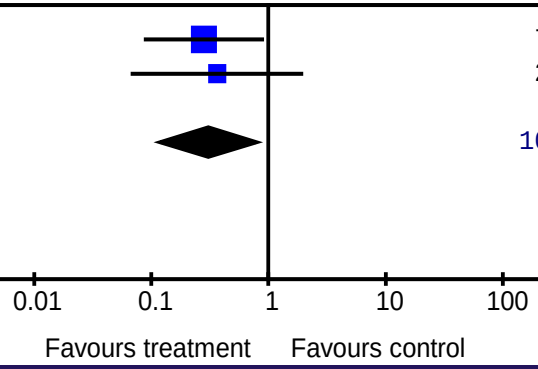
Doig GS, Heighes PT, Simpson F, Sweetman EA and Davies AR. Enteral nutrition within 24 h of ICU admission significantly reduces mortality: A meta-analysis of RCTs. *Intensive Care Medicine* 2009 Dec;35(Issue 12):2018-2027.

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

Study or sub-category	early EN (<24 h) n/N	Control n/N	OR (fixed) 95% CI	Weight %	OR (fixed) 95% CI
Kompan 2004	9/27	16/25		70.15	0.28 [0.09, 0.88]
Nguyen 2008	3/14	6/14		29.85	0.36 [0.07, 1.91]
Total (95% CI)	41	39		100.00	0.31 [0.12, 0.78]

Total events: 12 (early EN (<24 h)), 22 (Control)
Test for heterogeneity: $Chi^2 = 0.06$, df = 1 (P = 0.80), $I^2 = 0\%$
Test for overall effect: Z = 2.47 (P = 0.01)



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

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.

Simulation study: Heyland's 2003 MA

- We conducted a *simulation study* to test the appropriateness of key assumptions behind our study selection and analysis techniques.

- We duplicated Heyland's 2003 MA,
  - we used Heyland's selection process and analysis techniques
  - BUT we only included articles that provided EN within 24 h of injury or ICU admission

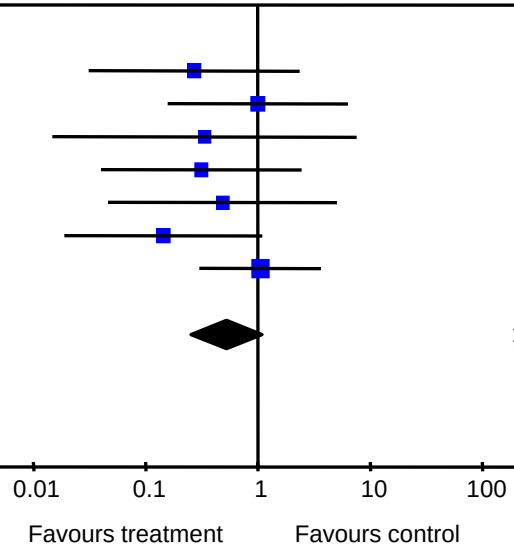
Heyland DK, Dhaliwal R, Drover JW, Gramlich L, Dodek P. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. *JPEN* 2003;27(5):355-373.

Simulation study: Heyland's 2003 MA

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

Study or sub-category	Early EN (<60 h) n/N	Control n/N	RR (random) 95% CI	Weight %	RR (random) 95% CI
Chiarelli	0/10	0/10			Not estimable
Chuntrasakul	1/21	3/17		11.14	0.27 [0.03, 2.37]
Eyer	2/19	2/19		15.27	1.00 [0.16, 6.38]
Kompan	0/14	1/14		5.39	0.33 [0.01, 7.55]
Minard	1/12	4/15		12.42	0.31 [0.04, 2.44]
Moore	1/32	2/31		9.51	0.48 [0.05, 5.07]
Pupelis	1/30	7/30		12.70	0.14 [0.02, 1.09]
Singh	4/21	4/22		33.57	1.05 [0.30, 3.66]
Total (95% CI)	159	158		100.00	0.52 [0.25, 1.08]

Total events: 10 (Early EN (<60 h)), 23 (Control)
Test for heterogeneity: $Chi^2 = 4.05$, df = 6 (P = 0.67), $I^2 = 0\%$
Test for overall effect: Z = 1.76 (P = 0.08)



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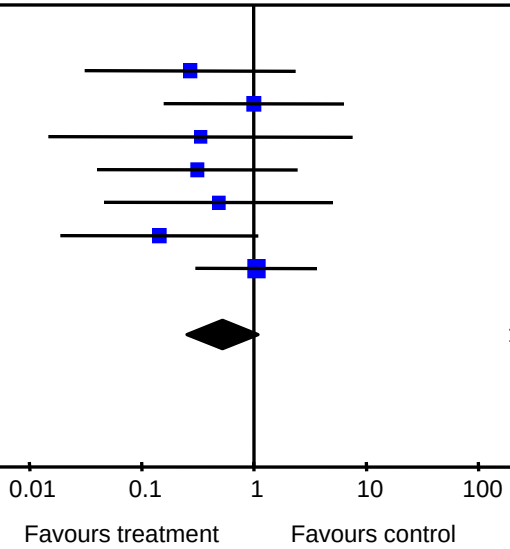

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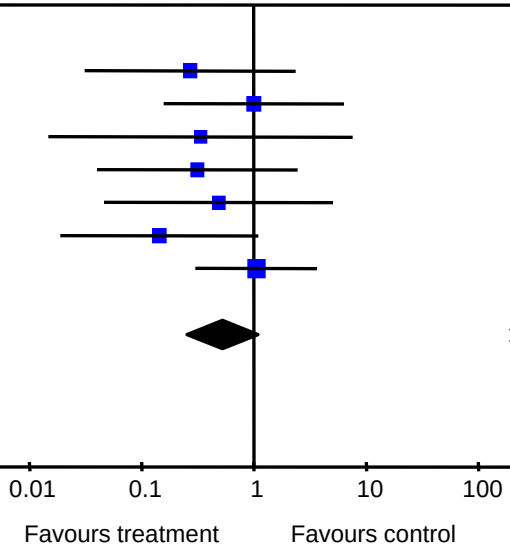
Singh (<48 h)	4/21	4/22		33.57	1.05 [0.30, 3.66]
Total (95% CI)	159	158		100.00	0.52 [0.25, 1.08]

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)



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

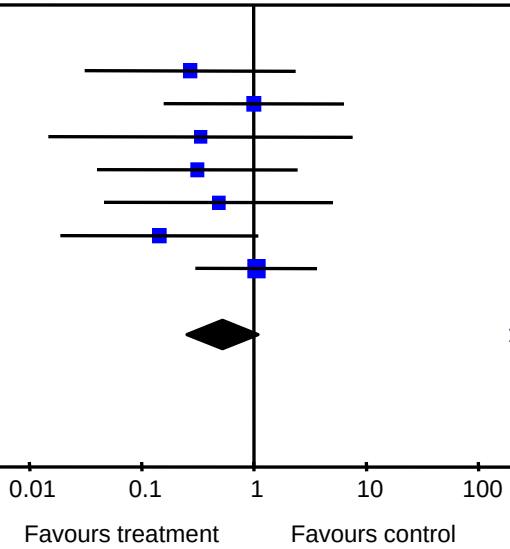
Heyland DK, Dhaliwal R, Drover JW, Gramlich L, Dodek P. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. *JPEN* 2003;27(5):355-373.

