Standardization of oral nutritional supplement provision in malnourished individuals

A Comprehensive Nutrition-Focused Quality Improvement Program Improves Patient Outcomes

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OBJECTIVES

– Review the impact of malnutrition on hospital readmissions and clinical outcomes

– Discuss the benefits of oral nutritional supplements (ONS) in malnourished patients

– Present new evidence of how a quality improvement program can decrease 30-day hospital readmission rates in malnourished hospitalized patients
Objectives, contd

• Upon completing this talk, the participant will be able to:
  • Appreciate that detection of malnutrition should be done at the
time of hospital admission using an easy to use validated
screening tool and modifications to the electronic medical records
templates
  • Understand that immediate nurse or dietician-directed provision of
oral nutritional supplements (in patients who are not “NPO”) should
be authorized by modifications to hospital regulations
  • Appreciate that a Quality Improvement program incorporating the
above will decrease unplanned 30-day hospital readmissions in
both medical and surgical patients, with significant cost savings
**Prevalence of Malnutrition**

<table>
<thead>
<tr>
<th>Hospital Admission</th>
<th>Hospital Stay</th>
<th>Hospital Discharge</th>
<th>Hospital Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>30% to 55%</strong></td>
<td><strong>33%</strong></td>
<td>Many patients</td>
<td>Patients with weight loss are at increased risk for readmission¹</td>
</tr>
<tr>
<td>of hospital patients are malnourished upon admission¹-⁴</td>
<td>of severely malnourished patients and <strong>38%</strong> of well-nourished patients experience nutritional decline⁴</td>
<td>continue to lose weight after discharge⁵</td>
<td>¹</td>
</tr>
</tbody>
</table>

Unrecognized malnutrition may lead to costly consequences

- Increased length of stay
- Increased muscle loss/function
- Increased risk of pressure ulcers
- Higher infection/complication rates
- Increased morbidity/mortality
- Increased admission/readmission rates/costs

Evidence that nutrition intervention decreases readmissions

Hospital patients who received dietary counseling plus oral nutritional supplements (ONS) experienced significantly fewer readmissions ($P=0.041$)\(^1\)

30-Day readmission rates decreased from 16.5% to 7.1% after institution of comprehensive nutrition pathway from inpatient to post discharge\(^2\)

Patients who received ONS ($\leq 995$ kcal/day) in addition to food for 6 weeks had fewer readmissions: 29% who consumed ONS vs 40% who ate food only\(^3\)

Benefits of Oral Nutritional Supplements on outcomes in malnourished patients

Benefits of ONS have been well demonstrated both in the community and in hospitals:

- Decreased mortality and morbidity\(^1\)
- Decreased complications including infections\(^2\)
- Decreased pressure ulcers\(^3\)
- Reduced length of stay\(^4\)
- Reduced readmissions in elderly patients\(^5\)

Recent review: ONS in community & home

Meta-analyses
A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in community and care home settings

M. Elia*, C. Normand**, A. Laviano*, K. Norman*

* Faculty of Medicine, University of Southampton, National Institute of Health Research Biomedical Research Centre (Nutrition), Southampton and University Hospital Southampton NHS Foundation Trust, Southampton, England, UK
** Centre for Health Policy and Management, Trinity College, Dublin, Ireland
† Department of Clinical Medicine, Sapienza University, Rome, Italy
‡ Research Group on Geriatrics, Charité Universitätsmedizin, Berlin, Germany

Conclusion: ONS use in the community produces an overall cost advantage, with clinically relevant outcomes.

Recent review: ONS in hospital


Conclusion: ONS in the hospital setting procures a cost-saving & is cost-effective.
Benefits of oral supplements are known, but....

- There is a lack of research that examines the practical aspects of implementing changes specific to ONS consumption
  - Incorporating a valid easy-to-use malnutrition screening tool upon admission
  - Developing and re-enforcing ONS consumption
Compliance to oral nutritional supplements

- Review of 46 studies (n=4328 patients)
- Overall compliance was 78%
- In-hospital: 67%; community 81%
- +ve association with high energy dense ONS
- - ve association with age

Hubbard GP. *Clin Nutr* 2012; 31:293
Impact of Oral Nutritional Supplementation Provided During Hospitalization Was Studied in a Retrospective Health Economic Analysis\(^1\)

