Quality Outcomes and Financial Benefits of Nutrition Intervention
Evolving Demographics and Health Policy Enable Nutrition to Have a Positive Economic Impact

↑ Aging Population

↑ Life Expectancy

↑ Disease Incidence

↑ Healthcare Consumption

↑ Quality of Life

Evolving Demographics

↓ CMS Payments

Transitional Care

↓ Costs of Care

↑ Quality of Care

Evolving Health Policy

↑ Role of Nutrition in Economic Impact and Quality of Patient Care
MALNUTRITION IS PREVALENT ACROSS HEALTHCARE SETTINGS

<table>
<thead>
<tr>
<th>Healthcare Setting</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td>30-50%&lt;sup&gt;1-4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Long-Term Care</td>
<td>21%-51%&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>Outpatient &amp; Homecare</td>
<td>13-30%&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Risk is increased in:<sup>6</sup>

- Older adults
- Critically ill patients
- Patients with comorbid chronic diseases, e.g., cancer, COPD, chronic kidney disease

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<sup>4</sup> Somanchi M et al. JPEN. 2011;35:209-216.  
<sup>5</sup> Guigoz Y. J Nutr Health Aging. 2006;10:466-487.  
BED REST, AGE AND HOSPITALIZATION INCREASE LOSS OF MUSCLE

Healthy Young  
28 Days Inactivity

Healthy Elders  
10 Days Inactivity

Elderly Inpatients  
3 Days Hospitalization

≈ 1 lb  
loss of muscle

≈ 2.2 lb  
loss of muscle

≈ 2.2 lb  
loss of muscle

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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UNRECOGNIZED MALNUTRITION CAN LEAD TO COSTLY CONSEQUENCES

Increased LOS\textsuperscript{1}

Higher complication rates\textsuperscript{1}

Increased readmission rates\textsuperscript{1}

Increased morbidity/mortality\textsuperscript{1}

Increased cost of care\textsuperscript{1}

Increased risk of pressure ulcers\textsuperscript{2}

PRE-EXISTING MALNUTRITION/WEIGHT LOSS INCREASES RISK OF NEVER EVENTS\textsuperscript{1}

\begin{itemize}
  \item Surgical site infection: 2.5
  \item Pressure Ulcer: 3.8
  \item Catheter-associated UTI: 5.1
  \item Mediastinitis after CABG: 5.3
\end{itemize}

NUTRITION CONTRIBUTES TO POST-HOSPITAL SYNDROME

Associated Causes:

- Poor Nutrition
- Pain and Discomfort
- Decline in Mental Functioning
- Sleep Deprivation

Malnutrition during hospitalization may cause poor outcomes, yet often receives little attention.

MALNUTRITION IS A COMMON REASON FOR READMISSION\(^1\)

National Surgical Quality Improvement Project protocol to identify risk factors associated with 30-day readmission.

Preoperative, intraoperative, and postoperative outcomes were collected in 1442 inpatient general surgery procedures at a single academic center between 2009 and 2011.

<table>
<thead>
<tr>
<th>Four Most Common Readmission Reasons</th>
<th>Operations With Highest Readmission Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal complications (28%)</td>
<td>Pancreatectomy (18%)</td>
</tr>
<tr>
<td>Surgical infection (22%)</td>
<td>Colectomy/colostomy (13%)</td>
</tr>
<tr>
<td>Malnutrition (10%)</td>
<td>Small bowel resection (12%)</td>
</tr>
<tr>
<td>Wound complications (8%)</td>
<td>Gastrectomy (11%)</td>
</tr>
</tbody>
</table>

PATIENTS “AT NUTRITIONAL RISK” ARE MORE LIKELY TO EXPERIENCE EMERGENT CARE VISITS AND REHOSPITALIZATIONS

Objective
To identify the association between baseline nutritional status and subsequent health service utilization and mortality

Population
N = 198 older adults receiving Medicare home health services for 1 year

Key Findings
12% were malnourished and 51% were at risk
Those who were malnourished or at risk at initial assessment were more likely to experience:
• Subsequent Hospitalization (P=.040)
• Number of Hospital Admissions (P=.045)
• ER Visit (P=.047)
• Mortality (6 months, P=.001; 1 year, P=.031)

ORAL NUTRITION SUPPLEMENTATION (ONS) HAS SHOWN SIGNIFICANT CLINICAL BENEFITS

Reduction in Pressure Ulcer Incidence¹

25%

0.75 95% CI (0.62-0.89)

P<0.001

Reduction in Serious Complications (e.g., infections)²

19%

Reduction in Hospital Readmission²

30%

P<0.004

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 OUTCOMES\(^1\)

- 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\(^1,2\)

Data from 2 retrospective health economic studies\(^1,2\)

<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)(^1)</td>
<td>(-12%^*) (1.2 days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestive Heart Failure (CHF)(^1)</td>
<td>(-10.9%^*)</td>
<td>(-10.1%^*) (1.3 days)</td>
<td>(-5.1%^) ($1,538)</td>
</tr>
<tr>
<td>Pneumonia (PNA)(^1)</td>
<td>(-5.2)</td>
<td>(-7.8%^*) (0.8 days)</td>
<td>(-8.5%^*) ($1,266)</td>
</tr>
<tr>
<td>Chronic Obstructive Pulmonary Disease (COPD)(^2)</td>
<td>(-10.6%^*)</td>
<td>(-13.1%^*)</td>
<td>(-12.50%) ($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).

NUTRITION INTERVENTION ALIGNS WITH THE INSTITUTE FOR HEALTHCARE IMPROVEMENT (IHI) TRIPLE AIM¹

## 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)
## Differences between QIP-e and QIP-b Programs

<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><strong>Time to RD consultation: &lt;24 hours</strong></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 including coupons and literature</strong></td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Standard post-discharge phone calls (24-72 hours)</td>
<td>✓*</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Nutrition-focused post-discharge phone calls (N = 4)</strong></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)
QIP-E PROGRAMS REDUCED READMISSIONS, LOS, AND COSTS

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

-29%*

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

-26%*

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†‡

Costs
6-Month Savings:
$4,896,758

*Data from QIP-e intervention, percentage expressed as relative risk reduction (RRR) compared to pre-QIP.
†Data from validation comparison cohort: 6-month hospital savings for the 4 QIP hospitals was $4,896,758 (when QIP program cost is subtracted).
‡Products available in each hospital’s formulary were used.


SUBPOPULATION ANALYSES EXAMINED
BROAD PATIENT TYPES\textsuperscript{1-4}

- 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 FOCUSED QIP\textsuperscript{1-4}

NUTRITION INTERVENTION IMPROVES OUTCOMES FOR ALL MALNOURISHED PATIENTS

All-cause 30-day Readmissions\(^*_{1,3-6}\)

Length of Hospital Stay\(^*_{1,3-6}\)

Costs\(^2\)\(^†‡\)

\(^*\) 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.

3 STEPS FOR ADDRESSING MALNUTRITION

1. **Screen and recognize**
   all patients at risk of malnutrition

2. **Rapidly implement**
   nutrition interventions
   and continue monitoring your patients

3. **Include nutrition in every**
   discharge plan
   with education on why nutrition is
   important to recovery