Simulation study: Heyland's 2003 MA

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

Study or sub-category	Early EN (<60 h) n/N	Control n/N	RR (random) 95% CI	Weight %	RR (random) 95% CI
Chiarelli	0/10	0/10			Not estimable
Chuntrasakul	1/21	3/17		11.14	0.27 [0.03, 2.37]
Eyer (average time to early EN: 31 h)	2/19	2/19		15.27	1.00 [0.16, 6.38]
Kompan	0/14	1/14		5.39	0.33 [0.01, 7.55]
Minard (<60 h)	1/12	4/15		12.42	0.31 [0.04, 2.44]
Moore	1/32	2/31		9.51	0.48 [0.05, 5.07]
Pupelis	1/30	7/30		12.70	0.14 [0.02, 1.09]
Singh (<48 h)	4/21	4/22		33.57	1.05 [0.30, 3.66]
Total (95% CI)	159	158		100.00	0.52 [0.25, 1.08]

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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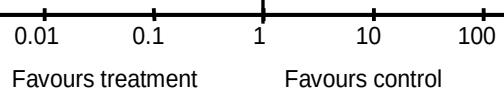
Pupelis	1/30	7/30		12.70	0.14 [0.02, 1.09]
Singh (<48 h)	4/21	4/22		33.57	1.05 [0.30, 3.66]
Total (95% CI)	107	102		100.00	0.26 [0.08, 0.83]

Total events: 3 (Early EN (<60 h)), 13 (Control)
Test for heterogeneity: Chi² = 0.64, df = 3 (P = 0.89), I² = 0%
Test for overall effect: Z = 2.27 (P = 0.02)



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

Therefore, evidence of benefit has been present in our literature since at least 2003, if early EN is defined as < 24 h from admission or injury!!!

Background: Review of the Guidelines

Five major clinical practice guidelines recommend *early* EN.

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- *Canadian guideline,*

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McClave SA, Martindale RG, Vanek VW, *et al*. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: : Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *J Parenter Enteral Nutr* 2009;33: 277

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< 48 h	– *Canadian guideline,*	Evidence of trend.
< 24 h	– *ACCEPT guideline (also Canadian),*	Significant evidence.
< 24 h	– *Australian and New Zealand guideline,*	Significant evidence.
< 24 h	– *European (ESPEN) guideline and*	Significant evidence.
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Practice change in the ICU

Change management encompasses a broad set of theories and structured processes aimed at helping to transition *individuals*, *teams* and *organisations* from a current state to a desired future state.

Smith WR. Evidence for the effectiveness of techniques to change physician behavior. *Chest* 2000;118(2) Suppl :8S-17S

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Change management encompasses a broad set of theories and structured processes aimed at helping to transition *individuals*, *teams* and *organisations* from a current state to a desired future state.

Practice change strategies should be *theory driven* and *evidence based.*

- supported by evidence that proves the theory correct.

Smith WR. Evidence for the effectiveness of techniques to change physician behavior. *Chest* 2000;118(2) Suppl :8S-17S

Efficient and effective change

1) Understand the evidence

- Conduct a formal critical appraisal of methodological quality.

Efficient and effective change

2) Conduct an Audit

- Review your own practice and your ICU's practice over time.

Efficient and effective change

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- Review your own practice and your ICU's practice over time.
- Undertake an external comparison to similar hospitals.
  - *Remember to use the correct metric: Early = within 24 h!!*

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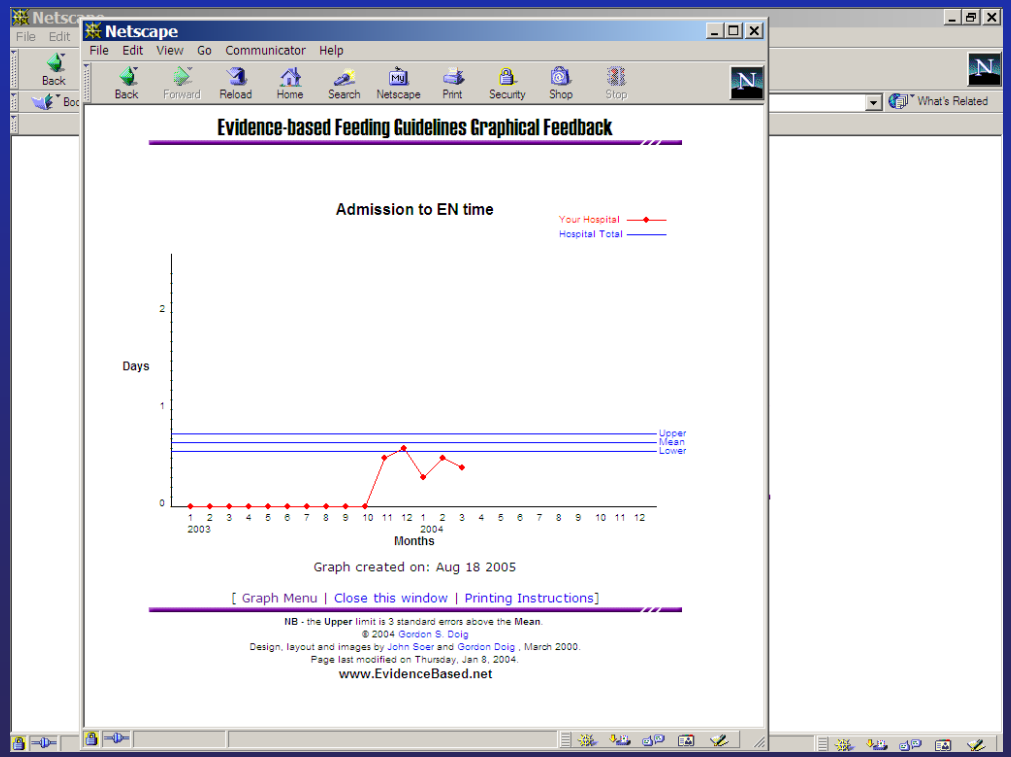