**The Sample**
- 11-year database from 2000-2010
- 44 million adults ages 18+ after inpatient episodes

**ONS Use Within Sample**
- Within the 11-year database, ONS use was used in 724,027 of 43,968,567 adult inpatient episodes
- Rate of ONS use: 1.6%

Oral Nutritional Supplements Provided During Hospitalization Was Associated With:

- **21% decrease** in length of stay (2.3 days)
- **21.6% decrease** in episode costs ($4734)
- **6.7% decrease** in probability of 30-day readmissions

*Monetary figures are based on 2010 US dollars and inflation adjusted.
†Readmission defined as return to study hospital for any diagnosis. Data measured delayed readmission and does not include patients not readmitted due to recovery or death.

A Comprehensive Nutrition-Focused Quality Improvement Program Reduces 30-Day Readmissions and Length of Stay in Hospitalized Patients

Krishnan Sriram, MD, FCCM, FRCS(C), FACS1; Suela Sulo, PhD1,2; Gretchen VanDerBosch, RD, LDN1; Jamie Partridge, PhD, MBA2; Josh Feldstein, BA3; Refaat A. Hegazi, MD, PhD2; and Wm. Thomas Summerfelt, PhD4
Study setting: ADVOCATE Health care system

- The largest health care provider in state of Illinois
- 250 sites of care and 12 hospitals
- Over 2 million patients seen annually
- Five Level I trauma centers, three Level II trauma centers
- Not-for-profit, mission-based health system
- A leader in population health management and coordinated care
Research Question AND Primary Endpoint

– **Study Hypothesis:** Administration of a rapid, automatic ONS intervention from screening to discharge will decrease 30-day readmission rate by 20% or more and yield superior cost-effectiveness compared with existing ONS protocol in patients at risk for malnutrition

– **Primary Endpoint:** Incidence of nonelective readmission 30-days post discharge

– **Secondary endpoint:** Length of stay

– **Patient Population:** 18+, any primary diagnosis, risk for malnutrition (Malnutrition Screening Tool [MST] score ≥2)

Sriram K et al., *JPEN J Parenter Enteral Nutr* 2017; 41:384-391
Limitations of ReAdmission Rates in Asian countries

- Patients might have returned to their home towns far away
- Patients may not return to the same hospital
- No guaranteed national tracking number
- Home care may be suboptimal requiring hospital readmission
Limitations of Length of Stay in Asian countries

- Patients may need to stay in the hospital longer than actually needed due to lack of family support or confidence.
- Similar Quality improvement programs may need to look at the time of possible or planned discharge.
The study addressed the 6 principles recommended to improve adult hospital malnutrition.

Baseline/Standard of care Prior to QIP

– Nutrition screening tool was not validated
  – 5 Questions: Any positive triggered Registered Dietitian (RD) consult
  – Notification to RD by manual system
– Intervention with ONS was not automatically sent to patients at risk for malnutrition
  – Delivery of ONS to patient up to 72 hours (or not at all)
– Nutrition discharge education was not routine
– Post-discharge reminders about nutrition were not in place

Pre-QIP readmission rate for malnourished patients: 20%
**How was the Pre-QIP 2013 ReAdmission rate calculated?**

<table>
<thead>
<tr>
<th>In-patient readmissions defined by Truven Model:</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.4%</td>
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</tbody>
</table>

**All-Cause readmissions including observation, rehabilitation, patients discharged to skilled nursing facilities:**

| 23% |

Average of 19.4% and 23% = 21.2% the research team decided to use a readmission rate of: 20%
Process Change

- **Occurred in 4 Hospitals**
  - Two hospitals were designated “QIPb” (basic)
  - Two hospitals were designated as “QIPe” (enhanced)
  - Patients in QIPb and QIPe were comparable (i.e. age, gender, illness severity, etc.)

