
Oral Nutritional Supplements in hospitalized patients

Krishnan Sriram

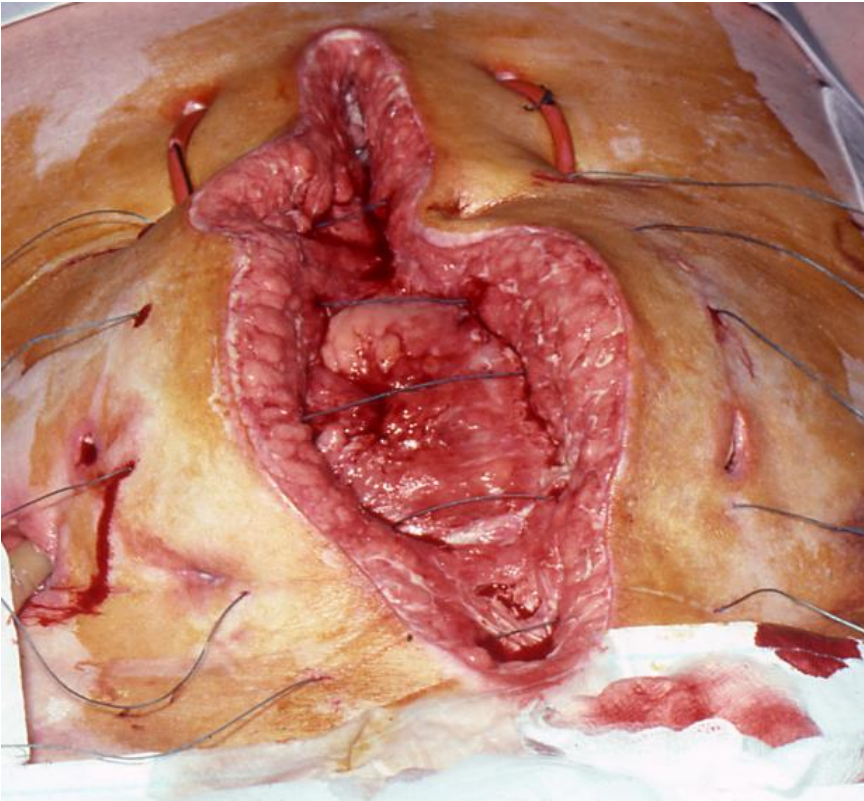
Physician's blind spot

- Nutrition is not taught in medical colleges, postgraduate courses
 - What little is taught is community based and not hospital related, nothing about enteral and parenteral nutrition
 - Physicians emphasize high technology measures
 - Depend on nutritionists who may not be sufficiently trained
-

Diagnosis and management

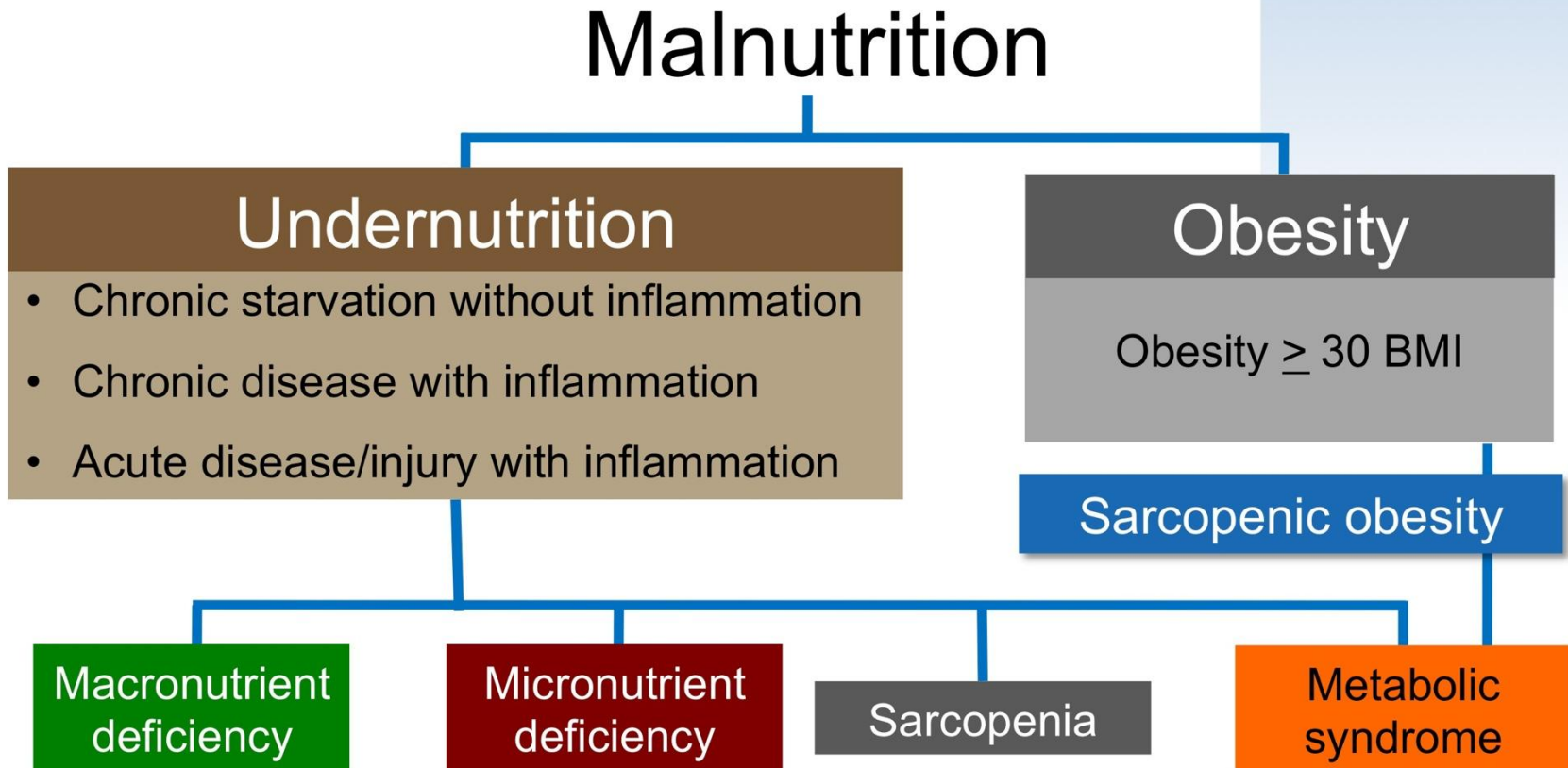
- Multiple diagnoses at time of admission
 - Each requiring a plan of management
 - Malnutrition often missed, so not treated
 - Rx of malnutrition is not necessarily enteral feeding via tubes, or parenteral nutrition
-

Postoperative complication



Admitted for bowel obstruction, workup took 5 days, scheduling and rescheduling took 3 more days. Wound dehiscence noted on Postop day # 3. Whose fault is this?

The Malnutrition Syndrome



New definitions of malnutrition

- Presence of 2 or more of the following:
- Insufficient energy intake
- Weight loss
- Loss of muscle mass
- Loss of subcutaneous fat
- Localized or generalized fluid accumulation
- Decreased functional status

Consensus statement by ASPEN and Academy of Nutrition and Dietetics (new name for Am Dietary Assn) : White JV. *JPEN* 2012;36:275

Hospital malnutrition in Canada: 2011 data

- Canadian Malnutrition Task Force
- Subjective Global Assessment (SGA) used
- Incidence of Grades B and C (ie moderate and severe malnutrition) is 43%

Available on line from website of Task Force; continues to be around 50%

Prevalence of Malnutrition

HOSPITAL ADMISSION

30% to 55%
of hospital
patients are
malnourished
upon admission¹⁻⁴

HOSPITAL STAY

33% of severely
malnourished
patients and
38% of well-
nourished patients
experience
nutritional decline⁴