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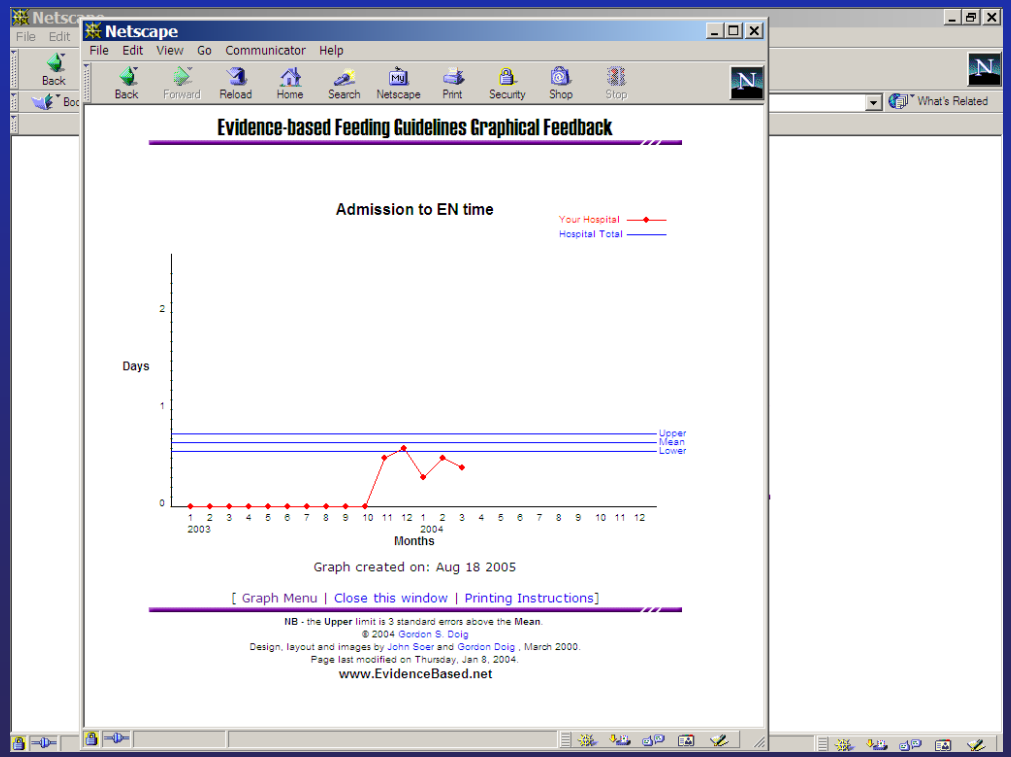