- **QIPb**
  - Utilized MST in the Cerner® Electronic Medical Record (EMR)
  - Targeted the ONS intervention for all patients with MST ≥2
  - 24-48 hours (on average) to receive ONS (with whatever product was in the hospital formulary)
    - Nutrition discharge education was not routine
  - Post-discharge calls were made but did not include reminders about nutrition and continuing ONS
Process Change

- **QIP-e (Enhanced)**
  - Utilized MST in Cerner® Electronic Medical Record (EMR)
  - Automatic ONS for all patients at risk for malnutrition (MST ≥2)
    - Less than 24 hours to receive ONS
  - Received instructions/coupons at discharge to continue ONS
  - Received 4 follow-up phone calls post discharge confirming ONS consumption
    - 1st call by Patient Experience Nurses or automated
    - 2nd, 3rd, and 4th calls were automated
Malnutrition Screening Tool (MST)

- MST is a validated screening tool and evaluates weight loss and appetite as two criteria most indicative of malnutrition risk
- The set of questions helps to quantify patients' malnutrition risk level

**STEP 1: Screen with the MST**

1. Have you recently lost weight without trying?
   - No: 0
   - Unsure: 2

2. If yes, how much weight have you lost?
   - 2-13 lb: 1
   - 14-23 lb: 2
   - 24-33 lb: 3
   - 34 lb or more: 4
   - Unsure: 2

   **Weight loss score:**

3. Have you been eating poorly because of a decreased appetite?
   - No: 0
   - Yes: 1

   **Appetite score:**

Add weight loss and appetite scores

**MST SCORE:**

Validity of Malnutrition Screening Tool (MST)

• Comparison between
  – Short Nutritional Assessment Questionnaire (SNAQ)
  – Malnutrition Screening Tool (MST)
  – Malnutrition Universal Screening Tool (MUST)
  – CONCLUSIONS
  – All share similar accuracy to NRS-2002
  – All were associated with increased length of hospital stay
  – Any of the tools can be applied in clinical practice

MST becomes an integral part of admission evaluation by nurses
Process change & Standardization: Screening

• Screening can be done by nurses, or dietitians or physicians
• But... must be done at time of admission
• Information is recorded and becomes a permanent part of medical records, either paper-form or electronic
METHODS- QIP-ENHANCED DROP DOWN MENU

<table>
<thead>
<tr>
<th>View</th>
<th>Orders for Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plans</td>
</tr>
<tr>
<td></td>
<td>Document In Plan</td>
</tr>
<tr>
<td></td>
<td>Interdisciplinary</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
</tr>
<tr>
<td></td>
<td>Respiratory Oxygen PowerPlan AHC (Ir)</td>
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<tr>
<td></td>
<td>F. Anesthesia POST GI Patient</td>
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<tr>
<td></td>
<td>Nursing</td>
</tr>
<tr>
<td></td>
<td>Suggested Plans (0)</td>
</tr>
<tr>
<td></td>
<td>Orders</td>
</tr>
<tr>
<td></td>
<td>LET Orders</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display</th>
<th>All Orders (All Statuses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>Ordering Phy...</td>
</tr>
<tr>
<td></td>
<td>Order Name</td>
</tr>
<tr>
<td></td>
<td>Details</td>
</tr>
<tr>
<td>Nutrition</td>
<td>RN To Advance Diet As Tolerated (Advance Diet As Tolerated)</td>
</tr>
<tr>
<td>Tomorrow</td>
<td>12/09/15 6:00:00, low fat/cardiac, if asymptomatic</td>
</tr>
<tr>
<td>Today</td>
<td>Clear Liquid Diet</td>
</tr>
<tr>
<td></td>
<td>12/08/15 18:00:00</td>
</tr>
<tr>
<td>Yesterday</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12/08/15 14:51:00, With meals</td>
</tr>
</tbody>
</table>
Process change & Standardization: Ordering

- Ordering ONS can be done by nurses, or dietitians or physicians
- Does not need physician’s authorization
- Provided there is no “Nil by mouth” or “NPO” order
- Order entry soon after identification of “Malnutrition Risk”
- Detailed assessment and fine tuning by dietitians as early as possible
## DIFFERENCES BETWEEN QIP

<table>
<thead>
<tr>
<th>Differences of QIPe and QIPb Programs</th>
<th>QIPe</th>
<th>QIPb</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST is a part of EMR</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>RN completes MST</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>ONS selection via automatic drop down menu</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>ONS ordered by MD, RN, or RD</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>RD consultation</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Time to RD consultation: &lt;24 hours</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td><strong>Time to ONS Delivery (on average)</strong></td>
<td>1 – 24 h</td>
<td>24 – 48 h</td>
</tr>
<tr>
<td>Discharge planning instructions</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Discharge materials including coupons and literature</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Standard post-discharge phone calls (24-72 hours)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Nutrition-focused post-discharge questions on phone calls</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

MD, Physician; RN, Registered Nurse; √ = Yes.

