Reducing Length of Stay, Readmissions and Cost of Care with Quality Improvement: Real World Evidence from One Health System

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DISCLOSURES

• Support for this program is provided by Abbott Nutrition

• This program is not intended for continuing education credits for any healthcare professional
OBJECTIVES

• Provide an overview of literature on the impact of nutritional care

• Review real-world experience with nutrition-focused Quality Improvement Programs (QIPs)

• Demonstrate how an improved nutrition care process, including the use of supplemental nutrition, has been shown to reduce readmissions, length of stay (LOS), and cost of care
NUTRITION INTERVENTION ALIGNS WITH THE INSTITUTE FOR HEALTHCARE IMPROVEMENT (IHI) TRIPLE AIM¹

NUTRITIONAL STATUS IS PROGRESSIVELY COMPROMISED OVER THE CONTINUUM OF CARE

Upon Admission to the Hospital

30% to 50% of patients are malnourished upon admission\(^1\)

During Hospital Stay

Many patients with normal nutrition status experience a decline during hospitalization\(^1\)

Post-discharge

Weight loss and loss of muscle increase risk of readmissions\(^2,3\)

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NUTRITION DAY – ONE DAY EACH YEAR AROUND THE WORLD

nutritionDay worldwide
62 countries
6,000 health care institutions
193,000 patients

nutritionDay in the US
2009-2015
245 hospitals
9,959 patients

Demographics:
- Mean age = 64 years
- Average BMI = 29.19 kg/m²
- Most common conditions:
  - Diabetes (28.8%)
  - Cardiac insufficiency (23.2%)
- Specialties with the most patients:
  - General internal medicine (48.3%)
  - Cardiology (14.7%)
  - Oncology (7.6%)
  - General surgery (7.4%)

NUTRITION DAY US SHOWS 32.7% OVERALL RISK OF MALNUTRITION\(^1\)

MALNUTRITION RISK AND FOOD INTAKE ON NUTRITION DAY

Meal Eaten on nutritionDay

- All: 36.5%
- Half: 5.6%
- Quarter: 7.1%
- Nothing: 6.9%
- Not allowed: 18.1%
- Missing: 25.8%

Weight Change Within Last 3 Months

- No change: 37.6%
- Weight gain: 43.7%
- Weight loss: 5.9%
- Don’t know: 4.6%
- Missing: 8.2%

Meal Intake in Last Week

- Normal: 39.6%
- Less than normal: 21.1%
- Less than half: 18.1%
- Less than quarter: 16.1%
- Not allowed: 18.1%
- Missing: 5.1%

MALNUTRITION CAN LEAD TO COSTLY CONSEQUENCES

- Increased LOS\textsuperscript{1}
- Increased readmission rates\textsuperscript{1}
- Increased cost of care\textsuperscript{1}
- Higher complication rates\textsuperscript{1}
- Increased morbidity/mortality\textsuperscript{1}
- Increased risk of pressure ulcers\textsuperscript{2}

A LARGE HEALTH ECONOMIC STUDY OF ONS DURING HOSPITALIZATION DOCUMENTED ECONOMIC BENEFITS

Study Design
• 11-year retrospective analysis

Premier Research Database
• Includes detailed information on adult (18+) U.S. hospital episodes from 2000 to 2010
  – 460 hospitals in the United States
  – 44 million adult inpatient episodes
  – ONS use identified in 724,027 of 43,968,567 adult inpatient episodes
  – Rate of ONS use=1.6%

LARGE HEALTH ECONOMICS STUDY SHOWED ONS DURING HOSPITALIZATION IMPROVED OUTCOMES¹

6.7% decrease* in probability of 30-day readmissions

21% decrease in LOS (2.3 days)

21.6% decrease† in episode costs ($4734)

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

ONS IMPROVED OUTCOMES AND REDUCED HOSPITAL COSTS IN FOUR TARGETED MEDICARE POPULATIONS\textsuperscript{1,2}

Data from 2 retrospective health economic studies\textsuperscript{1,2}

<table>
<thead>
<tr>
<th>Condition</th>
<th>30-day Readmission Probability</th>
<th>LOS</th>
<th>Episode Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Myocardial Infarction (AMI)\textsuperscript{1}</td>
<td>-12%*</td>
<td>-10.9%*</td>
<td>-5.1%* ($1,538)</td>
</tr>
<tr>
<td>Congestive Heart Failure (CHF)\textsuperscript{1}</td>
<td>-10.1%*</td>
<td>-14.2%*</td>
<td>-7.8%* ($1,266)</td>
</tr>
<tr>
<td>Pneumonia (PNA)\textsuperscript{1}</td>
<td>-5.2%</td>
<td>-8.5%* (0.8 days)</td>
<td>-10.6%* ($1,516)</td>
</tr>
<tr>
<td>Chronic Obstructive Pulmonary Disease (COPD)\textsuperscript{2}</td>
<td>-13.1%*</td>
<td>-21.5%* (1.88 days)</td>
<td>-12.5%* ($1,570)</td>
</tr>
</tbody>
</table>