HOSPITAL DISCHARGE

Many patients
continue to lose
weight after
discharge⁵

HOSPITAL READMISSION

Patients with
weight loss are at
increased risk for
readmission¹

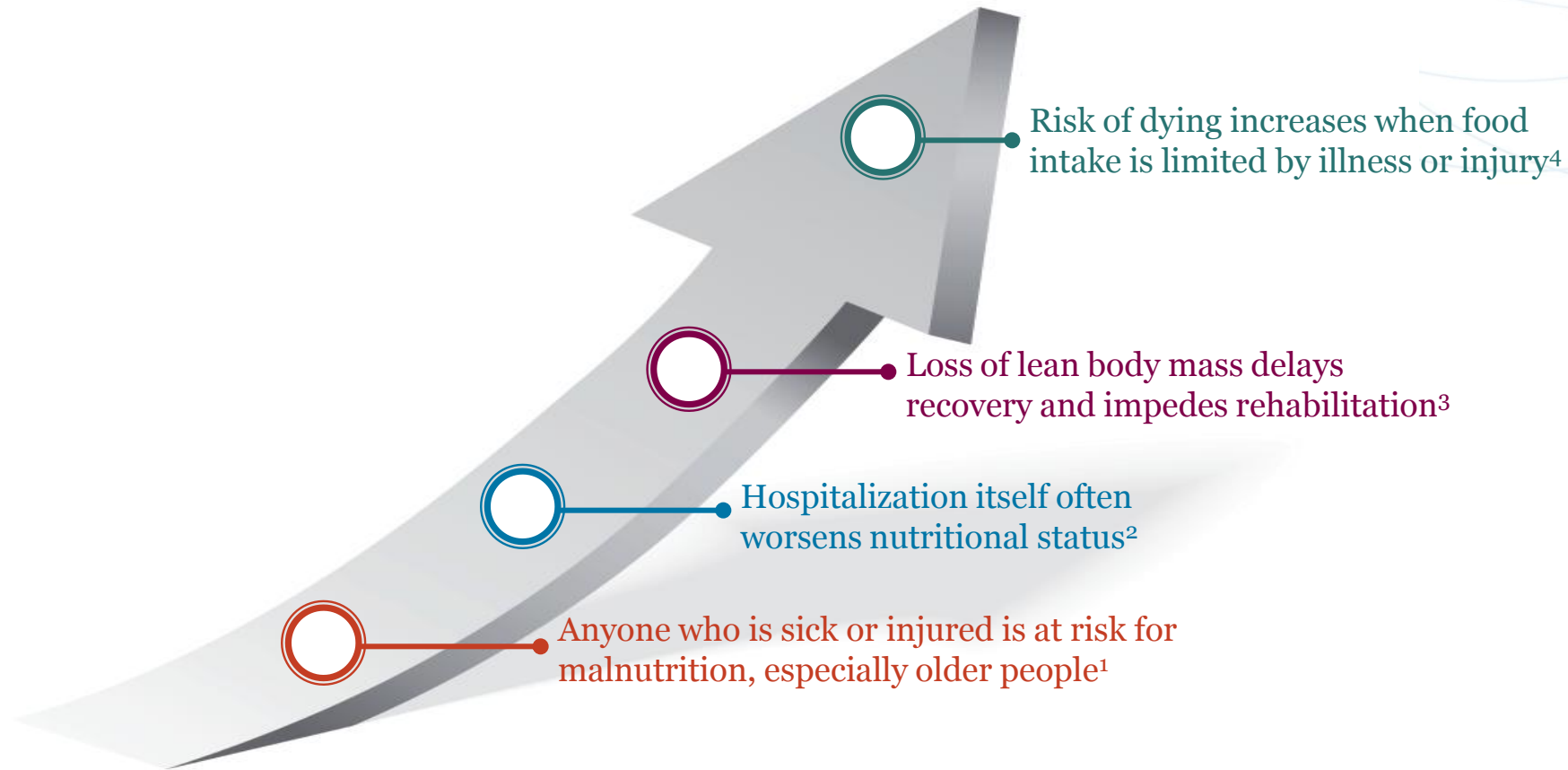


1. Tappenden KA et al. *JPEN J Parenter Enteral Nutr.* 2013;37(4):482-497. 2. Naber TH et al. *Am J Clin Nutr.* 1997;66(5):1232-1239.

3. Somanchi M et al. *JPEN J Parenter Enteral Nutr.* 2011;35(2):209-216. 4. Braunschweig C et al. *J Am Diet Assoc.* 2000;100(11):1316-

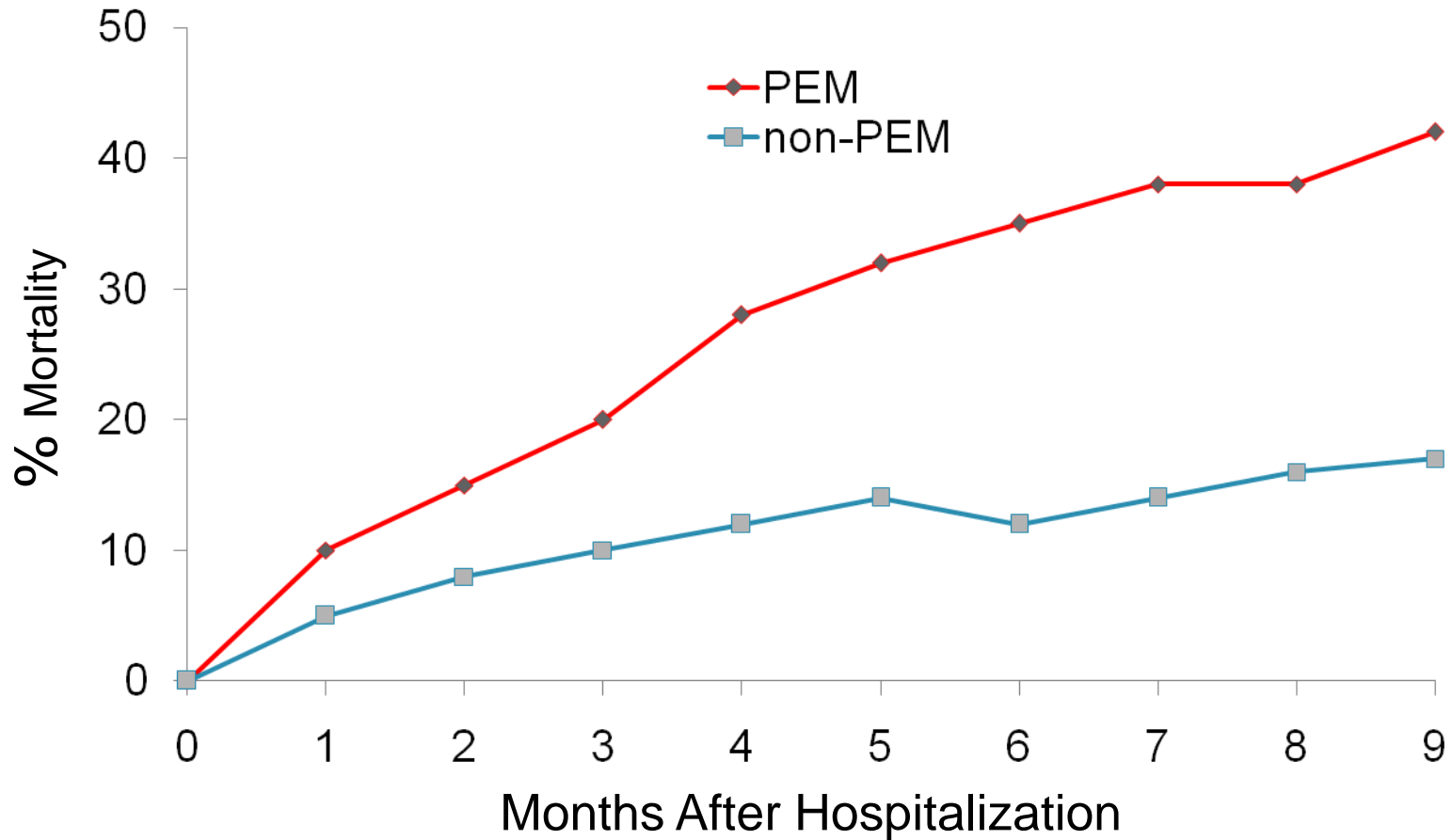
1322. 5. Beattie AH et al. *Gut.* 2000;46(6):813-818.

