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

Malnutrition

Undernutrition
- Chronic starvation without inflammation
- Chronic disease with inflammation
- Acute disease/injury with inflammation

Obesity
- Obesity > 30 BMI
  - Sarcopenic obesity

Macronutrient deficiency

Micronutrient deficiency

Sarcopenia

Metabolic 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 (i.e., moderate and severe malnutrition) is 43%

Available online from website of Task Force; continues to be around 50%
Prevalence of Malnutrition

HOSPITAL ADMISSION
30% to 55% of hospital patients are malnourished upon admission

HOSPITAL STAY
33% of severely malnourished patients and 38% of well-nourished patients experience nutritional decline

HOSPITAL DISCHARGE
Many patients continue to lose weight after discharge

HOSPITAL READMISSION
Patients with weight loss are at increased risk for readmission

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

Risk of dying increases when food intake is limited by illness or injury

Loss of lean body mass delays recovery and impedes rehabilitation

Hospitalization itself often worsens nutritional status

Anyone who is sick or injured is at risk for malnutrition, especially older people

Increased Mortality Rates (Delayed)

Consequences of malnutrition

Affects every organ system
Cardiovascular, pulmonary
Immunity
Renal, hepatic, etc

Wound dehiscence
(“Burst abdomen”)
UNRECOGNIZED MALNUTRITION MAY LEAD TO COSTLY CONSEQUENCES

<table>
<thead>
<tr>
<th>Increased length of stay&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Higher infection/complication rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased muscle loss/function</td>
<td>Increased morbidity/mortality&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Increased risk of pressure ulcers&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Increased admission/readmission rates/costs&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

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. J.PEN 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 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$^3$

Hospital Malnutrition
Malnutrition: Who is at Risk?

- Living in a home for elderly
- Chewing or swallowing difficulty
- Chair bound or bed bound
- Living alone
- Illness; chronic condition
- Elderly
- Socioeconomic deprivation
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

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 'pull 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 weekend 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 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 campaign.

By Andrew Levy

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 not having the procedure. That's why we listened to the doctors and made sure mum didn't eat or drink.'

Caron Hayes, 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

![Bar chart showing the comparison between presented and consumed food (Protein, Carbohydrate, Fat) per meal.](image)
Effect of Starvation on Organ Function

- **Impaired muscle strength/mass**

- **Impaired thermoregulation**

- **Reduced respiratory function**

- **Reduced pancreatic function**

- **Reduced gastrointestinal function**

- **Reduced mental function**

- **Reduced endocrine function**

- **Reduced cardiovascular function**
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 quality 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 morbidity\(^1\)
  - Decreased complications including infections\(^2\)
  - Decreased pressure ulcers\(^3\)

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


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

A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in the hospital setting

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

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


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 stay\(^1\)
  - Reduced readmissions in elderly patients\(^2\)
  - Shorter length of stay (2.3 d, by 21%) and 21.6% decrease in cost\(^3\)

ORAL NUTRITION SUPPLEMENTATION 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.  
Oral Nutritional Supplements: Benefits to Patients

- ONS can increase energy and nutrient intake in geriatric patients, Cochrane analysis - in 29/33 trials\(^1\)
- ONS can maintain or improve nutritional status \(^2\)
- ONS can improve average survival (ESPEN guidelines)
  - Meta-analysis of 32 RCT revealed a lower mortality risk in supplemented elderly subjects than in controls\(^1\)

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 not

- ONS supplemented group had significantly higher energy and protein intakes compared to non-supplemented group

- ONS supplemented group had significantly higher energy intake per day (400 calories ~ value supplied by 500 ml ONS)

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

Tappenden KA. JPEN 2013; 37:482
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
Challenge of Oral Nutritional Supplementation

Oral nutrition supplement can be ordered...