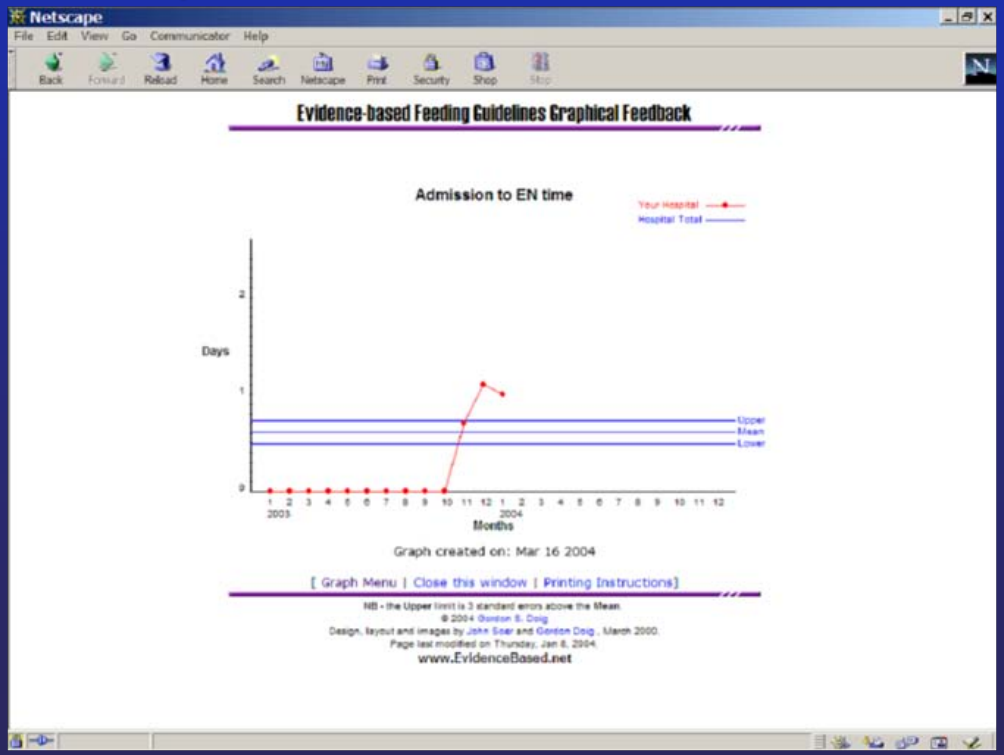

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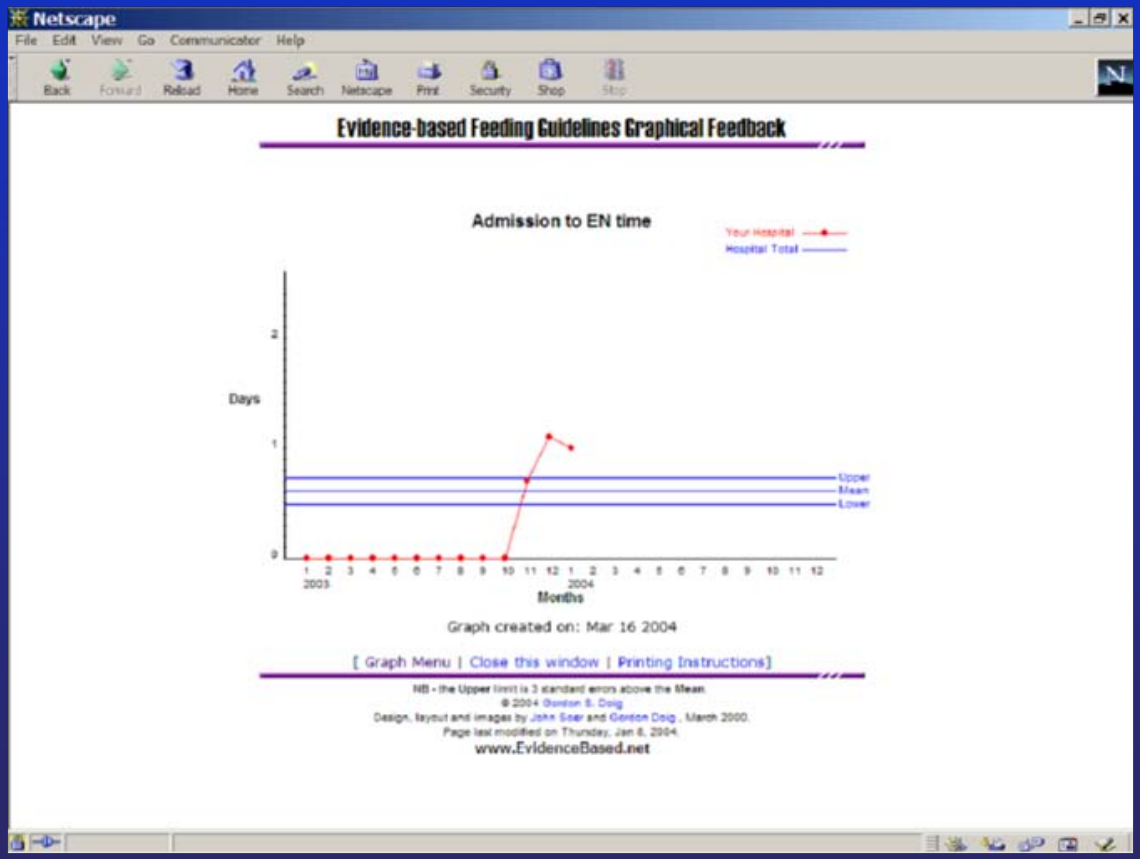

- Promotes awareness of the need for change.
- Allows clinicians to see ‘others’ using the new technology.
- Regarded as being a *moderately strong* motivator for change.

Sinuff T, Cahill NE, Dhaliwal R, Wang M, Day AG, Heyland DK. The value of audit and feedback reports in improving nutrition therapy in the intensive care unit: a multicenter observational study. *J Parenter Enteral Nutr*. 2010 Nov-Dec;34(6):660-8

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3) Provide feedback

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3) Provide feedback: Academic Detailing

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Academic Detailing is the single most powerful way to change physician practice patterns when conducted *peer to peer.*

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"*short*, *one-to-one* conversations between a detailer and a practitioner with the goal of persuading the detailee to change behavior through the provision of *useful information and evidence*"

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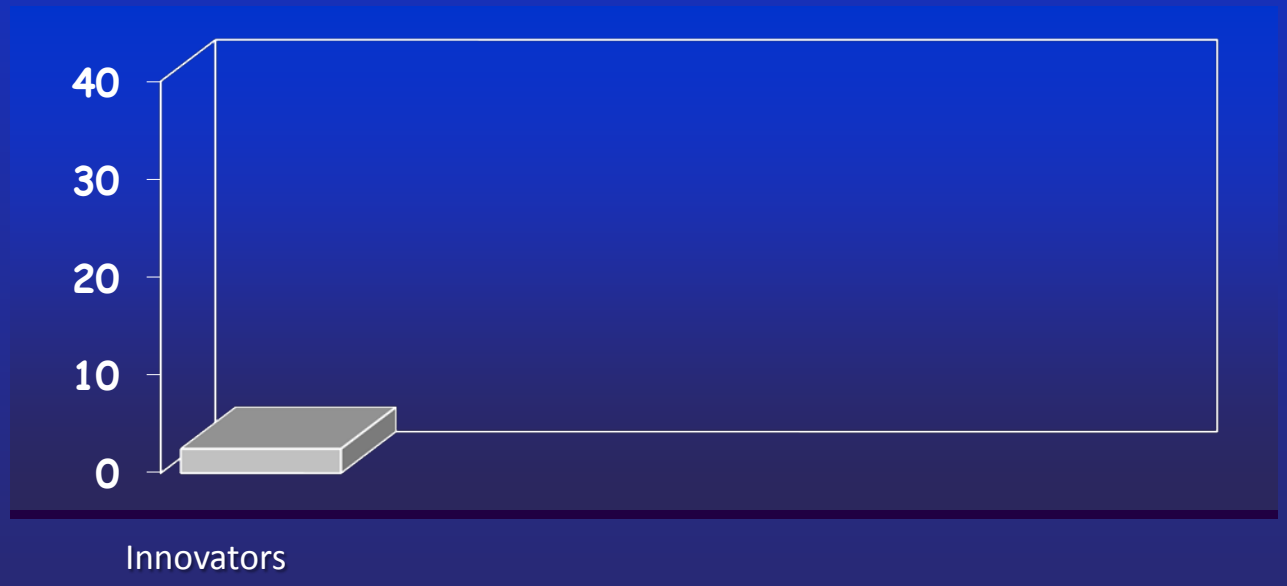

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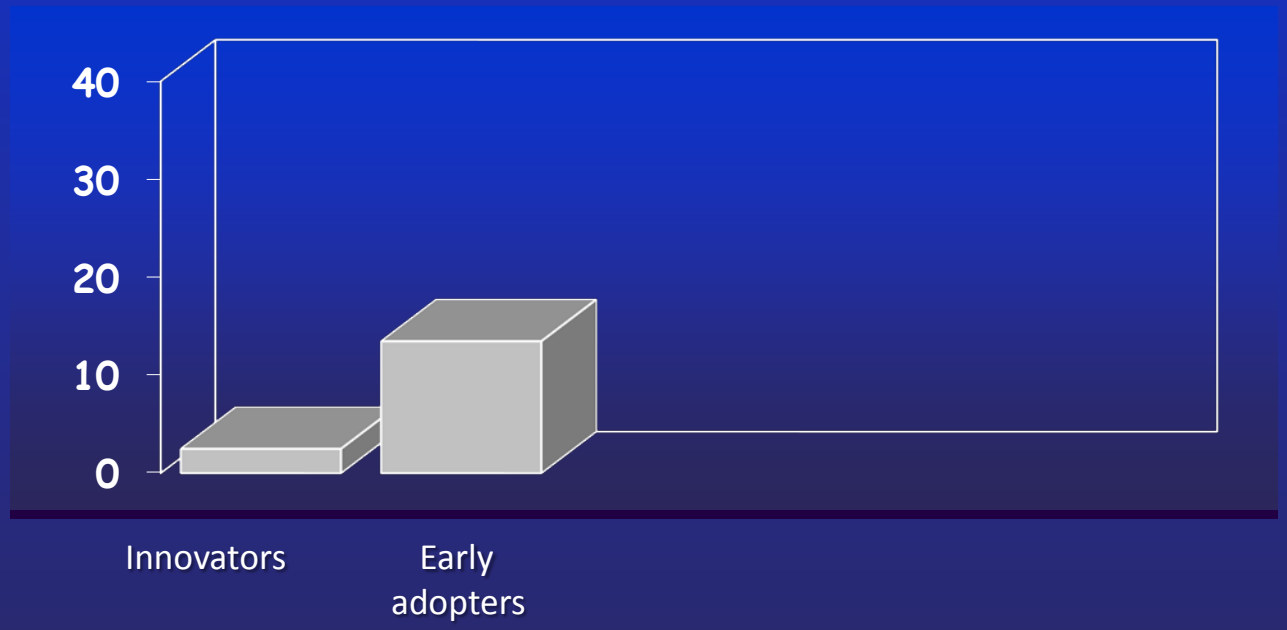

