Who took my food?
Your Nurse did!!! What???
How much nutrition does your patient really receive?

Total ordered: 1000 mL  
Actual delivered: 700 mL
Underfeeding: Silent Starvation Syndrome

Presented by Jennifer Veler, MSN, RN, CNL, CCRN
Evidence-Based Practice Fellow
NorthBay Healthcare ICU Project
August 2, 2018
Underfeeding: Silent Starvation Syndrome
Learning Objectives

- After completing the presentation:
  - The learner will be able to describe how the project was developed and implemented
  - The learner will be able to identify the significance of the results and the implications for practice change
  - The learner will be able to explain the gastric residual volume (GRV) threshold and volume-based enteral nutrition (VBEN)
PICOT Question

- In adult critical care patients, how does a nurse-driven protocol for volume-based enteral nutrition compared to rate-based enteral nutrition without a nurse-driven protocol affect percentage of daily caloric intake goals and accuracy of nursing documentation?
Attain

Definition: to reach as an end; gain, achieve (Merriam-Webster, 2019)

- Objectives
- Implementation:
  - Education
  - PowerPoint & handouts
  - ICU Skills Day
  - Pilot the EBP project
  - PDSA
  - Implement in both ICU’s
Implementation

- Primary stakeholder meeting: nurse, Clinical Nurse Specialist, Registered Dietitian, Intensivist
- Formulate an algorithm
- Algorithm approval by Critical Care Medical Director & Registered Dietitian
- Algorithm approval by Nursing Director and Manager of Critical Care Services
- Formulate Daily Caloric Intake Tracking Sheet
Implementation

- Education sessions at the June Intensive Care Unit (ICU) Skills Day meetings
- Initial launch at VacaValley Hospital Intensive Care Unit
- Pilot for one month
- PDSA
- Implement project at NorthBay Medical Center Intensive Care Unit
Underfeeding: Silent Starvation Syndrome  
EBP Project Learning Objectives

- After completing the lesson:
  - The nurse will be able to explain the gastric residual volume (GRV) threshold and volume-based enteral nutrition.
  - The nurse will also be able to compute the volume to recover and make adjustments in the tube feeding rate.
Underfeeding: Silent Starvation Syndrome

- **Problem:** current standard of practice is rate-based enteral nutrition without a nurse driven protocol
- patient’s tube feeding turned off; assessment of gastric residual volume (GRV), tasks, diagnostics
- patient deprived of nutrition creating a caloric deficit
- patient’s daily nutrition goals are not met

- **Purpose:** an evidence-based quality improvement project
  - implement a nurse-driven volume-based protocol for enteral nutrition
  - increase caloric intake
  - achievement of daily nutrition goals
Underfeeding: Silent Starvation Syndrome

- **Significance:** Majority of ICU patients are not fed enough calories or protein to allow for healing (61.2% calories, 57.6% protein)

- **Statistics:** Proportion of prescribed energy from EN according to initial EN delivery strategy. Heyland et al. (2015)
Underfeeding: Silent Starvation Syndrome
Individual Studies of Importance

  - found volume-based feeding met target of 80% caloric intake
  - recommend initiate EN early using a protocol
- McClave, S., Mohamed, S., Esterle, M., Anderson, M., Jotautas, A., Franklin, G., Heyland, D., Hurt, R.
  - found the greater the caloric deficit led to worsened patient outcomes, increased ICU LOS
  - recommend volume-based EN
- Taylor, B., ...Roberts, P.
  - found amounts of GRV for holding EN inconsistent
  - recommend continued feeding if GRV<500 mL
Underfeeding: Silent Starvation Syndrome
Operational Definitions

- **Nurse-driven protocol** – the nurse initiates the detailed plan of the medical/nursing treatment according to a set protocol. Barto ( )

- **Volume-based** – allows for adjustment in the feeding rate to make up for interruptions or periods of feeding cessation. McClave et al. (2015)

- **Rate–based** - 24 hour estimated or measured requirements are provided continuously by a consistent hourly rate of infusion. This method does not allow for any means of correcting the deficit should cessation of feeds OCCUR. McClave et al. (2015)
Underfeeding: Silent Starvation Syndrome
Looking Ahead

• Implications for nursing:
  • Empowerment
    • Autonomy
    • Decision-making
  • Provision of care
    • Evidence-based practice

• Principle stakeholders:
  • Patient
    • Improved outcomes
  • Nurses
    • Point of Care
  • Intensivist
    • Orders enteral nutrition, route, restrictions
  • Registered Dietician
    • Calculates daily caloric intake
Underfeeding: Silent Starvation Syndrome

Nurse-Driven Protocol for Volume-Based Enteral Nutrition

Goal: Achieve > 80% infusion of goal volume of enteral tube feeding by allowing RN to adjust infusion rate to recover interruptions in tube feeds.