DISEASE-ASSOCIATED MALNUTRITION (DAM) ASSOCIATED WITH ILLNESS, INJURY, AND HOSPITALIZATION



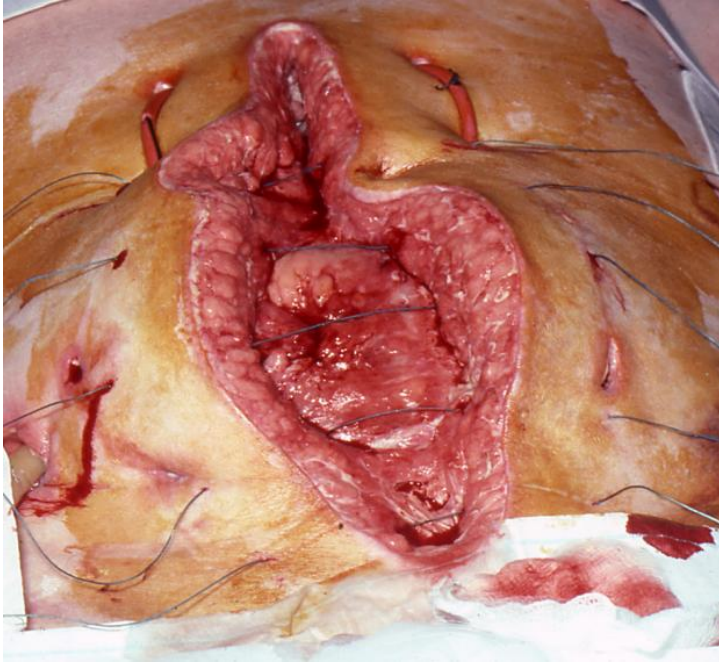
1. Imoberdorf R et al. *Clin Nutr.* 2010;29(1):38-41. 2. Krumholz HM. *N Engl J Med.* 2013;368(2):100-102. 3. Li HJ et al. *J Adv Nurs.* 2013;69(8):1691-1703. 4. Hiesmayr M et al. *Clin Nutr.* 2009;28(5):484-491.

Increased Mortality Rates (Delayed)



Cederholm T et al. *Am J Med* 1995; 98: 67.

Consequences of malnutrition



Wound dehiscence
("Burst abdomen")

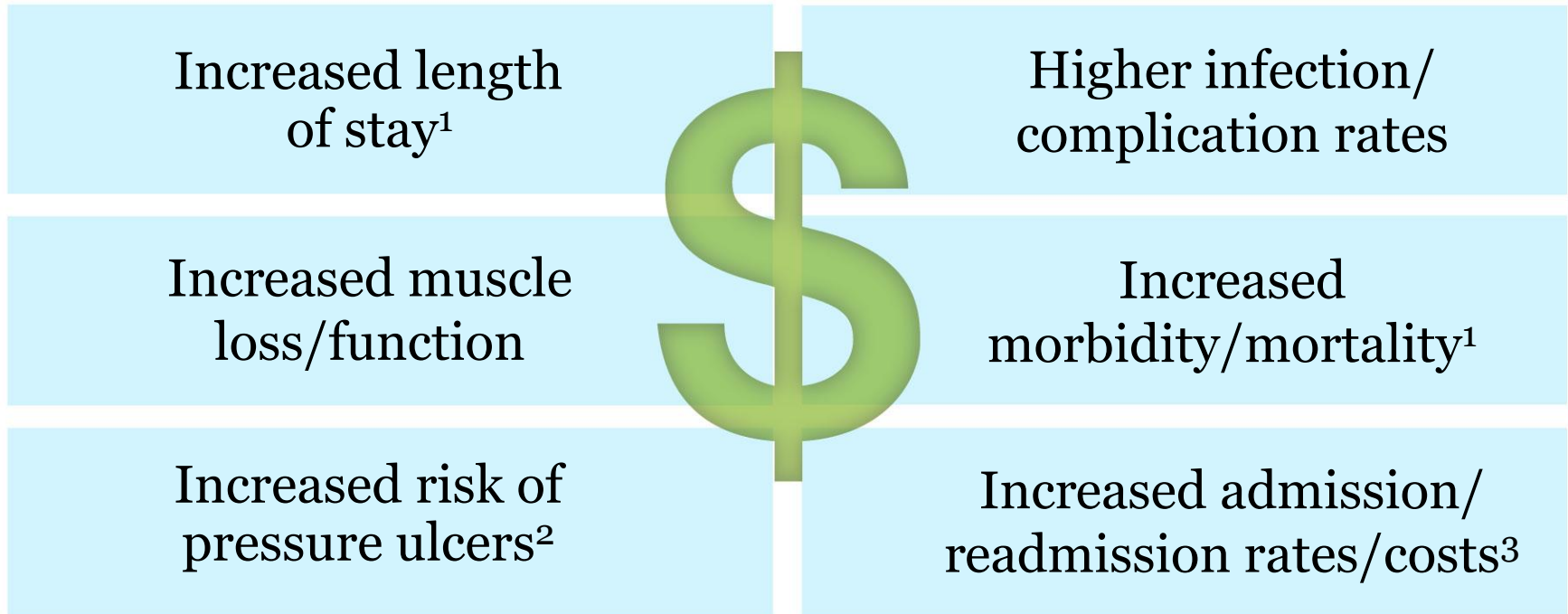
Affects every organ system

Cardiovascular, pulmonary

Immunity

Renal, hepatic, etc

UNRECOGNIZED MALNUTRITION MAY LEAD TO COSTLY CONSEQUENCES



1. Stratton RJ et al. *Br J Nurs*. 2006;95(2):325-330. 2. Shahin ES et al. *Nutrition*. 2010;26(9):886-889.
3. Amaral TF et al. *Clin Nutr*. 2007;26(6):778-784.

Burden of hospital malnutrition

- Impaired wound healing; increased pressure ulcers
- Immune suppression and increased infections
- Muscle wasting and functional loss
- Decreased quality of life
- Increased Length of ICU + Hospital stay
- Higher readmission rates
- Higher costs
- Increased mortality

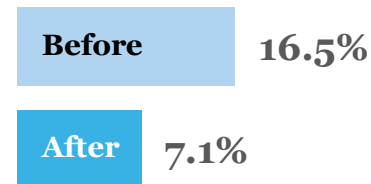
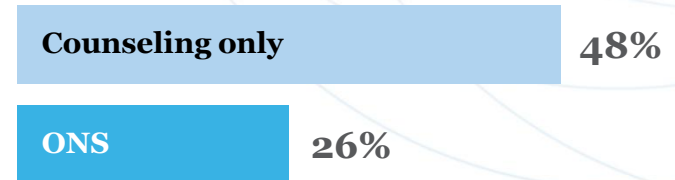
Tappenden KA. *JPEN* 2013; 37:482

EVIDENCE THAT NUTRITION INTERVENTION DECREASES READMISSIONS

Hospital patients who received dietary counseling plus oral nutrition 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 discharge²