*Indicates significance at the 1\% level.  †Indicates significance at the 5\% level. ‡One to one matched sample was created from a 10,322 ONS episodes and 368,097 non-ONS episodes data population (N=14,326).

WHAT ARE THE REAL-WORLD IMPLICATIONS OF THESE RESEARCH FINDINGS?

And just what is a QIP?¹

• The Affordable Care Act and pay-for-performance are driving healthcare organizations across the nation to institute QIPs.

• A QIP involves systematic activities that are organized and implemented by an organization to monitor, assess, and improve the quality of healthcare.

• The activities are cyclical, i.e., organization continues to seek higher levels of performance to optimize care for the patients it serves, while striving for continuous improvement.

Study Design
Multi-site, 2-group, pre-post QIP study
Conducted from October 13, 2014 to April 2, 2015

Patient Population
(N=1269*; 45.2% at risk for malnutrition)
- Older adults; mean age of 66.6 ± 17.2 years
- Most were white/caucasian (70.4%)
- Admitted for a primary medical diagnosis (77.3%)

Study Scheme
Two hospitals implemented a QIP-basic program—QIP-b
Two hospitals implemented a QIP-enhanced program—QIP-e

*2808 patients were screened with 1269 patients enrolled.

THE RESEARCH QUESTION AND ENDPOINTS

• **Study Hypothesis:** Nutrition-focused QIP will decrease **30-day readmission rate by 20%** compared with existing ONS protocol in patients at risk/malnourished

• **Sample Size:**
  - Baseline comparator patients (n=4611)—January 1, 2013-December 31, 2013
  - 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

• **Primary Endpoint:** Non-elective readmission 30-days post-discharge

• **Secondary Endpoints:** Length of hospital stay, cost of care

• **Patient Population:** Aged 18+ years, any primary diagnosis, risk for malnutrition (Malnutrition Screening Tool [MST] score ≥2)
THE QIP USED THE 6 PRINCIPLES OF NUTRITION CARE TO DESIGN THE PROCESS CHANGE

# PROCESS CHANGE AND INTERVENTIONS IN THE QIP HOSPITALS

## ALL HOSPITALS
- MST is a part of EMR
- RN Completes MST
- RD Consult
- Discharge Planning
- Post-discharge phone calls

## ENHANCED HOSPITALS
- Oral Nutritional Supplement selection via automatic drop-down menu by RN
- Discharge materials *including coupons and literature*
- Post-discharge phone calls *with added nutrition questions*

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MST = Malnutrition Screening Tool  
EMR = Electronic Medical Record
Utilized a matched comparison group for the QIP groups:

**Population** - compared with the same 4 hospitals

**Seasonality** - compared same time period, one year prior (Oct 2013-April 2014)

**Nutrition Status** - Patients with an ICD9 code for malnutrition and ONS order as proxy for MST score

22% Readmission Rate for malnourished patients
QIP-E programs reduced readmissions, LOS, and costs\(^2\)

**All-cause 30-day Readmissions\(^1\)**
-29\%*  

**Length of Hospital Stay\(^1\)**  
-26\%*  

**Costs\(^2\)**  
6-Month Savings:  
\$4,896,7583

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

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

**Net savings > \$ 3800 per patient\(^2\)**

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\(^\ddagger\)

*Data from QIP-e intervention, percentage expressed as relative risk reduction (RRR) compared to pre-QIP.
†Data from baseline comparison cohort: 6-month hospital savings for the 4 QIP hospitals was $5,452,309 (when QIP program cost is subtracted).
‡Products available in each hospital's formulary were used.