- Intensivist orders volume-based tube feeding via nasogastric/orogastric route
- Registered Dietitian specifies formula
- Registered Dietitian calculates ‘Estimated Energy Needs High’ Kcal/day

Nurse initiates tube feeding at goal (Ex: Goal 1200 mL/24 hours, initiate feeds at 50mL/hr)

Check GRV q4h
- Maximum Gastric Residual Volume (GRV) threshold: 500 mL

Is GRV >500 mL?

- Refeed to maximum of 500 mL; discard excess; hold feeds; recheck residual in 1 hour
- Rechecked GRV >500mL?

Refeed GRV & continue tube feedings

- Recovery of Missed Tube Feeding:
  - Every 8 hours
  - Nurse advances tube feeding by 20ml/hr q hr at most
  - Maximum Infusion Rate: 150ml/hr
  - Reset the 24 hour goal at 0700

Consider Prokinetic Medications:
- Metoclopramide HCl 10 mg IV q6hrs
- Metoclopramide HCl 5 mg IV q6hrs (renal impairment)
- Erythromycin 250 mg NGT/OGT q8hrs

Consult Intensivist for Prokinetic medication &/or post-pyloric/small bore feeding tube
Physician orders Enteral Feeding continuous
Free Text: Volume-based Feeding Protocol
Find the Total Volume Goal
Click box to expand menu
Check Re-fed Feeding Residual
Document Re-fed amount including “O” for zero mL
Enter Enteral Feeding amount from the feeding pump
8 hour Shift Total should match the feeding pump intake

Do NOT enter the feeding rate every hour
This method gives the RD an incorrect calorie count: the patient is actually being underfed.

Volume off the feeding pump: Actual amount of tubed feeding patient received.

This method is accurate and provides the RD with the exact calories the patient was fed.

False amount: This is NOT the amount of tube feeding the patient received.
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# Daily Caloric Intake Tracking Sheet

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>24 hr Goal Volume in mL</th>
<th>Calculated Starting Goal rate: Goal Volume/24hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/5/18</td>
<td>0700</td>
<td>1200 mL</td>
<td>(1200mL/24=) 50mL</td>
</tr>
</tbody>
</table>

**Calculated Shift Tube Feeding:**
- AM Shift: 0700-1500
- Volume to Recover: AM Shift Tube Feeding – Volume Fed

<table>
<thead>
<tr>
<th>(50mL x 8=)</th>
<th>400mL</th>
<th>(400mL - 350mL=) 50 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>350 mL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PM Shift: 1500 – 2300:**
- PM Shift: 1500-2300
- Volume to Recover: PM Shift Tube Feeding – Volume Fed

<table>
<thead>
<tr>
<th>(400mL + 50mL=)</th>
<th>450mL</th>
<th>(50mL/20mL=) 2.5 hrs</th>
</tr>
</thead>
</table>

**NOC Shift: 2300-0700:**
- Volume Never Recovered: Shift Tube Feeding – Volume Fed

<table>
<thead>
<tr>
<th></th>
<th>Rate 70 mL</th>
<th>Rate 70 mL</th>
<th>Rate 60 mL</th>
<th>Rate 70 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Hr 20m mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Hr 20 mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd Hr 10 mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th Hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th Hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Patient Sticker**
24 Hour Total Volume of Tube Feeding

1. Look up the 24 Hour Total Volume of Tube Feeding in the Enteral Feeding Order
   Ex: 1200 ml

2. Verify the tube feeding hourly goal
   Ex: 1200ml / 24 hours = **50 mL/hr**

3. Calculate the amount of Shift Tube Feeding (STF)
   Ex: 50ml x 8 hours = 400 mL

4. End of Shift record Volume Fed (VF) off the feeding Pump
   Ex: 350mL

5. Subtract: STF – VF = Volume to Recover (VR)
   Ex: STF 400mL – VF 350mL = **VR 50mL**

   **On-coming RN**
   6. On-coming RN Add: STF + VR = new STF
      Ex: 400mL + 50mL = 450mL

7. Divide VR/20mL = hours to recover missed feedings
   Ex: 50mL/20mL = 2.5 hrs

8. Calculate increased hourly rate for the 2.5 hrs if TF is increased at 20mL/hr every hr
   1\(^{st}\) hour: 70mL (20mL recovered), 2\(^{nd}\) hour: 70 mL (20mL recovered), 3\(^{rd}\) hour: 60 mL (10 mL recovered) Total recovered: 20+20+10= **VR 50 mL**