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

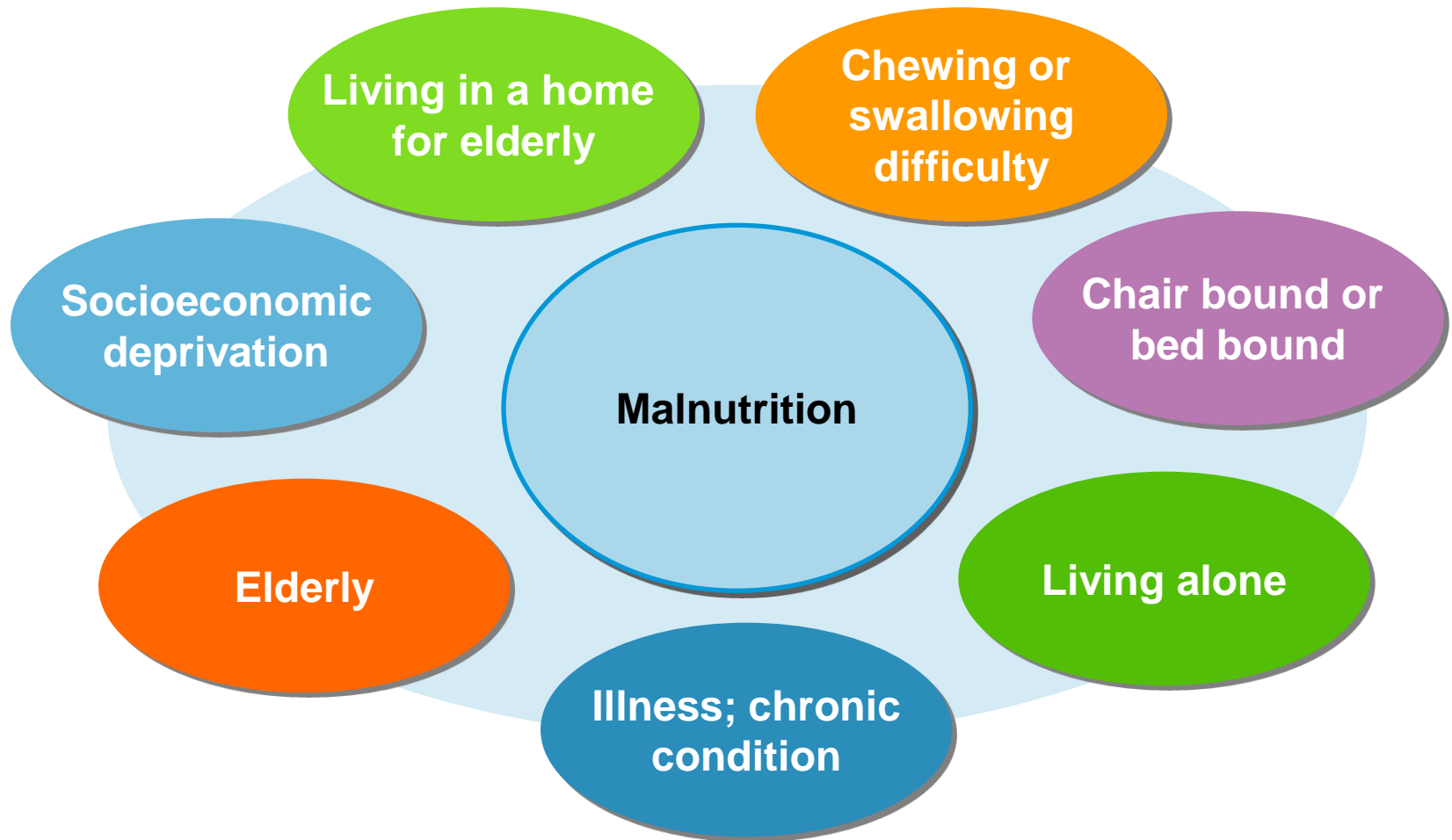


1. Norman K et al. *Clin Nutr.* 2008;27:48-56. 2. Brugler L et al. *Jt Comm J Qual Improv.* 1999;25:191-206.
3. Gariballa S et al. *Am J Med.* 2006;119:693-699.

Hospital Malnutrition



Malnutrition: Who is at Risk?



Recent report, Malnutrition in UK

- In 2007-2008, 150,000 Britons entered hospital with malnutrition
- 158,000 left the hospital with malnutrition
- ie about 8000+ patients were worse off when they were discharged!
- For 2008-2009, the figure is 10,500

Source: *Wall Street Journal*, Sept 4, 2010

Healthy granny, 76 dies after hospital denies her food and water for a WEEK

A HEALTHY and active grandmother died in hospital after she was repeatedly denied food and water over a week.

Joan Pertoldi, 76, was put on a nil-by-mouth regime while she waited for a routine hip operation at the Queen Elizabeth II Hospital in Welwyn Garden City, Hertfordshire.

The pensioner, who enjoyed looking after her two grandchildren, had suffered a fall in her garden but her family expected her to 'sail through the surgery'.

They were told she would be operated on within 48 hours but the procedure was put off three times - twice because the prosthesis due to be inserted into the joint was not properly sterilised.

Other delays occurred because of week-end staff shortages.

The operation eventually went ahead eight days after she was admitted to hospital but, severely weakened, Mrs Pertoldi never recovered and died a few weeks later.

During her stay in hospital, Mrs Pertoldi

By Andrew Levy

died due to neglect. The pensioner's daughter, Anna Pertoldi, said: 'The treatment my mother received in hospital was disgraceful.'

'When mum went into hospital she was in good spirits. But because of the cancellations she was left weak and then quickly went downhill.'

'Being left on nil-by-mouth was just one of a number of failings my mother had to suffer. Basic standards of care and nursing weren't there.'

The Daily Mail has campaigned for older people to be afforded the level of care they deserve in its Dignity for the Elderly

separated from her husband Bernard, 80, a retired undertaker, six years ago.

She was admitted to hospital on August 5, 2009, after the fall at her Welwyn Garden City home and was found to need a hip operation.

On seven of the eight nights before her operation she was not allowed food or water, as she was expected to undergo the procedure the following day. However, the operation was delayed three times.

A source close to the case said Mrs Pertoldi would have had some food and drink during the seven days, possibly before the procedure was rescheduled each time.

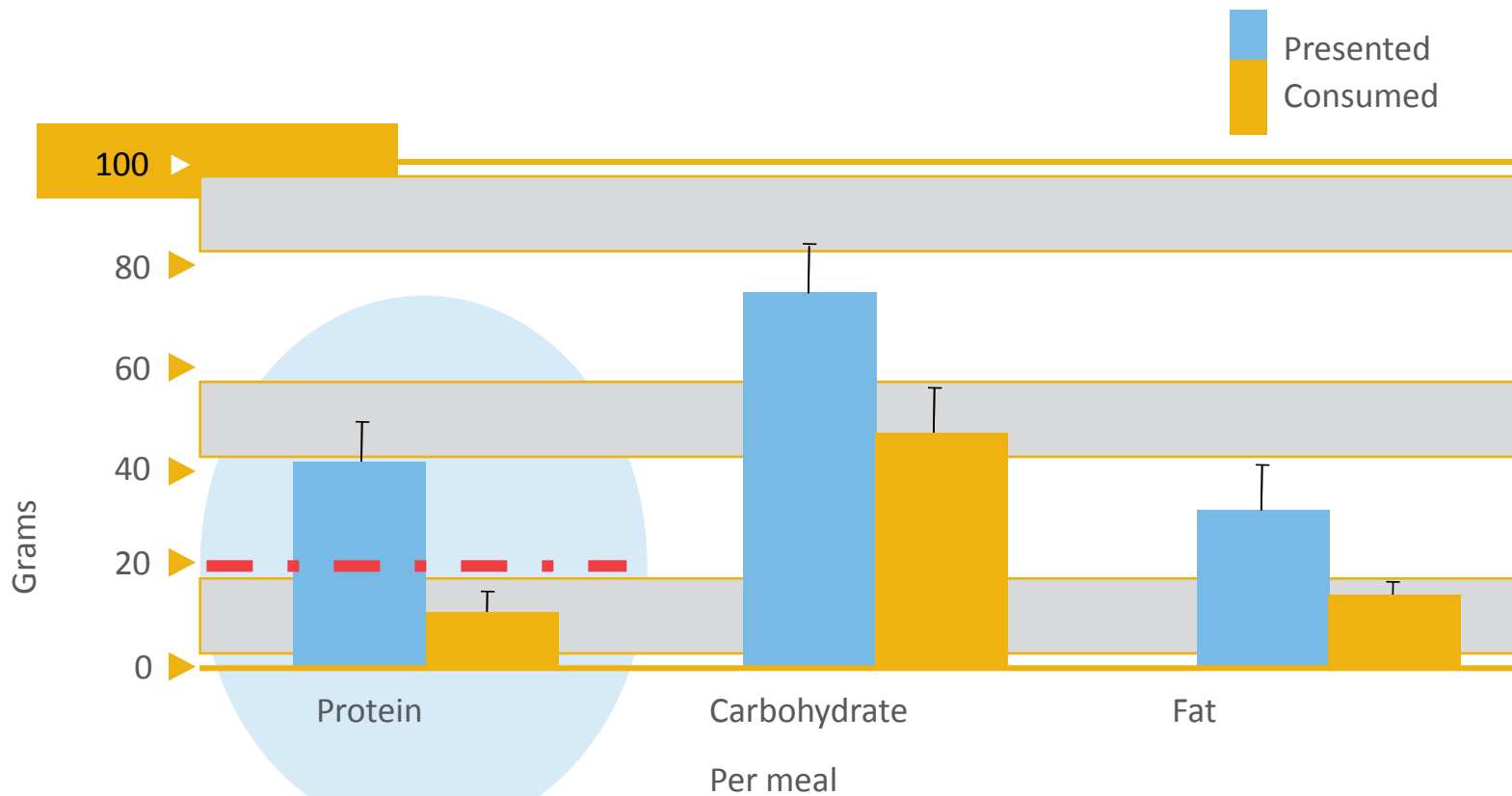
Anna Pertoldi, who is a lawyer, told a Sunday newspaper: 'It was soul destroying to have the operations cancelled every day.'