Sriram K et al., *JPEN J Parenter Enteral Nutr* 2017; 41:384-391
<table>
<thead>
<tr>
<th>Screening</th>
<th>Pre-QIP</th>
<th>QIPb</th>
<th>QIPe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonvalidated screening tool</td>
<td>Validated screening tool (MST) integrated into EMR</td>
<td>Targeted ONS intervention in 24-48 hours</td>
<td>Validated screening tool (MST) integrated into EMR</td>
</tr>
<tr>
<td>No early intervention</td>
<td>Targeted ONS intervention in 24-48 hours</td>
<td>Automatic ONS intervention in 24 hours</td>
<td>Targeted ONS intervention in 24-48 hours</td>
</tr>
<tr>
<td>No formalized nutrition discharge education</td>
<td>No formalized nutrition discharge education</td>
<td>Formalized nutrition discharge education with coupons</td>
<td>Targeted ONS intervention in 24-48 hours</td>
</tr>
<tr>
<td>No post-discharge reminders about nutrition</td>
<td>No post-discharge reminders about nutrition</td>
<td>Follow-up calls encouraging ONS adherence</td>
<td>Targeted ONS intervention in 24-48 hours</td>
</tr>
</tbody>
</table>

Readmission Rate: 20% vs Baseline 18% Reduction vs Baseline, \( p < 0.01 \)

Readmission Rate: 16.4% vs Baseline 22% Reduction vs Baseline, \( p < 0.01 \)
RESEARCHERS ALSO USED A 22% READMISSION RATE FOR MALNOURISHED PATIENTS AS A BENCHMARK

This was based on post hoc data collected on 1319 “validation comparison patients”

- Comparison of the same time period
  - Enrolled in QIP (N=1269; QIP-b n=769; QIP-e n=500)—October 13, 2014-April 2, 2015
  - Validation comparator patients (n=1319)—October 13, 2013-April 2, 2014

- Patients having an ICD9 (International Classification of Diseases) code for malnutrition and ONS order

- Comparison of the same Advocate hospitals (4 QIP hospitals)
RESULTS USING 22% AS COMPARISON IN QIP-E

Table 1. Readmission rates and LOS results by group pre-post QIP

<table>
<thead>
<tr>
<th></th>
<th>QIP Cohorts 16.1%</th>
<th>QIPb 16.4%</th>
<th>QIPe 15.6%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Readmission Rates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RRR from Baseline Cohort, 20%</strong></td>
<td>19.5% ((\delta = 3.9)% )</td>
<td>18% ((\delta = 3.6)% )</td>
<td>22% ((\delta = 4.4)% )</td>
</tr>
<tr>
<td><strong>P Value</strong></td>
<td>.001</td>
<td>.01</td>
<td>.01</td>
</tr>
<tr>
<td><strong>RRR from Validation Cohort, 22.1%</strong></td>
<td>27.1% ((\delta = 6.0)% )</td>
<td>25.8% ((\delta = 5.7)% )</td>
<td>29.4% ((\delta = 6.5)% )</td>
</tr>
<tr>
<td><strong>P Value</strong></td>
<td>&lt;.001</td>
<td>.001</td>
<td>.002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>QIP Cohorts 5.4 ± 4.7 d</th>
<th>QIPb 5.4 ± 4.8 d</th>
<th>QIPe 5.3 ± 4.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of Stay</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RRR from Baseline Cohort, 6.0 ± 6 d</strong></td>
<td>10.0% ((\delta = .63) d )</td>
<td>10.0% ((\delta = .63) d )</td>
<td>11.7% ((\delta = .73) d )</td>
</tr>
<tr>
<td><strong>P Value</strong></td>
<td>.001</td>
<td>.008</td>
<td>.011</td>
</tr>
<tr>
<td><strong>RRR from Validation Cohort, 7.2 ± 8 d</strong></td>
<td>25% ((\delta = 1.8) d )</td>
<td>25% ((\delta = 1.8) d )</td>
<td>26.4% ((\delta = 1.9) d )</td>
</tr>
<tr>
<td><strong>P Value</strong></td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Abbreviations: d, day; \(\delta\), delta (difference); NA, not applicable; SD, standard deviation.
All subpopulations benefited from the nutrition-based QIP

Diagnoses Related Group Analyses Examined

• All of the QIP patients were pooled into one group (QIPe + QIPb)\(^1\)

• Data from 2588 patients (1269 electively admitted, non-critically ill, QIP patients enrolled between October 2014 and April 2015, and 1319 validation controls admitted in the same hospitals between October 2013 and April 2014) were categorized by:
  
  – Diagnosis Related Group (DRG)
  – Largest DRGs: oncological (365, 14.1%), gastrointestinal (331, 12.8%), and cardiovascular (310, 12.0%).

