Using A Quality Improvement Program to Reduce Length of Stay and Readmissions: Real World Evidence from One Health Care System

Wm. Thomas Summerfelt, PhD
April 19, 2017
Becker’s Hospital Review Conference
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 oral nutritional supplements (ONS)

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

• Demonstrate how an improved nutrition care process that includes the use of ONS, has been shown to reduce readmissions, length of stay (LOS), and cost of care
Evolving Demographics and Health Policy Enable Nutrition to Have a Positive Economic Impact

Evolving Demographics

- ↑ Aging Population
- ↑ Life Expectancy
- ↑ Disease Incidence
- ↑ Healthcare Consumption
- ↑ Quality of Life

Evolving Health Policy

- ↓ CMS Payments
- ↓ Costs of Care
- ↑ Quality of Care

↑ Role of Nutrition in Economic Impact and Quality of Patient Care
NUTRITION INTERVENTION ALIGNS WITH THE INSTITUTE FOR HEALTHCARE IMPROVEMENT (IHI) TRIPLE AIM

NUTRITIONAL STATUS IS PROGRESSIVELY COMPROMISED OVER THE CONTINUUM OF CARE

Upon Admission to the Hospital

30% to 50% of patients are malnourished upon admission¹

During Hospital Stay

Many patients with normal nutrition status experience a decline during hospitalization¹

Post-discharge

Weight loss and loss of muscle increase risk of readmissions²,³

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UNRECOGNIZED MALNUTRITION CAN LEAD TO COSTLY CONSEQUENCES

- Increased LOS
- Increased readmission rates
- Increased cost of care
- Higher complication rates
- Increased morbidity/mortality
- Increased risk of pressure ulcers

STUDIES OF ONS INTERVENTION DEMONSTRATE REDUCED HOSPITAL ADMISSIONS

GI = gastrointestinal.

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></th>
<th>Acute Myocardial Infarction (AMI)\textsuperscript{1}</th>
<th>Congestive Heart Failure (CHF)\textsuperscript{1}</th>
<th>Pneumonia (PNA)\textsuperscript{1}</th>
<th>Chronic Obstructive Pulmonary Disease (COPD)\textsuperscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-day Readmission Probability</td>
<td>-12%* (*1.2 days)</td>
<td>-10.9%* (*1.2 days)</td>
<td>-10.1%* (*1.3 days)</td>
<td>-5.2% * (0.8 days)</td>
</tr>
<tr>
<td>LOS</td>
<td>-0.7% ($1,538)</td>
<td>-14.2%* ($1,266)</td>
<td>-7.8%* ($1,266)</td>
<td>-10.6%* ($1,516)</td>
</tr>
<tr>
<td>Episode Cost</td>
<td>-10.6%* ($1,516)</td>
<td>-5.2%</td>
<td>-8.5%* (0.8 days)</td>
<td>-10.6%* ($1,516)</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, ie, organization continues to seek higher levels of performance to optimize care for the patients it serves, while striving for continuous improvement

QIP PLANNING AND EVALUATION STEPS

Quality Measures
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 Endpoint:** Length of hospital stay

• **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

<table>
<thead>
<tr>
<th>Principles to Transform the Hospital Environment</th>
<th>Principles to Guide Clinical Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Institutional Culture</td>
<td>Recognize and Diagnose ALL Patients at Risk</td>
</tr>
<tr>
<td>Redefine Clinicians’ Roles to Include Nutrition</td>
<td>Rapidly Implement Interventions and Continue Monitoring</td>
</tr>
<tr>
<td>Communicate Nutrition Care Plans</td>
<td>Develop Discharge Nutrition Care and Education Plan</td>
</tr>
</tbody>
</table>

# Differences between QIP-e and QIP-b

<table>
<thead>
<tr>
<th>Differences between QIP-e and QIP-b Programs</th>
<th>QIP-e</th>
<th>QIP-b</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><strong>ONS selection via automatic drop-down menu by RN</strong></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 (in hours)</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><strong>Discharge materials</strong> 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 <strong>post-discharge phone calls</strong> <em>(N = 4)</em></td>
<td>✓*</td>
<td>-</td>
</tr>
</tbody>
</table>

