The PEP uP Protocol
I’M HUNGRY!!
PEP uP Study

**Design:** Prospective, cluster-randomized trial.

**Setting:** 18 ICUs from United States and Canada.

**Patients:** 1059 mechanically ventilated, critically ill patients.

**Interventions:** A novel feeding protocol combined with a nursing educational intervention.
The two primary outcomes of this study are:

Proportion of
(1) protein and (2) energy prescriptions received enterally over the first 12 days in the ICU.

Secondary outcomes include:
Incidence of vomiting
Witnessed aspiration
ICU-acquired pneumonia
Methods

- Cluster randomised trial of 18 North American ICUs
- Both academic teaching centres and community hospitals participated
- Sites were randomised to study and control groups
- Before and after data collected to determine differences
Patient eligibility

- All adult patients (≥18 years of age)
- Mechanically ventilated before or within the first 6 hours of admission to ICU.
- Remained mechanically ventilated >72 hrs.
Exclusion criteria

- Nutrition (either EN or PN) started before admission to ICU,
- Not intubated within 6 hours of admission to ICU
- Receiving non-invasive ventilation (i.e. mask ventilation) during the first 6 hours of ICU stay or
- Moribund (as evidenced by death within 48 hours of admission to ICU)
Adequate Nutrition

- Provides fuel for cellular metabolism
- Prevents protein/muscle wasting
- Decreases ventilator time
- Helps prevent infection/VAP
- Decreases ICU length of stay
- Promotes healthy wound healing
- Reduces mortality
GUT disuse causes loss of functional and structural integrity of the GI tract and is associated with increased complications.

These changes are time dependent; the longer they are left NPO, the greater the complications.
Our ICU Has Joined the PEP uP Protocol Trial!

Main Objective:

To study the effect of an innovative enteral feeding protocol and nursing education program on the adequacy of enteral feeding delivery.
Main Features the PEP uP Protocol

- All patients will receive Peptamen 1.5 initially
- All patients will start on Beneprotein®
  - 2 packets (14 g) mixed in 120ml water administered bid via NG
- All patients will be given metaclopramide on Day 1 of enteral feeding
  - 10 mg IV q 6h

....... Reassess formula, protein supplement, and motility agent daily
Get PEPed up!

**Option 1: Begin Volume-Based feeds.**

- The 24 hour period begins at XXXXh daily.
- Patient is to receive **Peptamen 1.5** initially.
- The total target volume for Day 1 of EN is based on the patient’s weight in kilograms.
- Consult dietitian to reassess 24 hr target volume as soon as possible.
- Determine hourly rate as per Volume Based Feeding Schedule.
- Monitor gastric residual volumes as per Gastric Feeding Flowchart and Volume Based Feeding Schedule.
What is volume based feeding?

- It is based on a 24 hour volume total rather than an hourly rate.

- The initial infusion rate is determined by dividing the total by 24.

- The hourly rate may be changed during the day due to interruptions (i.e. tests, surgery) to achieve the 24 hour volume total.

- During daily rounds nursing report will include the percentage of feeds the patient received the previous day.

- The goal is to improve nutrition in ICU patients.
Get PEPed up!
Option 2: Trophic feeds

**Begin** Peptamen 1.5 at 10 mL/h after initial tube placement confirmed. Hold if gastric residual volume >500 ml and ask Doctor to reassess.

**Reassess** ability to transition to Volume-Based feeds next day.

**Intended for patient who is:**

- On vasopressors (regardless of dose) as long as they are adequately resuscitated
- Not suitable for high volume enteral feeding (ruptured AAA, surgically place jejunostomy, upper intestinal anastomosis, or impending intubation)
Get PEPed up!
Option 3: NPO

NPO

- **Only** if contraindication to EN present: bowel perforation, bowel obstruction, proximal high output fistula.

- **X** Recent operation and high NG output are not a contraindication to EN.

- **✓** Reassess ability to transition to Volume-Based feeds next day.
Place feeding tube or use existing gastric drainage tube. X-ray to confirm placement (as required)

Elevate head of bed to 45° (or as much as possible) unless contraindicated.
Start feed at initial rate or volume ordered.

Measure gastric residual volumes q4h.
Is the residual volume > 300 ml?
NOTE: Do not aspirate small bowel tubes.