'But each day the focus was on getting down to theatre and having the procedure. That's why we listened to the doctors and made sure mum didn't eat or drink.'

Caron Heyes, the solicitor representing Mrs Pertoldi's family, said that she 'should have sailed through the surgery' but died as a result of preventable delays and neglect.



Older Patients Do Not Consume Enough Food in Hospital



Effect of Starvation on Organ Function

◆ Impaired muscle strength/mass

Pichard C, Jeejeebhoy KN. *Q J Med.* 1988;69:1021-1045.

◆ Reduced gastrointestinal function

Winter TA, et al. *Eur J Gastroenterol Hepatol.* 2000; 12:191-196.

◆ Impaired thermoregulation

Mansell PI, et al. *Q J Med.* 1990;76:817-829.

◆ Reduced mental function

Brozek J. *Nutrition.* 1990;6:389-395.

◆ Reduced respiratory function

Lewis MI, Sieck GC. *J Appl Physiol.* 1990;68:1938-1944.

◆ Reduced endocrine function

Schwartz MW, Seeley RJ. *N Eng J Med.* 1997;336:1802-1811.

◆ Reduced pancreatic function

Winter TA, et al. *Eur J Gastroenterol Hepatol.* 2000; 12:191-196.

◆ Reduced cardiovascular function

Winick M (ed). *Hunger Disease. Studies by the Jewish Physicians in the Warsaw Ghetto.* New York, Wiley, 1979.

Benefits of Oral Nutritional Supplements

Definition of oral nutritional supplements

- Scientific formulation, a medical food
 - Nutritional pharmaceutical or nutraceutical
 - Not all food supplements or nutrition drinks qualify to be labeled as ONS
 - ONS must contain macronutrients in right proportions and form
 - Must contain bioavailable micronutrients (both vitamins and trace elements)
-

Benefits of ONS

- General benefits of ONS have been well demonstrated both in the community and in hospitals:
 - Decreased mortality and morbidity¹
 - Decreased complications including infections²
 - Decreased pressure ulcers³

1. Stratton RJ et al. *Disease-related Malnutrition*. Cambridge, MA: CABI Publishing; 2003.

2. Beattie AH et al. *Gut*. 2000;46(6):813-818.

3. Stratton RJ et al. *Ageing Res Rev*. 2005; 4(3):422-450.

Recent review: ONS in community & home

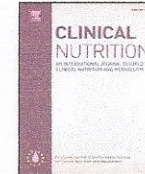


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Meta-analyses

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



M. Elia ^{a,*}, C. Normand ^b, A. Laviano ^c, K. Norman ^d

^a 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

^b Centre for Health Policy and Management, Trinity College, Dublin, Ireland

^c Department of Clinical Medicine, Sapienza University, Rome, Italy

^d Research Group on Geriatrics, Charité Universitätsmedizin, Berlin, Germany

Elia M et al. *Clin Nutrition*, 2016; 35:125-137

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

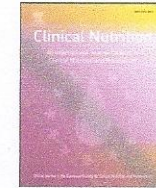
Recent review: ONS in hospital



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Meta-analyses

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^a Faculty of Medicine, University of Southampton National Institute of Health Research Biomedical Research Centre (Nutrition)

Elia M et al. Clin Nutr 2015

Conclusion: ONS in the hospital setting procures a cost-saving & is cost-effective.

BENEFITS OF ONS

- Specific benefits of ONS on 30-day readmissions have also been demonstrated:
 - Reduced length of stay¹
 - Reduced readmissions in elderly patients²
 - Shorter length of stay (2.3 d, by 21%) and 21.6% decrease in cost³

1. Somanchi M et al. *JPEN J Parenter Enteral Nutr.* 2011;35(2):209-216.
2. Stratton RJ. *Ageing Res Rev.* 2013; 12(4):884-897.
3. Philipson TJ et al. *Am J Manag Care.* 2013;19(2):121-128.

ORAL NUTRITION SUPPLEMENTATION PROVIDED DURING HOSPITALIZATION WAS ASSOCIATED WITH:¹



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.

1. Philipson TJ et al. *Am J Manag Care*. 2013;19(2):121-128.

Oral Nutritional Supplements: Benefits to Patients

- ONS can increase energy and nutrient intake in geriatric patients, Cochrane analysis - in 29/33 trials¹
- ONS can maintain or improve nutritional status²
- ONS can improve average survival (ESPEN guidelines)
 - Meta-analysis of 32 RCT revealed a lower mortality risk in supplemented elderly subjects than in controls¹

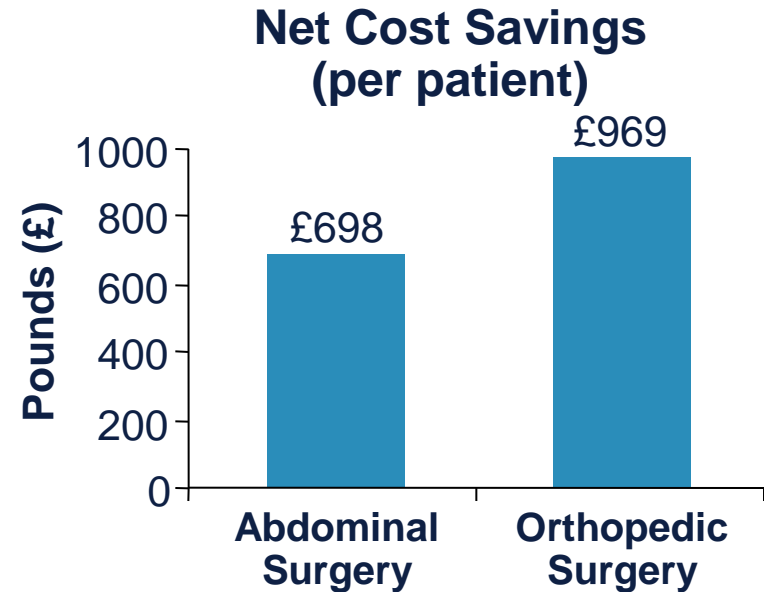
1. Milne AC, et al. *Cochrane Database Syst Rev.* 2005.

2. Volkert D, et al. *Clin Nutr.* 2006;25:330-360.

Oral Nutritional Supplements: Cost-Savings

■ BAPEN 2005 Report

- ONS given postoperatively can result in significant net cost savings
- ONS result in cost savings when given to older adults at high pressure ulcer risk



- **ONS in community can result in mean net cost savings of £688 per patient**

ONS Does Not Replace Normal Food Intake

- The consumption of ONS between meals allowed individuals to meet or exceed energy & nutrient needs when snacks that were typically served did not¹
- ONS supplemented group had significantly higher energy and protein intakes compared to non-supplemented group²
- ONS supplemented group had significantly higher energy intake per day (400 calories ~ value supplied by 500 ml ONS)³

1. Turic A, et al. *JADA*. 1998;12:1457.
 2. Hoh R, et al. *Am J Clin Nutr*. 1998;68:154
 3. Woo J, et al. *Age and Ageing*. 1994;23:40
-