MST = Malnutrition Screening Tool  
EMR = Electronic Medical Record  
*Nutrition-focused questions were incorporated in the standard post-discharge phone calls.*
RESEARCHERS USED A 22% READMISSION RATE FOR MALNOURISHED PATIENTS AS A BENCHMARK

This was based on 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 code for malnutrition and ONS order
- Comparison of the same Advocate hospitals (4 QIP hospitals)
THE VALIDATED MST AS IT APPEARED IN THE EMR
Patients with an MST score of ≥2 received ONS on their next meal tray.

Orders for Signature:
- Document In Plan
- Interdisciplinary
- Medical
  - Respiratory Oxygen PowerPlan AHC (In
- MRO adult post op anesthesia plan
- F. Anesthesia POST GI Patient
- Nursing
- Suggested Plans (0)
- Orders

View:
- All Orders (All Statuses)

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Order Name</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN To Advance Diet As Tolerated (Advance Diet As Tolerated)</td>
<td>12/09/15 6:00:00, low fat/cardiac, if asymptomatic</td>
<td></td>
</tr>
<tr>
<td>Clear Liquid Diet</td>
<td>12/08/15 18:00:00</td>
<td></td>
</tr>
<tr>
<td>Clear Liquid ONS</td>
<td>12/08/15 14:51:00, With meals</td>
<td></td>
</tr>
</tbody>
</table>
QIP-E PROGRAMS REDUCED READMISSIONS, LOS, AND COSTS²

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

Length of Hospital Stay¹
-26%*

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

Costs²
6-Month Savings:
$5,452,309

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†‡

*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.

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
ALL SUBPOPULATIONS BENEFITED FROM THE NUTRITION-BASED QIP

Across all MST Scores

MST = 2

MST > 2

CONTINUAL MST EDUCATION CORRELATES WITH FEWER MST ERRORS

Spearman $r = -.943$, $P = .005$
**NUTRITION INTERVENTION IMPROVES OUTCOMES FOR ALL MALNOURISHED PATIENTS**

- **All-cause 30-day Readmissions**
  - *1,3-6

- **Length of Hospital Stay**
  - *1,3-6

- **Costs**
  - **2†‡

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*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?

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

• Studies show 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

• Keys to success:
  – Foster a culture of nutrition science
  – Multidisciplinary team work
  – Provide continuing staff education
  – Monitor and adjust the process to ensure continuous quality improvement
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.

<table>
<thead>
<tr>
<th>Age</th>
<th>Medical</th>
<th>Surgical</th>
<th>DRG</th>
<th>MST Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65 (n=1154)</td>
<td>(P&lt;0.01) 14.0% (σ±4.78)</td>
<td>(P=NS) 17.1% (σ±4.69)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥65 (n=1434)</td>
<td>(P&lt;0.01) 31.7% (σ±4.69)</td>
<td>(P=NS) 32.3% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical (n=2198)</td>
<td>(P&lt;0.01) 29.6% (σ±4.00)</td>
<td>(P&lt;0.01) 46.9% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical (n=390)</td>
<td>(P&lt;0.01) 39.6% (σ±4.49)</td>
<td>(P&lt;0.01) 47.3% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oncologic (n=413)</td>
<td>(P&lt;0.01) 42.7% (σ±4.00)</td>
<td>(P&lt;0.01) 8.2% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardio-vascular (n=856)</td>
<td>(P&lt;0.01) 20.6% (σ±4.00)</td>
<td>(P&lt;0.01) 32.3% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastro-intestinal (n=390)</td>
<td>(P&lt;0.01) 29.0% (σ±4.49)</td>
<td>(P&lt;0.01) 32.3% (σ±4.49)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **30-day Readmission Probability**
- **LOS**
To validate this readmission estimate and identify possible confounding issues, data were extracted post hoc.