Replace up to 300mL of aspirate, discard remainder. Set rate of EN based on remaining volume and time until X-am (max rate 150mL/hr). Reassess motility agents after feeds tolerated at target rate for 24 hours.

Replace 300 mL of aspirate, discard remainder. Reduce rate by 25 mL/h to no less than 10 mL/h.

**Step 1:** Start metoclopramide 10mg IV q 6 hr. If already prescribed, go to Step 2.
**Step 2:** Consider adding erythromycin 200 mg IV q12h (may prolong Qt interval). If 4 doses of erythromycin are ineffective, go to Step 3.

**Step 3:** Consider small bowel feeding tube placement and discontinue motility agents thereafter.

Was the residual volume greater than 300 mL the last time it was measured?
Education tools

- 2 Power point presentations
- Self-directed learning module
- Power point slides for rotating notices on computers/unit displays
- Posters for display in participating units
- Participating sites oriented to materials
Data Collection

- Began September 2010
- 30 consecutive eligible patients
- Randomised to control group and intervention group
- Data collection repeated ~ 6 months later
- Daily nutrition information collected on each patient for maximum 12 days
## Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
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<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Follow-up</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>270</td>
<td>252</td>
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<tr>
<td><strong>Age</strong></td>
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<tr>
<td><em>Mean ± SD</em></td>
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<tr>
<td></td>
<td>65.1±15.5</td>
<td>64.1±16.7</td>
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<tr>
<td><strong>Sex</strong></td>
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<tr>
<td><em>Male (%)</em></td>
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<tr>
<td></td>
<td>157(58.1%)</td>
<td>137(54.4%)</td>
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<tr>
<td><strong>Admission category</strong></td>
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<tr>
<td><em>Medical</em></td>
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<td></td>
<td>230(85.2%)</td>
<td>222(88.1%)</td>
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<td><em>Elective surgery</em></td>
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<td>14(5.2%)</td>
<td>12(4.8%)</td>
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<td><em>Emergent surgery</em></td>
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<td>26(9.6%)</td>
<td>18(7.1%)</td>
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Results

➢ Control and Intervention group same amount protein and calories at baseline

➢ Received significantly more total protein and calories from EN than compared to baseline

➢ 47 vs. 34 %, p=0.005 for protein, 44 vs. 32 %, p=0.001 for calories

➢ Control group did not increase.

➢ Increase in protein and calories was statistically significantly greater in the intervention arm than the control group (p=0.005 and p=0.0004 respectively.)
Results

- PEP uP protocol decreased the time from ICU admission to start of EN compared to the control group
  - 40.7 to 29.7 hours vs. 33.6 to 35.2 hours, p=0.10
- On average, patients remained on study protocol for 6.3 days and had interruptions to their feeding protocol on 2.9 days during their ICU stay.
- Main reason for interrupting the feeding protocol was for procedures
Results

- Initial nutrition order in the intervention group included more patients ordered to receive trophic feeds and 24-hour volume feeds compared to baseline.
- In the first 48 hours, only 48.5% of patients actually received motility agents.
- 31.7% received protein supplements.
- Of those started on EN, 67.5% were started on Peptamen 1.5.
- There was no significant difference in complication rates between the 2 groups.
Strengths

- Robust study design
- Large sample size
- Included a variety of different ICUs in Canada and the United States.
- Results of our study are generalizable to a broad range of ICUs struggling with achieving adequate nutritional performance.
Limitations discussion

- ICU’s with < 50% nutritional performance
- Poor compliance with PEPuP protocol
  - No motility or protein supplements
  - Not started on weekends
- Implemented in all patients even if not fed
- Failed to show a difference with this novel protocol
Conclusions

- Safe to start patients on full volume feeds on admission
- Have the potential to reach 80% of goal calories and protein by day 3
- Greater attention to implementation there is the potential to improve protein and calorie intake even further.
Further study

➢ Further protocols that deal with feeding interruptions
➢ Repeat study with focus on patients in ICU > 72 hours
➢ Implement protocol with increased emphasis on knowledge translation
Further resources

➢ PEP uP Collaborative

➢ www.criticalcarenutrition.com
PEP uP Steering Committee

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