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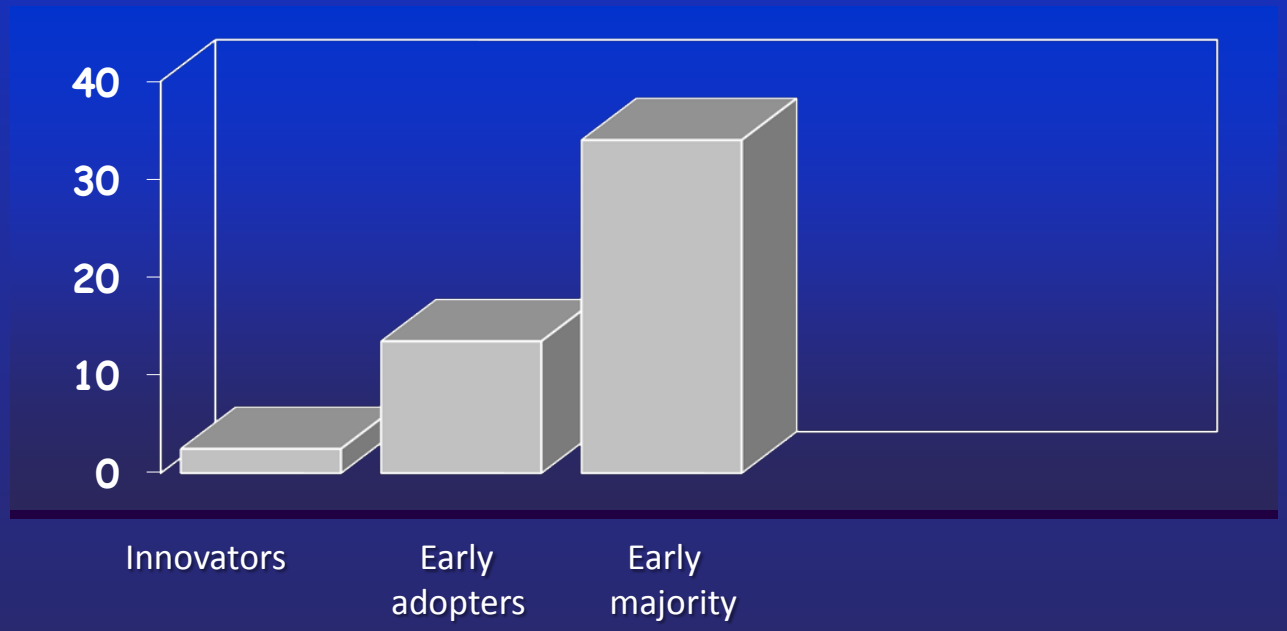

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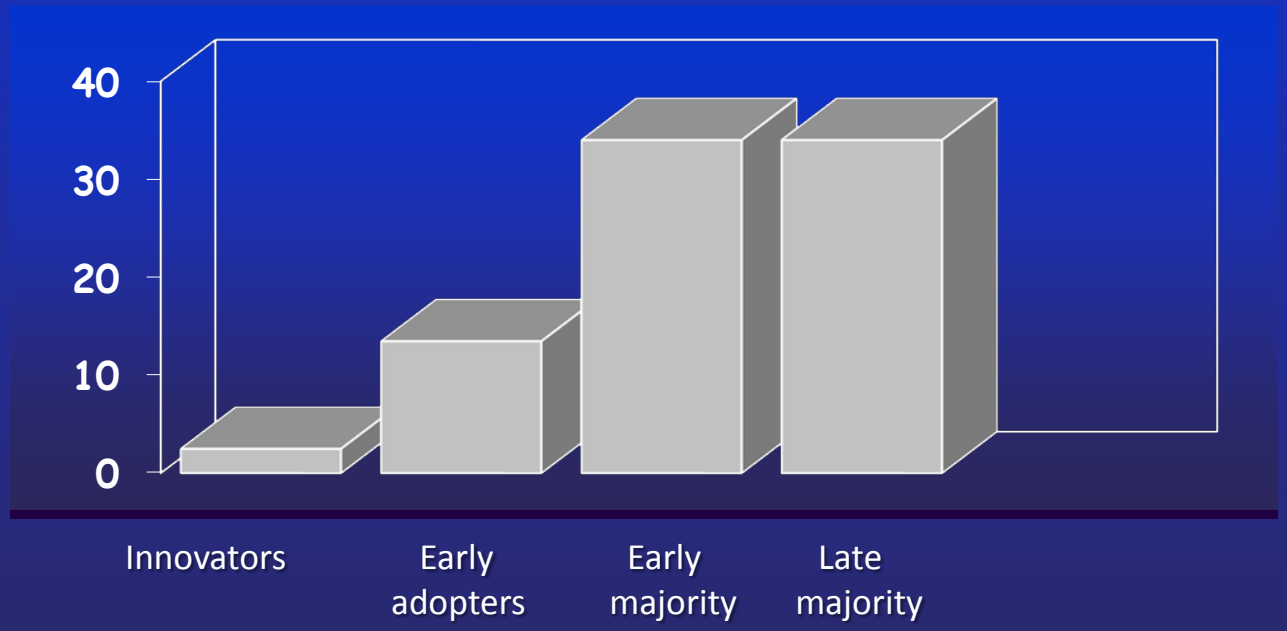