Summary: Impact of ONS on Key outcomes

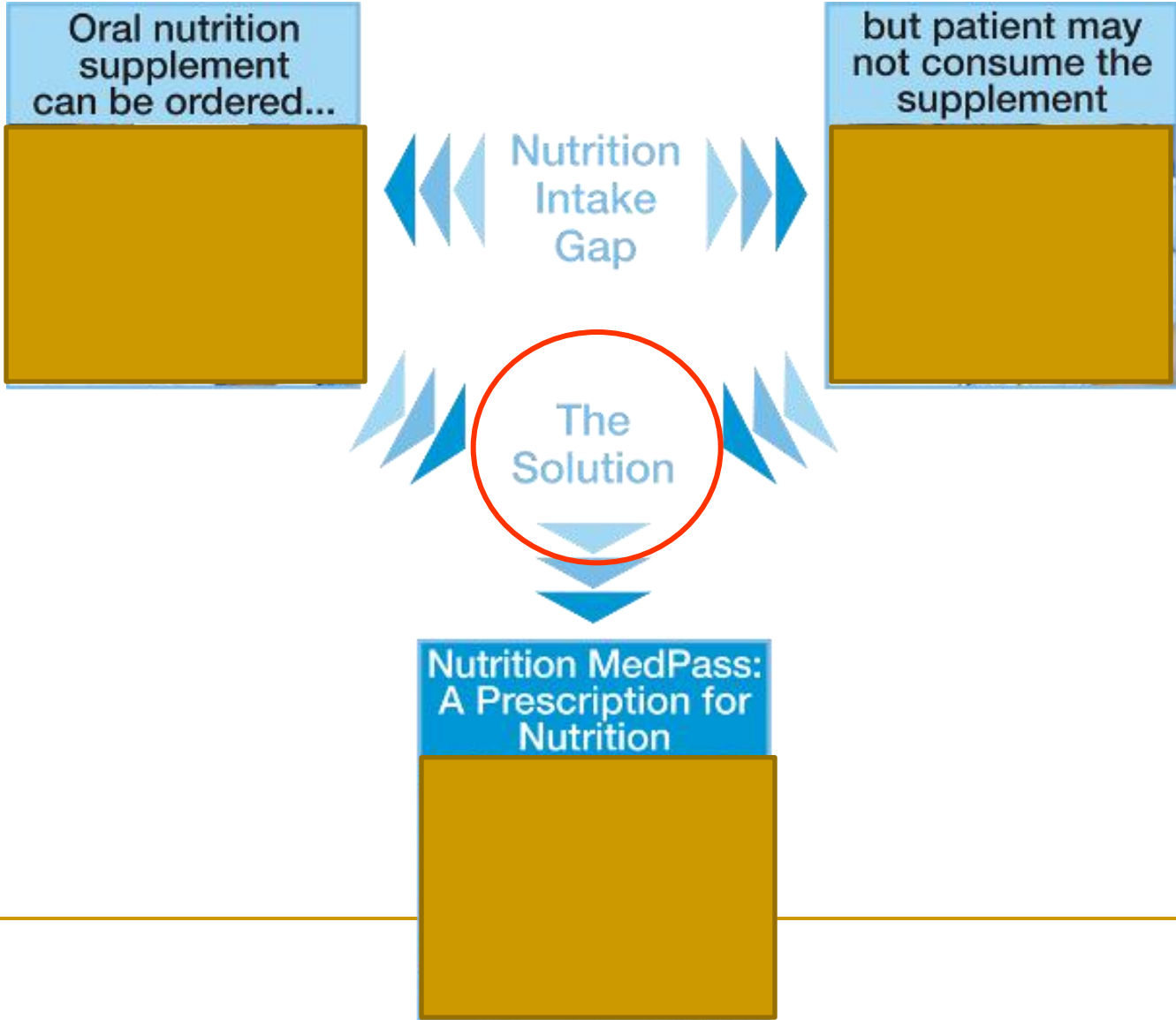
- Decreased complications (infections, pressure ulcers, GI problems, anemia, cardiac complications, deep vein thrombosis, urinary tract infections, pneumonia)
- Decreased length of stay
- Decreased readmissions
- Decreased mortality

Implementation

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



What is Nutrition MedPass?

- 50 mL of ONS
 - Delivered by nursing staff during medication pass (QID)
 - Pharmacist reviews all medication to assure that there are no drug-nutrient interactions
 - Valuable addition to a pressure ulcer prevention and healing program
-

Nutrition MedPass: Patient Benefits

- Small amount well-tolerated by patients
 - Does not interfere with appetite
 - Good compliance
 - Many patients gain or stop losing weight
 - Increased nutritional intake supports skin integrity
-

“Sip therapy”

- 15 to 30 cc consumed by mouth every hour when awake (500 cc per 24 h)
 - Consider 1 L of saliva, 1-1.5 L of gastric secretions, 1-2 L of bile + pancreatic secretions / 24 h
 - Increase as tolerated
 - Recommend with ice
 - Add Flavor considering cultural preferences:
 - Cinnamon, cloves ; Or more vanilla, hazelnut, chocolate
 - Coffee, tea
-

Nutrition MedPass Outcomes: Improves Compliance

Demographics

Treatment

Results in Treatment Group*

- N = 200
- Hospital patients malnourished and at nutritional risk
- Mean age = 84 yrs

Group 1
1-2 mid-meal supplements/day

Group 2
60 mL TwoCal QID

↑ **Compliance**
(95% vs 48%)

Positive nursing response
(95%)

Improved MNA Scores

↓ **LoS**
(23 vs 36 days)

MNA: Mini Nutrition Assessment;
LoS: Length of Stay

9 months

A Rapid, Comprehensive Oral Nutritional Supplement Quality Improvement Program Reduces 30-day Readmission in Malnourished Hospitalized Patients

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Oak Brook, IL

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Introduction

- 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

Study Background

Sriram K, Sulo S, Summerfelt T, VanDerBosch G,
Nikolich S, Feldstein J, Partridge J, Hegazi R, Ries M

Russell Institute for Research & eICU, Advocate Health Care, Park Ridge, IL, USA

Research & Development, Abbott Nutrition, Columbus, OH, USA

Center for Applied Value Analysis, Great Barrington, MA, USA

This trial was registered with U.S. National Institutes of Health and U.S. National Library of Medicine on www.ClinicalTrials.gov NCT02262429.

Study Objective

To investigate the effect of the administration of a Quality Improvement Program (QIP) in hospitalized patients on non-elective 30-day ReAdm

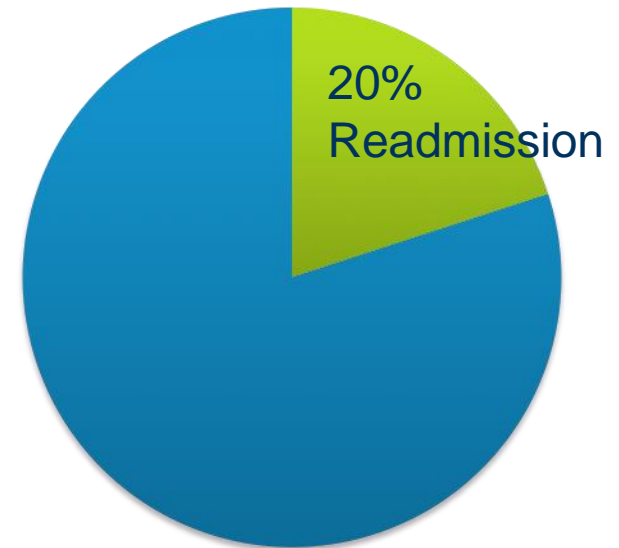
- Integrating nutrition risk screening by nursing staff upon admission
- Immediate provision of ONS supplementation when oral intake is not contraindicated

Target was to demonstrate an absolute difference of 4% reduction in 30-day ReAdm rates, as compared to pre-QIP historical rate of ReAdm.

Pre-Study ReAdmission Data

- The research team decided to conservatively use a ReAdm rate of 20% which is consistent with published data

Jencks ST et al. *NEJM* 2009; 360:1418-1428



Methods

The “QIP” and “QIP+” hospitals consisted of 2 in each group (a teaching hospital and a community hospital), from a 10-member system

Electronic Medical Record (EMR) was upgraded to include Malnutrition Screening Tool (MST) for all hospitals

In QIP+ hospitals alone, automatic condition specific ONS orders for all patients at-risk for malnutrition

Efficacy of Malnutrition Screening Tools

- Many screening tools have been available for > 3 decades
- Several common elements in different tools
- No single tool is appropriate for all settings
- The Malnutrition Screening Tool (MST) has been well validated and is as good as or even better than other tools
- MST has been used exclusively in some countries

alliance Malnutrition Screening Tool (MST)
to Advance Patient Nutrition

STEP 1: Screen with the MST

1 Have you recently lost weight without trying?

No	0
Unsure	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:

2 Have you been eating poorly because of a decreased appetite?

No	0
Yes	1

Appetite score:

Add weight loss and appetite scores

MST SCORE:

STEP 2: Score to determine risk

MST = 0 OR 1 NOT AT RISK
Eating well with little or no weight loss

If length of stay exceeds 7 days, then rescreen, repeating weekly as needed.

MST = 2 OR MORE AT RISK
Eating poorly and/or recent weight loss

Rapidly implement nutrition interventions. Perform nutrition consult within 24-72 hrs, depending on risk.

STEP 3: Intervene with nutrition for your patients at risk of malnutrition.