A second QIP comparator cohort—patients who were admitted to the 4 hospitals a year prior to QIP (October 13, 2013–April 2, 2014) were analyzed.

1319 patients included in the validation cohort.

Their 30-day readmission rate was 22.1%, thereby affirming the conservative use of 20% as the baseline readmission rate estimate.

For comparisons, pre-post QIP readmission differences were referenced to the baseline cohort and the validation cohort rates—20% and 22.1%, respectively.

PRE-QIP BASELINE & VALIDATION COHORT LOS DATA

• Average LOS for the **baseline cohort** was 6.3 (±6) days; investigators conservatively set the pre-QIP LOS at 6 (±6) days

• The average LOS for the **validation cohort** was 7.2 (±8) days

• Pre-post QIP LOS differences are, therefore, calculated by referencing the LOS of 6 and 7.2 days, respectively, for baseline and validation cohorts
### SUMMARY OF RESULTS

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

#### Readmission Rates

<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>RRR from Baseline Cohort, 20%</strong></td>
<td>19.5% (δ = 3.9%)</td>
<td>18% (δ = 3.6%)</td>
<td>22% (δ = 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% (δ = 6.0%)</td>
<td>25.8% (δ = 5.7%)</td>
<td>29.4% (δ = 6.5%)</td>
</tr>
<tr>
<td><strong>P Value</strong></td>
<td>&lt;.001</td>
<td>.001</td>
<td>.002</td>
</tr>
</tbody>
</table>

#### Length of Stay

<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>RRR from Baseline Cohort, 6.0 ± 6 d</strong></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><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% (δ = 1.8 d)</td>
<td>25% (δ = 1.8 d)</td>
<td>26.4% (δ = 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; δ, delta (difference); NA, not applicable; SD, standard deviation.
SUB-ANALYSIS: AGE

• 1434 (55.4%) patients were aged ≥65 and 1154 (44.6%) were <65 years
• Pre-QIP readmission rates were 20% and 24% for the aged ≥65 and <65 years subgroups, respectively, while LOS were 6.5 days and 8.0 days
• Post-QIP 30-day readmission rate in patients aged ≥ 65 years was 15.8%, showing an absolute rate reduction (ARR) of 4.2% as compared to pre-QIP (21% RRR; P < 0.01)
• 7.6% ARR (31.7% RRR, P < 0.01) was seen in patients aged <65 years
• The post-QIP hospital LOS in patients aged ≥ 65 years was 5.4 days, showing an absolute reduction of 1.1 days (17% RRR, P< 0.01)
• Absolute reduction of 2.7 days (33.7% RRR, P < 0.01) post-QIP was reported in patients aged <65 years old
SUB-ANALYSIS: MST

Compare the readmission rates and hospital LOS between patients with MST scores = 2 and >2 to determine differences regarding their risk for 30-day readmissions and prolonged hospitalizations.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MST = 2 N = 413</th>
<th>MST &gt; 2 N = 856</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readmission Rate, n (%)</td>
<td>58 (14.0)</td>
<td>146 (17.1)</td>
<td>0.171</td>
</tr>
<tr>
<td>LOS, mean (± SD)</td>
<td>5.19 (± 4.78)</td>
<td>4.49 (± 4.69)</td>
<td>0.277</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>&lt;65 years N = 151</th>
<th>≥65 years N = 262</th>
<th>&lt;65 years N = 366</th>
<th>≥65 years N = 490</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readmission Rate, n (%)</td>
<td>18 (11.9)</td>
<td>40 (15.3)</td>
<td>67 (18.3)</td>
<td>79 (16.1)</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>LOS, mean (± SD)</td>
<td>5.24 (± 5.89)</td>
<td>5.15 (± 4.02)</td>
<td>5.37 (± 4.88)</td>
<td>5.59 (± 4.54)</td>
<td>&gt;0.05*</td>
</tr>
</tbody>
</table>