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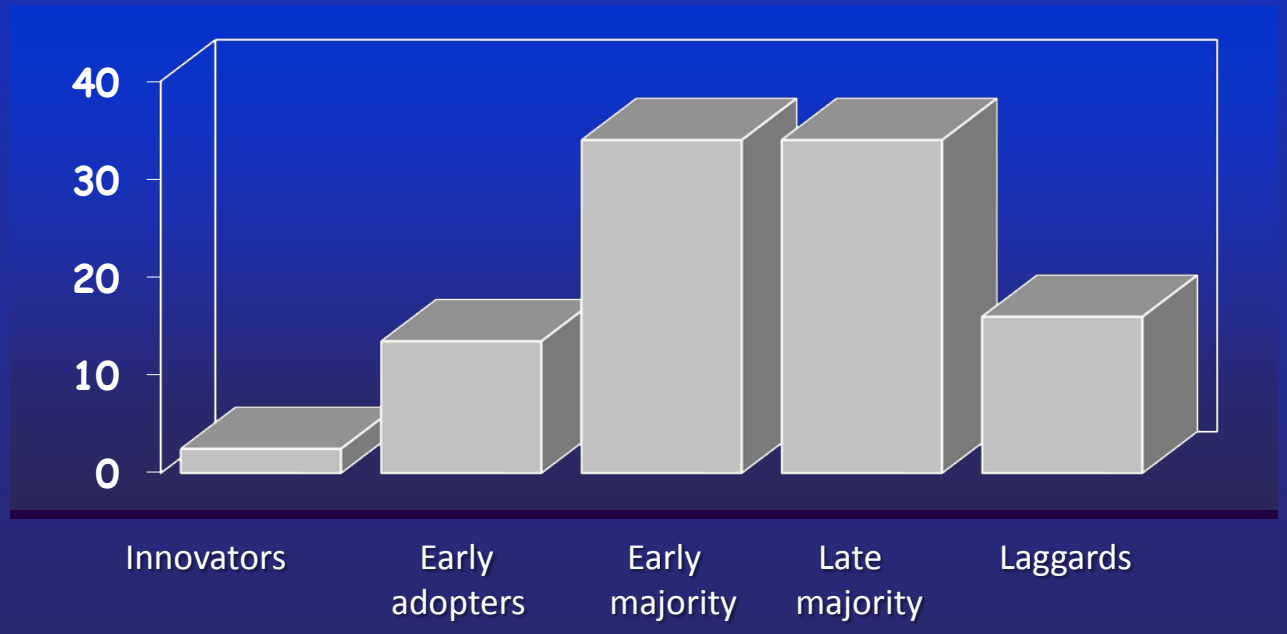

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Efficient and effective change

5) Repeat steps 2, 3 and 4 as required.

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 in implementing evidence-based guidelines. *J Eval Clin Pract* 2007 Oct;13(5):709-15.

Efficient and effective change: Recap

1) Understand the evidence

2) Conduct an audit

3) Provide feedback: Academic detailing

4) Add tincture of time.

5) Repeat steps 2, 3 and 4 as required.

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How is your ICU performing?

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THE UNIVERSITY OF SYDNEY

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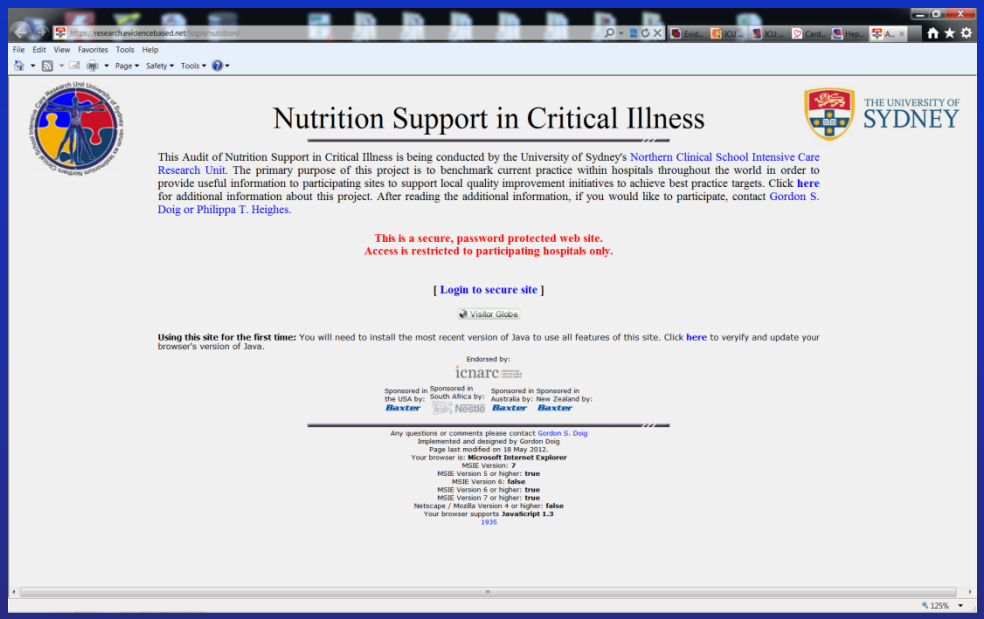

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How is your ICU performing?

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

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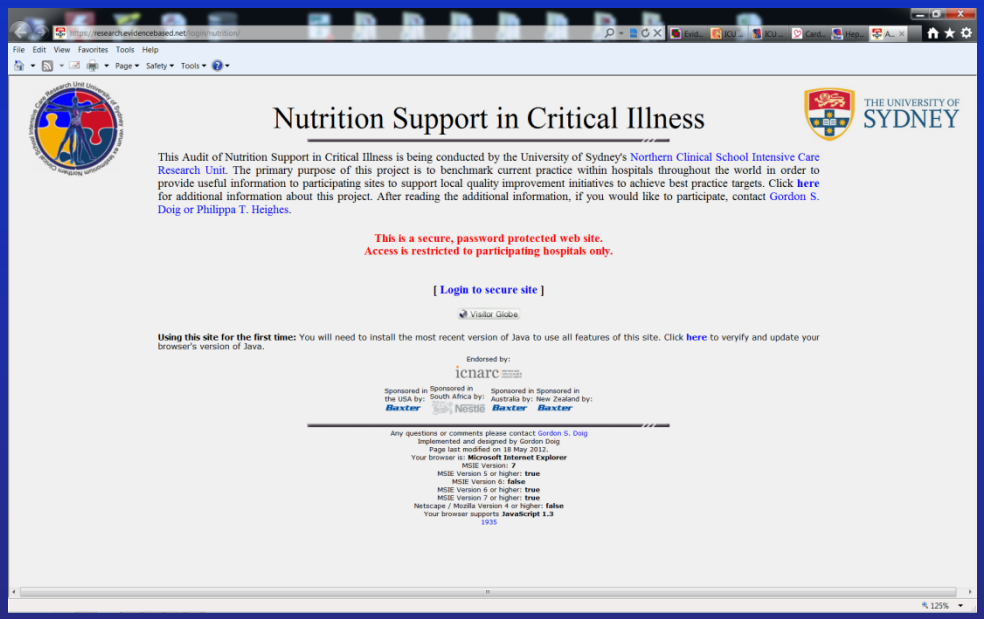