Notes: _____

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alliance to Advance Patient Nutrition | AMSN | **AMERICAN** SOCIETY OF CLINICAL NUTRITION | **sm** | **Abbott** NUTRITION

These health organizations are dedicated to the education of effective hospital nutrition practices to help improve patients' medical outcomes and support all clinicians in collaboration on hospital-wide nutrition



*Performed on: 12/08/2015 1451



- General Informati
- Allergies
- Pain
- Anesthesia & Tran
- Family History
- Medical History/P
- Home Medication
- Social History
- Procedure History
- Implants, Devices
- * Reproductive Hist
- * Infection History
- Nutrition / Dietary**
- Pediatric Nutrition
- Morse Fall Risk
- Fall Safety Plannir
- Psychosocial Ass
- Pregnancy and Bi
- Growth and Deve
- Discharge Plannir
- * Admission Form C
- CMC Admit Facility
- CND Admit Facility
- GSA Admit Facility
- GSH Admit Facility
- IMMC Admit Facili
- LGH Admit Facility
- SSH Admit Facility
- TRI Admit Facility
- OB/NICU Admissi

Nutrition / Dietary

Malnutrition Screening Tool

Is Patient Able to Complete Assessment at This Time

Yes

No

Have You Recently Lost Weight Without Trying

No

Unsure

If Yes, How Much Weight Have You Lost

2-13 lb

14-23 lb

24-33 lb

34 lb or More

Unsure

Have You Been Eating Poorly Because of a Decrease Appetite

Yes

No

Right Click in Box Below to View MST Tool

Malnutrition Screening Tool Score

MST High Risk = 2 or More at Risk Eating Poorly and/or Recent Weight Loss

Nutrition / Dietary

Home Diet

For Diet Reference Text Right Click In Box Below

<input type="checkbox"/> Regular	<input type="checkbox"/> Nectar Thick Liquids
<input type="checkbox"/> Bland	<input type="checkbox"/> No Added Salt
<input type="checkbox"/> Diabetic	<input type="checkbox"/> Nutritional Supplements
<input type="checkbox"/> Dysphagia	<input type="checkbox"/> Puree
<input type="checkbox"/> Honey Thick Liquids	<input type="checkbox"/> Renal
<input checked="" type="checkbox"/> Ketogenic Diet	<input type="checkbox"/> Tube Feedings
<input type="checkbox"/> Kosher	<input type="checkbox"/> Vegetarian - Lacto
<input type="checkbox"/> Low Cholesterol	<input type="checkbox"/> Vegetarian - Lacto Ovo
<input type="checkbox"/> Low fat	<input type="checkbox"/> Vegetarian - Ovo
<input type="checkbox"/> Low Sodium	<input type="checkbox"/> Vegetarian - Vegan
<input type="checkbox"/> Mechanical Soft	<input type="checkbox"/> Other:

Religious / Cultural Diet Restrictions

Pregnancy Nutritional Screen

Methods: QIP +

The enhanced QIP (QIP+) included 2 other hospitals (same mix as QIP), where additional initiatives were introduced

Aggressive nutrition-related procedures were implemented

- Faster administration of ONS, facilitated by a drop down menu in electronic medical records
- Specific discharge instructions provided

Follow-up

- Coupons for purchase of ONS
- 4 follow-up/compliance telephone calls

Methods QIP + Drop down menu

Orders

+ Add | Document Medication by Hx | Reconciliation | External Rx History | Rx Plans (1): HUMANA MEDICARE

Orders Medication List Document In Plan

Display: All Orders (All Statuses)

\$	Ordering Phy...	Order Name	Details
Nutrition			
Today			
	SYSTEM		12/08/15 13:28:39, BID
		General Diet	12/08/15 8:23:00

View

- Orders for Signature
- Plans
 - Document In Plan
 - Interdisciplinary
 - Nursing
 - Suggested Plans (1)
 - Orders
 - LET Orders
 - Admission Orders
 - Consults
 - Continuous Infusions
 - Diagnostic Imaging
 - Diagnostic Tests
 - Laboratory
 - Medications
 - Miscellaneous
 - Non Categorized
 - Nursing Orders

Methods: QIP +

Importantly, in the QIP+ hospitals, additional educational activities for nurses and dietitians were initiated

Reinforced the patient and caregiver education about the importance of ONS

Differences between QIP and QIP+

Differences of QIP+ and QIP Programs	QIP+	QIP
MST is a part of EMR	Y	Y
RN completes MST	Y	Y
ONS selection by automatic drop down menu by RN	Y	Y
ONS ordered by MD, RN, or RD	Y	Y
Dietician Consultation	Y	Y
Time to RD Consultation: < 24 Hours	Y	
Time to ONS Delivery in Hours	1 - 24	24 - 72
Discharge Planning Instructions	Y	Y
Discharge Materials including Coupons and Literature	Y	
Standard Post-discharge Phone Calls (24-72 Hours)	Y	Y
Nutrition Focused Post-Discharge Phone Calls (N = 4)	Y	

MST: Malnutrition Screening Tool; EMR: Electronic Medical Records; ONS: Oral Nutritional Supplements, RN: Registered Nurse, MD: Physician; RD: Registered Dietitian; Y = Yes

Results

Data from 1269 patients enrolled between October 2014 and April 2015 were analyzed

- QIP, n=769
- QIP+, n= 500

Between the two QIP groups, the demographic, clinical characteristics, and length of stay were comparable

Summary: % Decrease in Readmissions

PRE-POST QIP RESULTS

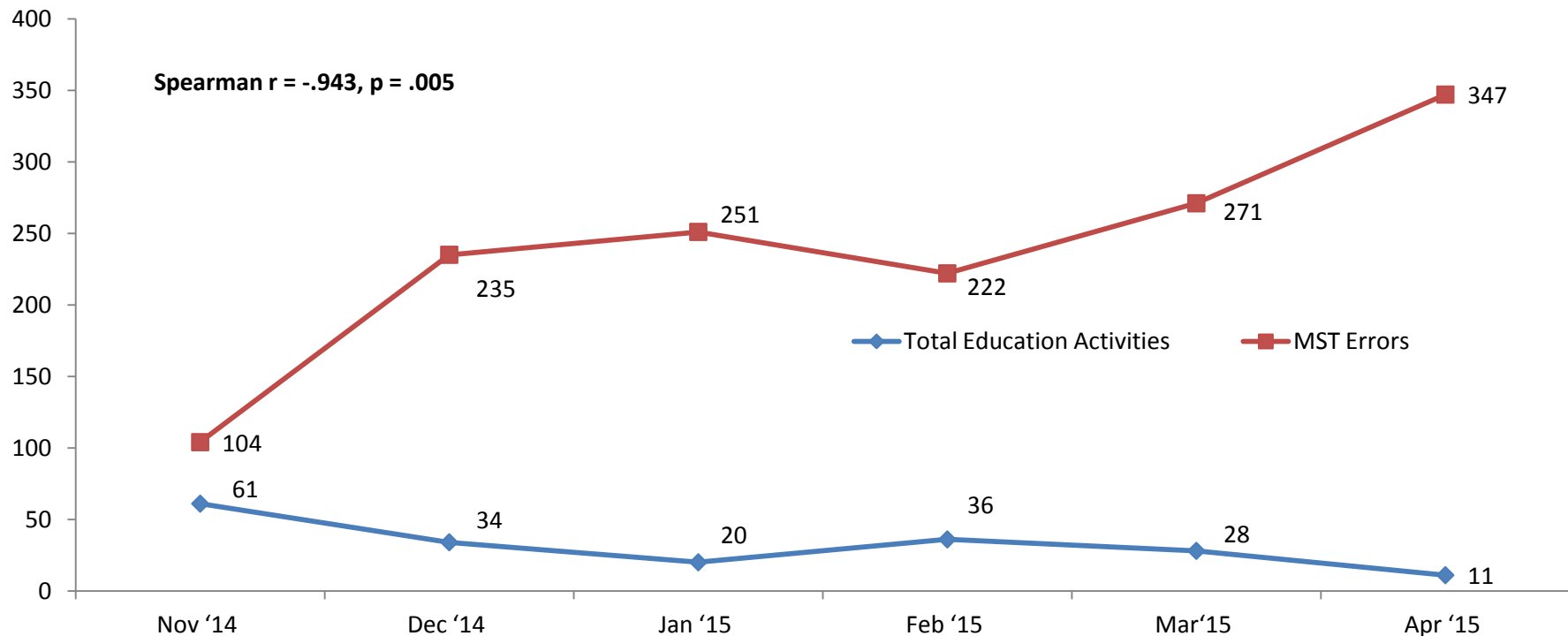
- **QIP +** = 4.4% absolute difference noted
or $4.4\%/20\% = 22\%$ reduction
- **QIP** = 3.6% absolute difference noted
or $3.6\%/20\% = 18\%$ reduction

Educational activities and errors

A negative correlation was observed between educational activities and errors in malnutrition risk identification using the MST ($p < 0.01$).