ALL SUBPOPULATIONS BENEFITED FROM THE NUTRITION-BASED QIP

NUTRITION INTERVENTION IMPROVES OUTCOMES FOR ALL MALNOURISHED PATIENTS\textsuperscript{1-6}

All-cause 30-day Readmissions\textsuperscript{*1,3-5}

Length of Hospital Stay\textsuperscript{*1,3-5}

Costs\textsuperscript{2†‡}

\textsuperscript{*} Data from QIP-e intervention, percentage expressed as RRR compared to pre-QIP. Products available in each hospital’s formulary were used.

† Data from baseline comparison cohort: 6-Month Hospital Savings for the 4 QIP hospitals was $5,452,309 (when QIP program cost is subtracted).

‡ Products available in each hospital's formulary were used.

NUTRITIONAL QIP INITIATIVES—WHERE DO WE GO FROM HERE?

Key Take-aways

• Malnourished hospitals patients have not often had their nutrition needs addressed while in the hospital\(^1\)

• Clear evidence that nutrition-based QIPs can improve readmission, length of stay, and cost outcomes for all patients at risk/malnourished\(^1-6\)

• An appropriate QIP includes:
  – Malnutrition risk screening at admission
  – Prompt initiation of ONS
  – Nutrition support during hospital stay and at discharge

• Tips for sustaining these initiatives:
  – Foster a culture of nutrition science
  – Multidisciplinary team work
  – Provide continuing staff education and ongoing data feedback
  – Monitor and adjust the process to ensure continuous quality improvement
QUESTIONS AND ANSWERS
BACK-UP AND ANCILLARY SLIDES
# BASELINE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Comparison Group N = 1319</th>
<th>QIP Group N = 1269</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male, No. (%)</td>
<td>622 (47.2)</td>
<td>552 (43.5)</td>
<td>.062</td>
</tr>
<tr>
<td>Age, mean (± SD), years</td>
<td>63.1 (17.4)</td>
<td>66.6 (17.2)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Race, No. (%)</td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Non-Hispanic White/Caucasian</td>
<td>865 (65.6)</td>
<td>893 (70.4)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>185 (14.0)</td>
<td>277 (21.8)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>120 (9.1)</td>
<td>84 (6.6)</td>
<td></td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>149 (11.3)</td>
<td>15 (1.2)</td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>1217 (92.3)</td>
<td>981 (77.3)</td>
<td></td>
</tr>
<tr>
<td>Surgical</td>
<td>102 (7.7)</td>
<td>288 (22.7)</td>
<td></td>
</tr>
</tbody>
</table>

SUBPOPULATION ANALYSES SHOW ALL PATIENTS BENEFIT FROM NUTRITION INTERVENTION

1. Reduction Due to ONS QIP Based on Age (RRR vs Pre-QIP).
2. Reduction Due to ONS QIP Based on Medical or Surgical Status (RRR vs Pre-QIP).
3. Reduction Due to ONS QIP Based on DRG (RRR vs Pre-QIP).
4. Differences in Readmission Rate and LOS Based on MST Score Were Non Significant (NS, P > 0.05)—All Patients Benefitted from Nutrition Intervention Irrespective of MST Score.
SUMMARY OF RESULTS

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

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

<table>
<thead>
<tr>
<th>Length of Stay</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>RRR from Baseline Cohort, 6.0 ± 6 d</td>
<td>10.0% (Δ = .63 d)</td>
<td>10.0% (Δ = .63 d)</td>
<td>11.7% (Δ = .73 d)</td>
</tr>
<tr>
<td>P Value</td>
<td>.001</td>
<td>.008</td>
<td>.011</td>
</tr>
<tr>
<td>RRR from Validation Cohort, 7.2 ± 8 d</td>
<td>25% (Δ = 1.8 d)</td>
<td>25% (Δ = 1.8 d)</td>
<td>26.4% (Δ = 1.9 d)</td>
</tr>
<tr>
<td>P Value</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>


Abbreviations: d, day; Δ, delta (difference); NA, not applicable; SD, standard deviation.
SUBPOPULATION ANALYSES EXAMINED BROAD-BASED PATIENT TYPES

• All of the QIP patients were pooled (QIPe + QIPb)

• For the MST analysis, data from 1269 patients enrolled in the QIP between October 2014 and April 2015 were analyzed and were grouped into:
  • MST = 2
  • MST > 2

• 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:
  • Age
  • Admission type (medical or surgical)
  • Diagnosis Related Group (DRG)

• All subpopulations benefited from nutrition-based QIP

CONTINUAL MST EDUCATION CORRELATES WITH FEWER MST ERRORS

Spearman $r = -0.943$, $P = 0.005$