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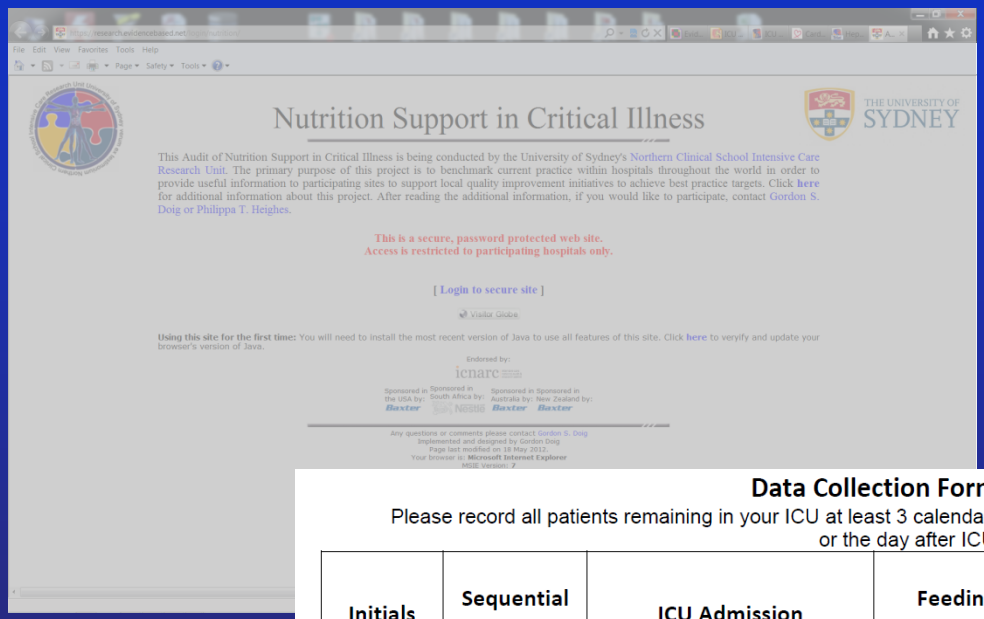

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Data Collection Form: ICU Nutrition Audit

Please record all patients remaining in your ICU at least 3 calendar days, who did not receive oral nutrition on day of ICU admit (Day 1) or the day after ICU admission (Day 2).

Initials	Sequential Number	ICU Admission		Feeding Start or ICU discharge		Type of Feeding Started Select a number: (1) Enteral Nutrition; (2) Parenteral Nutrition; (3) EN+PN; (4) Oral feeding; (5) No feeding started.
	eg (001)	*dd/mm/yy*	*24 h clock*	*dd/mm/yy*	*24 h clock*	

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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...

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ICU Nutrition Audit Data Submission Form

Hospital ID AA	Region SA
Patient No.	

ICU Feeding Process Measures					
ICU Admission date	2012	Nov	26	Time:	24h clock
Outcome type:					
Outcome date:				Time:	24h clock

EN start date
PN start date

Check data before submitting

Submit

All submissions are FINAL

This will reset ALL the fields

Reset

[Close this window]

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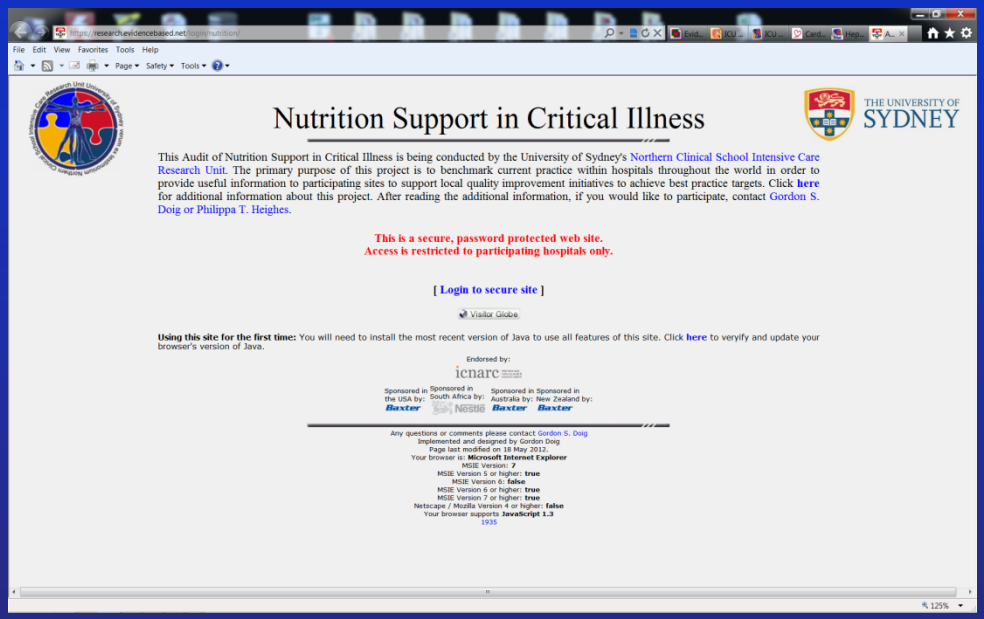