Educational/Reinforcing Activities

- Nurse/Dietitian/Physician** Educational / Reinforcing Activities include: Emails / Online Computerized Behavioral Training / Leadership Meetings / Situation-Background-Assessment-Recommendation / Safety Huddles / Conference Calls / In Person Presentations



Estimated Cost Savings

- **QIP+ and QIP sites**

- ✓ 500 pts x 20% = 100 pts Expected Readmissions

- ✓ 500 pts x 15.6% = 78 pts Observed Readmissions

- ✓ 100 Expected - 78 Observed = 22 Prevented Readmissions x **\$18,500 Average Admission Cost* = \$407,000**

- ✓ 769 pts x 20% = 154 pts Expected Readmissions

- ✓ 769 pts x 16.4% = 126 pts Observed Readmissions

- ✓ 154 Expected – 126 Observed = 28 Prevented Readmissions x **\$18,500 Average Admission Cost = \$518,000**

- ✓ Average Admission Cost - \$ 18,500 *

- ✓ Cost of preventable Readmissions - **\$ 925,000**

(during the period of this study involving 4 hospitals only)

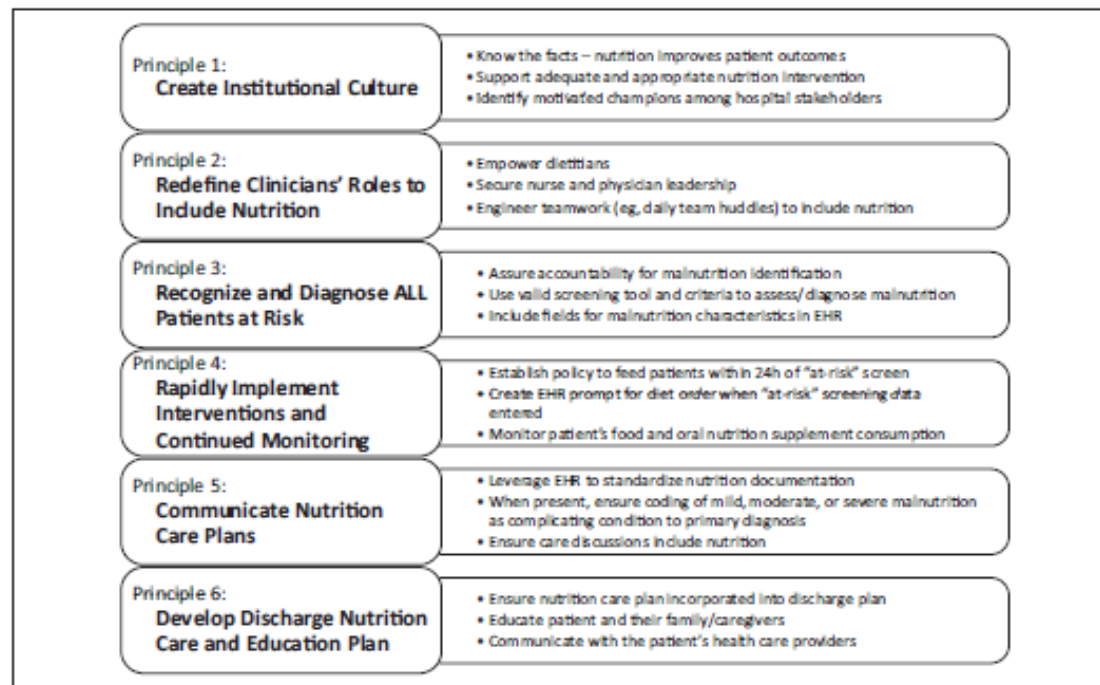


Figure 1. The Alliance's Key Principles for Advancing Patient Nutrition. EHR, electronic health record.

Conclusions

- 30-day unplanned hospital ReAdm can be significantly decreased among malnourished inpatient population
- A validated nurse-initiated nutrition screening tool incorporated into the EMR is crucial
- The following components are also key:
 - Immediate provision of ONS
 - Multi-disciplinary team follow-up
 - Ongoing patient and care giver education
 - Ongoing provider education
 - Sustained provider and administrative programmatic support

Pre-Operative Oral Nutritional Supplements

Preoperative Nutritional Support

- Enteral nutritional support decreases wound complications, length of stay, duration on ventilator, and anastomotic leaks if given for 7 to 10 days prior to surgery

Standard oral nutritional supplements in the pre-op patient

- Given the lack of a significant difference between immunonutrition and standard ONS
- and the fact that standard ONS are less expensive and widely available,
- recommend use of standard ONS for nutritional optimization of the surgical patient.
- Cost and accessibility are key factors to patient compliance

Hegazi R A. *J Am Coll Surg* 2014

Preop Nutrition and Infection Rates in GI Cancer Patients

Author	Blinding	Control Group	Patients (N)	Nutritional Status	Infection Rate (Treatment vs Control)	P Value
Braga, 1999	Yes	Standard EN	206	Mixed	14% vs 30%	.02
Senkal, 1999	Yes	Standard EN	154	Mixed	13% vs 24%	.08
Gianotti, 2002	No	Fluids	305	Well-nourished	14% vs 30%	.0006
Braga, 2002a	No	Fluids	200	Well-nourished	12% vs 30%	.04
Braga, 2002b	No	Standard EN	150	Malnourished	10% vs 24%	.06

GI = gastrointestinal; EN = enteral nutrition

Braga M, et al. *Arch Surg.* 1999;134:428; Senkal M, et al. *Arch Surg.* 1999;134:1309

Gianotti L, et al. *Gastroenterology.* 2002; 122:1763; Braga M, et al. *Surgery.* 2002a;132:805

; Braga M, et al *Arch Surg.* 2002b;137:174-

Braga M, Rocchetti S. *Contemp Surg.* 2006(Sept suppl):276.

Cost-effectiveness of Preop Nutrition*

Author	Cost of Nutrition†		Cost of Complication†		Cost-Effectiveness†	
	Treatment	Control	Treatment	Control	Treatment	Control
Senkal, 1999‡	347	49	964	2688	1503	3587
Gianotti, 2000§	347	103	768	2345	1339	3725
Braga, 2005§	144	33	1728	3089	2985	6244

*Cost-effectiveness was calculated by dividing per-patient costs of clinical nutrition and treatment of postoperative complications by the percentage of complication-free patients. †Per patient randomized ‡Cost in deutsche marks §Cost in euros

Senkal M, et al. *Arch Surg.* 1999;134:1309; Gianotti L, et al. *Shock.* 2000;14:325; Braga M, et al. *Nutrition.* 2005;21:1078. Braga M, Rocchetti S. *Contemp Surg.* 2006(Sept suppl):276.

Micronutrients in ONS

- Common but not recognized
- Obese patients are also micronutrient deficient
- No need for routine laboratory testing
- Must be an integral part of nutrition therapy
(SCCM/ASPEN 2016 Guidelines)
- Must be present in formula feeds in bio-available forms

Sriram K, Lonchyna V. *JPEN* 2009; 33:548

Valentino D, Sriram K. *Curr Opin Clin Nutr Metab Care* 2011

Shankar P, Sriram K. *Nutrition* 2010; 26:735

Concluding remarks

- New definitions of malnutrition
 - Burden of malnutrition
 - Oral nutritional supplements: Efficacy, cost effectiveness
 - Practical strategies
-

Websites for more information

- www.IndiaANHI.com (Abbott Nutrition Health Institute, India)
 - www.nutritioncare.org (Am Soc Parenteral & Enteral Nutrition)
 - www.espen.org (European Soc PEN)
 - www.nice.org (Natl Inst of Clin Excellence, U.K.)
 - www.sccm.org (Soc of Crit Care Med)
- Check out Webcast on “Malnutrition: New International Etiology-Based Diagnosis”
- <http://nutritioncareincanada.ca> (Canadian Malnutrition Task Force)
 - www.criticalcarenutrition.com (Canadian site: Critical Care Nutrition)
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