9. Decrease rate to original goal rate
   Ex: 50 mL/hr

10. Repeat from Step 3
Underfeeding: Silent Starvation Syndrome

- Time to practice filling out the sheet and calculating the tube feeding adjustment
- Use the tracking sheet and the 24 Hr Volume instructions to calculate the PM shift tube feeding
- Question and answer session???
Engrain
Definition: to work indelibly into the natural texture or mental or moral constitution
(Merriam-Webster, 2019)

- Champions
- Establish a habit in daily routine
- Standardized workflow
Standardized Work

PROJECT TEAM:
EBP Project Leader: Jennifer Veler, RN
Clinical Mentor: 1 CNS
Change Team Members:
  • Opinion Leaders: 2 Day shift RN’s, 1 PM shift RN, 1 RD, 1 MD
  • Change Champions: 1 RN/shift (Day, PM, NOC), 12-hr RN’s 2/shift (Day, NOC)
  • Core Group: 2 Day shift RN’s, 1 PM shift RN, 1 NOC RN
NorthBay Healthcare Preceptor: 1 CNS
Faculty Advisor: 1
Statistician: 1
Sustain
Definition: to give support or relief to; keep up, prolong

- Continue new habit
- Communication, communication, communication
- Rounding with the stakeholders
  - Nurses
  - Registered dietitian
  - Intensivists
  - Leadership
Daily Caloric Intake Results

Pre-intervention Percent of Daily Caloric Intake

Post-intervention Percent of Daily Caloric Intake
### Results Table 1: Description of Caloric Intake

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAL pre-intervention</td>
<td>76%</td>
</tr>
<tr>
<td>CAL post-intervention</td>
<td>97%</td>
</tr>
<tr>
<td>Improvement</td>
<td>21%</td>
</tr>
<tr>
<td>( P )-value</td>
<td>0.001</td>
</tr>
<tr>
<td>Confidence Interval</td>
<td>95%</td>
</tr>
</tbody>
</table>
## Results Table 2: Description of Gastric Residual Volume Measurements

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Documentation of GRV</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRV pre-intervention</td>
<td>18/30</td>
</tr>
<tr>
<td>GRV post-intervention</td>
<td>29/30</td>
</tr>
<tr>
<td>Improvement</td>
<td>21%</td>
</tr>
<tr>
<td>$P$-value</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>Confidence Interval</td>
<td>95%</td>
</tr>
</tbody>
</table>
### Results Table 3: Description of Tube Feeding Volume Documented from Pump

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Recorded Volume Off Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation pre-intervention</td>
<td>1/30</td>
</tr>
<tr>
<td>Documentation post-intervention</td>
<td>24/30</td>
</tr>
<tr>
<td>Improvement in Documentation</td>
<td>76%</td>
</tr>
<tr>
<td>$P$-value</td>
<td>&lt; 0.0005</td>
</tr>
<tr>
<td>Confidence Interval</td>
<td>95%</td>
</tr>
</tbody>
</table>
Sustainment Plan

- Track data monthly (metrics)
- Round with nurses to identify barriers, reinforce education, clarification
- Develop a Power Plan for Volume-Based Enteral Nutrition
- Transition paper charting to the electronic environment

- Build a calculator for auto-calculation of tube feed rate changes
Sustainment Plan

- Regular meetings with stakeholders to PDSA the process
- Reassess GRV element of protocol
  - SCCM recommendation to cease GRV assessments
- Hardwire orientation of new staff to VBEN protocol
Significance?

- Rate-based method is not effective in providing optimum nutrition
- Volume-based enteral nutrition with a nurse-driven protocol is a more effective method

Impact

- Nursing practice alignment with most current EBP for enteral nutrition
- Standardization of practice
  - guided nursing decisions
  - drove nursing interventions
- Patients received greater daily caloric intake
  - contributes to the healing process
  - holistic care
  - decreases LOS in ICU
References

- Barto, D., ( ). Let’s be the driver of this bus: nurse – driven protocols in acute care. AACN Session # 211 PP, dbarto@virtua.org


  https://www.merriam-webster.com/dictionary
References