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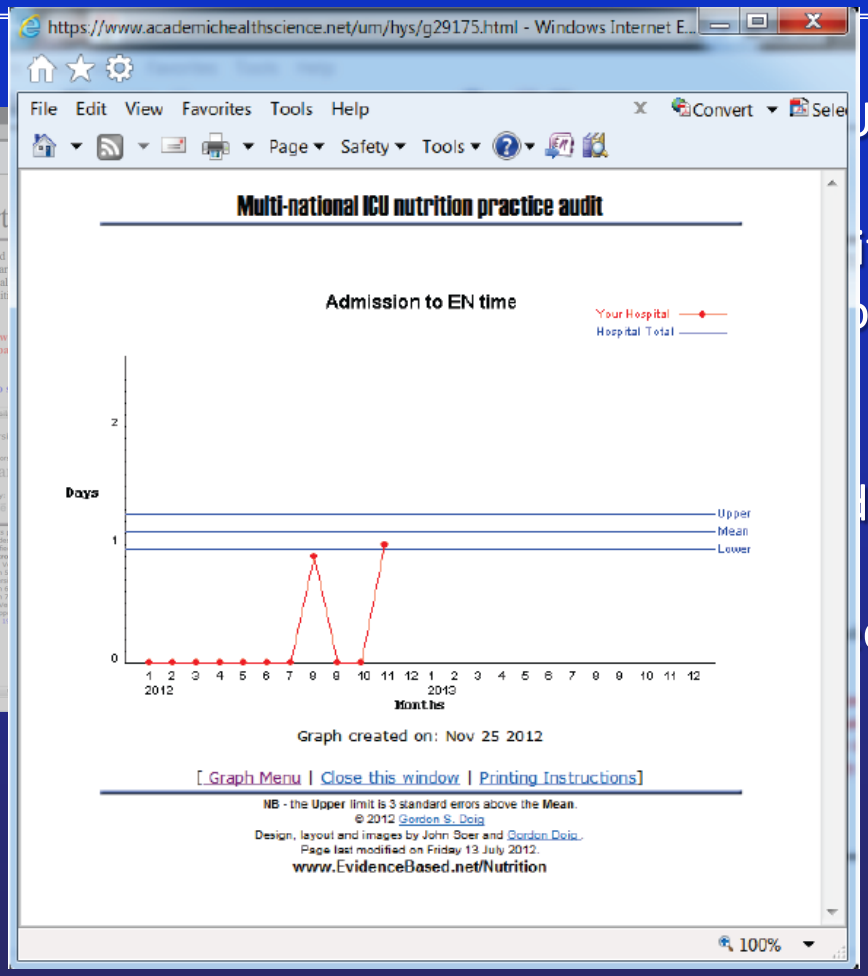

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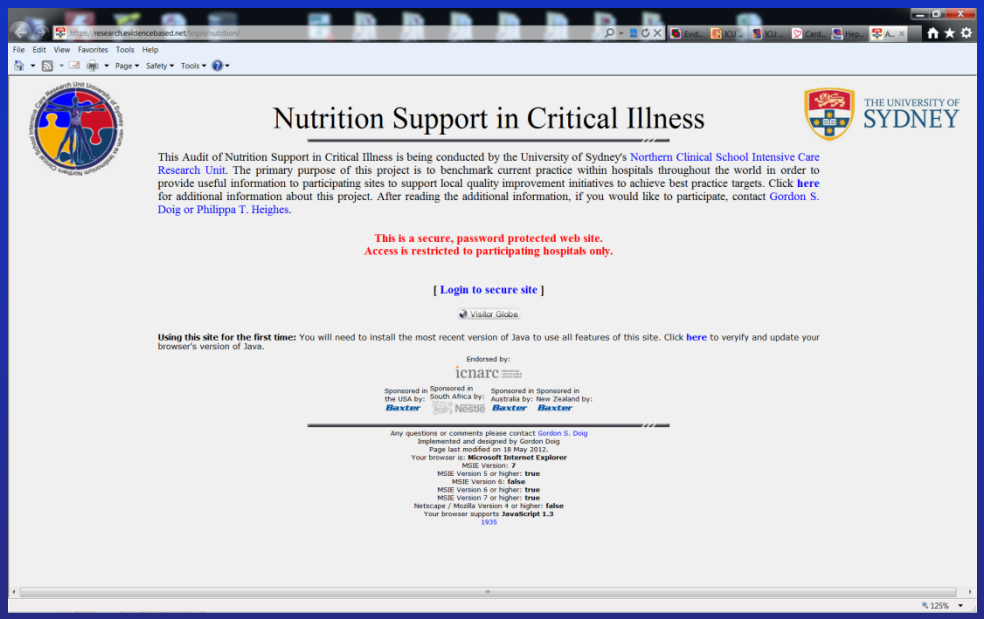

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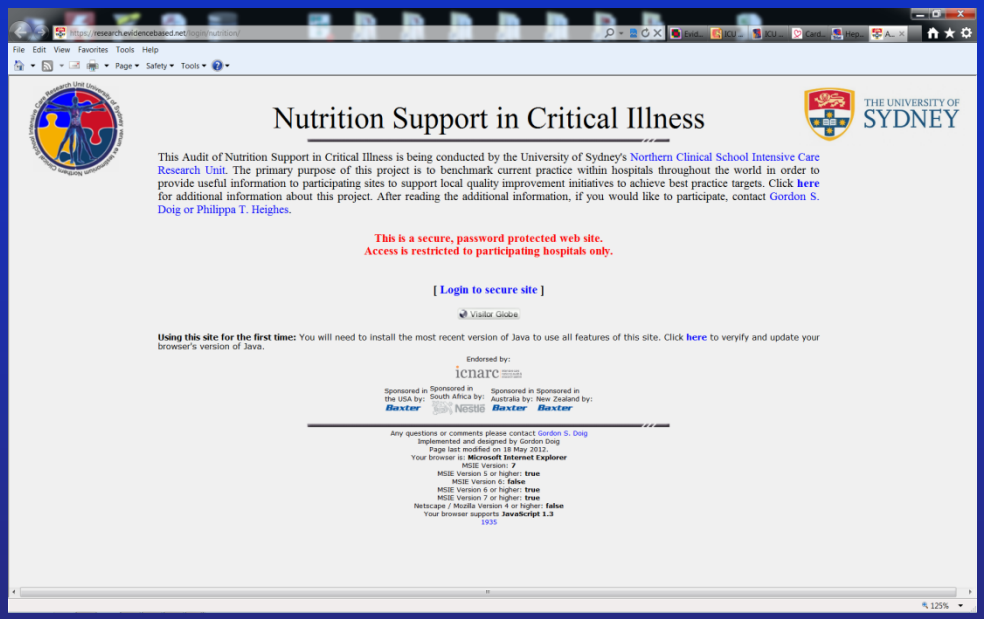

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- If your data suggests you could improve practice, Phase II of the project will help you improve by providing you with a comprehensive change management strategy to focus on the aspect of nutrition therapy that needs change.
- No costs involved (to you or your hospital).

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