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\(^1\)Sulo S. Abstract presented at Society for Hospital Medicine 2017 Meeting, May 1-4, Las Vegas, NV
Compliance, Which component of QIP had the most effect?

- Compliance and consumption are issues with many nutrition intervention studies in both community and institutions
- Not practical to do so in the real world
- Modifications to type of ONS were made by nurses, dietitians and physicians
- Education of patients, care givers and health care providers improves compliance
- If compliance can be enforced in a future study, beneficial results may even be more robust

Sriram K, Sulo S, Summerfelt WT. Response to letter to Editor on ONS QIP study. JPEN 2017; 41:528-529
Did other system-wide initiatives during the period of study affect results?

- No
- Readmission rates remained around 20% in the other non-participating hospitals
NUTRITION QIP IMPROVED OUTCOMES AND RESULTED IN COST SAVINGS

<table>
<thead>
<tr>
<th>Length of Hospital Stay&lt;sup&gt;1&lt;/sup&gt;</th>
<th>-26% *</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause 30-day Readmissions&lt;sup&gt;1&lt;/sup&gt;</td>
<td>-29% *</td>
</tr>
<tr>
<td>Costs&lt;sup&gt;2&lt;/sup&gt;</td>
<td>$4,896,758</td>
</tr>
</tbody>
</table>

QIP-e, including ONS therapy, reduced **length of hospital stay** by 26% (1.9 [±3.6] days) vs pre-QIP

QIP-e, including ONS therapy, reduced **all cause 30-day readmission rates** by 29% vs pre-QIP

A Healthcare Quality Outcomes Study that included interventions with Abbott Nutrition formulary for the QIP hospitals during a 6-month period **reduced healthcare costs from avoided readmissions and reduced LOS**†‡

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<sup>*</sup>Data from QIP-e intervention, percentage expressed as relative risk reduction (RRR) compared to pre-QIP.

<sup>†</sup>Data from validation comparison cohort: 6-month hospital savings for the 4 QIP hospitals was $4,896,758 (when QIP program cost is subtracted).

<sup>‡</sup>Products available in each hospital’s formulary were used.

Further budget impact analysis

• ➤ A budget impact model analysis demonstrated that properly applied nutritional interventions result in significant cost-savings.

• ➤ The total cost-savings from reduced 30-day readmissions & hospital stay associated with nutrition intervention was >$4.8 million

• The net savings was >$3800 per patient

• ➤ The role of nutrition remains poorly understood by providers, administrators, and payers

• Sulo S et al. Am Health Drug Benefits 2017; 10:264
IMPORTANCE OF EDUCATIONAL AND REINFORCING ACTIVITIES FOR MALNUTRITION SCREENING TOOL (MST) ACCURACY

Nurse/Dietitian/Physician Educational Reinforcing Activities:
• Emails/online computerized behavioral training/leadership meetings
• Situation-background-assessment-recommendation/safety huddles
• Conference calls/in-person presentations
Continual MST education correlates with fewer MST errors

Spearman r=-.943, P=.005

MST: Malnutrition Screening Tool
CONCLUSIONS, KEY TAKE AWAY POINTS

• A comprehensive ONS QIP reduced 30-day unplanned hospital readmissions among hospitalized patients at risk of malnutrition

• Keys to success:
  ✓ Multidisciplinary team collaboration and follow-up
  ✓ Implementation of a validated nutrition screening tool in EMR
  ✓ Immediate provision of ONS
  ✓ Ongoing patient and care giver education in hospital and at discharge
  ✓ Post-discharge questions related to ONS
  ✓ Ongoing provider education
  ✓ Sustained provider and administrative program support

•
REFERENCES


• Sriram K, Sulo S, Summerfelt WT. Response to letter to Editor on “A rapid, comprehensive oral nutritional supplement quality improvement program reduces 30-day readmission in malnourished hospitalized patients.” *JPEN* 2017; 41(4):528-529.