Nutrition Intake Gap

but patient may not consume the supplement

The Solution

Nutrition MedPass: A Prescription for Nutrition
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**
- N = 200
- Hospital patients malnourished and at nutritional risk
- Mean age = 84 yrs

**Treatment**
- **Group 1**: 1-2 mid-meal supplements/day
- **Group 2**: 60 mL TwoCal QID

**Results in Treatment Group**
- ↑ Compliance (95% vs 48%)
- Positive nursing response (95%)
- Improved MNA Scores
- ↓ LoS (23 vs 36 days)

MNA: Mini Nutrition Assessment; LoS: Length of Stay

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

Krishnan Sriram MD FRCS(C) FACS FCCM
Tele-Intensivist, Adult Critical Care & eICU, Advocate Health Care
Oak Brook, IL

krishnan.sriram@advocatehealth.com
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


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.
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.
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

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
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+

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

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

Spearman $r = -0.943$, $p = 0.005$
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 Readmission 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 Readmission Cost = $518,000

- Average Readmission Cost - $18,500 *
- Cost of preventable Readmissions - $925,000
  (during the period of this study involving 4 hospitals only)

* Philipson TJ. *Am J Managed Care*. 2013;19:121-128
| Principle 1: Create Institutional Culture | - Know the facts – nutrition improves patient outcomes  
- Support adequate and appropriate nutrition intervention  
- Identify motivated champions among hospital stakeholders |
|----------------------------------------|--------------------------------------------------|
| Principle 2: Redefine Clinicians’ Roles to Include Nutrition | - Empower dietitians  
- Secure nurse and physician leadership  
- Engineer teamwork (e.g., daily team huddles) to include nutrition |
| Principle 3: Recognize and Diagnose ALL Patients at Risk | - Ensure accountability for malnutrition identification  
- Use validated screening tool and criteria to assess/diagnose malnutrition  
- Include fields for malnutrition characteristics in EHR |
| Principle 4: Rapidly Implement Interventions and Continued Monitoring | - Establish policy to feed patients within 24h of “at-risk” screen  
- Create EHR prompt for diet order when “at-risk” screening data entered  
- Monitor patient’s food and oral nutrition supplementation consumption |
| Principle 5: Communicate Nutrition Care Plans | - Leverage EHR to standardize nutrition documentation  
- When present, ensure coding of mild, moderate, or severe malnutrition as a complicating condition to primary diagnosis  
- Ensure care discussions include nutrition |
| Principle 6: Develop Discharge Nutrition Care and Education Plan | - Ensure nutrition care plan incorporated into discharge plan  
- Educate patient and their family/caregivers  
- Communicate with the patient’s healthcare providers |

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

ReAdm: ReAdmission; EMR: Electronic Medical Records; ONS: Oral Nutritional Supplement
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

# Preop Nutrition and Infection Rates in GI Cancer Patients

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

GI = gastrointestinal; EN = enteral nutrition
; Braga M, et al *Arch Surg.* 2002b;137:174-
Cost-effectiveness of Preop Nutrition*

<table>
<thead>
<tr>
<th>Author</th>
<th>Cost of Nutrition†</th>
<th>Cost of Complication†</th>
<th>Cost-Effectiveness†</th>
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<tbody>
<tr>
<td></td>
<td>Treatment</td>
<td>Control</td>
<td>Treatment</td>
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<tr>
<td>Senkal, 1999‡</td>
<td>347</td>
<td>49</td>
<td>964</td>
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<tr>
<td>Gianotti, 2000§</td>
<td>347</td>
<td>103</td>
<td>768</td>
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<tr>
<td>Braga, 2005§</td>
<td>144</td>
<td>33</td>
<td>1728</td>
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</tbody>
</table>

*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 deutshe marks §Cost in euros

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](http://www.IndiaANHI.com) (Abbott Nutrition Health Institute, India)
- [www.nutritioncare.org](http://www.nutritioncare.org) (Am Soc Parenteral & Enteral Nutrition)
- [www.espen.org](http://www.espen.org) (European Soc PEN)
- [www.sccm.org](http://www.sccm.org) (Soc of Crit Care Med)

Check out Webcast on “Malnutrition: New International Etiology-Based Diagnosis”

- [http://nutritioncareincanada.ca](http://nutritioncareincanada.ca) (Canadian Malnutrition Task Force)
- [www.criticalcarenutrition.com](http://www.criticalcarenutrition.com) (Canadian site: Critical Care Nutrition)