Nutrition in the Older Surgical Patient: Importance and Optimisation

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Percentage of weight loss: A basic indicator of surgical risk in patients with chronic peptic ulcer

Studdon HO. JAMA. 1936;106:458.
Perioperative Stress Response

- Inflammatory process leading to catabolic state—‘Diabetes of Injury’
- Most pronounced day after surgery
- Depletion of liver, skeletal muscle and myocardial glycogen stores
- Immune function suppression
Sequential Changes in the Metabolic Response in Critically Injured Patients During the First 25 Days After Blunt Trauma


- 10 critically injured patients
- Energy expenditure and body composition measured out to Day 25 (fat, nitrogen, skeletal muscle mass)

Graphs showing changes in protein and REE (kcal/d) over time.
Elective Surgery = Controlled Trauma

• Healthy individuals lose 40-80g nitrogen after elective abdo surgery =1.2-2.4kg skeletal muscle.
• 50% greater in Type 2 DM after abdo surgery
• Burns/sepsis = 800g of muscle lost per day.
• No evidence that elderly have greater catabolic changes but muscle mass reduced so effect greater

Effect of Preoperative Nutritional Deficiency on Mortality After Radical Cystectomy for Bladder Cancer

• 538 patients undergoing radical cystectomy
• Albumin <35g/L, BMI <18.5, wt loss >5%
• 19% malnourished
• 16.5% v 5.1% 90 day mortality (HR 2.91 (1.36 - 6.23))
• 3 year survival 45% v 68%
Identifying Preoperative Malnutrition

- Food intake
- Weight loss
- BMI
- Serum albumin, prealbumin, transferrin
- Biometrical analysis - phase angle (Fat and LBM)
- Scoring systems
  - SGA
Nutritional Risk Score-2002

<table>
<thead>
<tr>
<th>Malnutrition</th>
<th>Mild Score 1</th>
<th>Moderate Score 2</th>
<th>Severe Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td></td>
<td>18.5–20.5</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Food Intake (%)</td>
<td>50–70</td>
<td>25–50</td>
<td>&lt;25</td>
</tr>
<tr>
<td>Weight loss &lt;5%</td>
<td>3 months</td>
<td>2 months</td>
<td>1 month</td>
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</table>

<table>
<thead>
<tr>
<th>Disease severity</th>
<th>Example</th>
<th>Major surgery¹, Stroke</th>
<th>Head injury, bone marrow transplantation, ICU patients (APACHE 20)</th>
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<tbody>
<tr>
<td>Age (Years)</td>
<td>&gt;70</td>
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¹ Major abdominal surgery includes colorectal, gastric, liver, pancreatic, and esophageal resection for benign and malignant disease by either laparotomy or laparoscopic approach, lasting usually >2 h.

Association between the score of preoperative nutritional risk screening and anastomotic leakage following anterior resection for rectal cancer.


- 641 consecutive patients
- 26 anastomotic leaks
- NRS-2002 ≥3: 6.9% vs. 2.1%, p=0.002
- After adjustment: OR=3.2 (1.3-7.7)
Preoperative Nutritional Support
Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk


1085 patients

NRS-2002 score 3-7

512 'At risk'

NRS-2002 score 3-4

392

NRS-2002 <3

573

NRS-2002 score ≥5

120

21 received preop nutrition

13 TPN

No difference in complications or length of stay

43 received preop nutrition

34 TPN

50% reduction in complications

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Malnutrition

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<th>Score</th>
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<th>Severe</th>
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<tr>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
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<td>3</td>
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Nutritional Status

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Disease severity

- Example: Hip fracture, cirrhosis, COPD
- Major surgery, Stroke
- Head injury, bone marrow transplantation, ICU patients (APACHE 20)

Age

>70 years

a Major abdominal surgery includes colorectal, gastric, liver, pancreatic, and esophageal resection for benign and malignant disease by either laparotomy or laparoscopic approach, lasting usually >2 h.
Preoperative Carbohydrate Loading
Preoperative Carbohydrate Loading

- Avoids long periods of starvation - shift from fasted to fed state
- Minimise catabolism - maintain glycogen stores
- Avoid lipolysis and proteolysis
- 50% decrease in insulin resistance
A meta-analysis of randomised controlled trials on preoperative oral carbohydrate treatment in elective surgery

- 21 studies, 1685 patients- ortho, abdominal, cardiac, thyroid

<table>
<thead>
<tr>
<th>1.2.2 Major abdominal surgery</th>
<th></th>
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<tbody>
<tr>
<td>Nygren</td>
<td>6.9</td>
<td>0.9</td>
<td>7</td>
<td>9</td>
<td>0.8</td>
<td>7</td>
<td>24.0%</td>
<td>-2.10 [-2.99, -1.21] 1999</td>
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<td>Henriksen</td>
<td>13.5</td>
<td>7.3</td>
<td>17</td>
<td>14.1</td>
<td>8.7</td>
<td>31</td>
<td>2.7%</td>
<td>-0.60 [-5.23, 4.03] 2003</td>
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<td>Yuill</td>
<td>10.6</td>
<td>0.7</td>
<td>49</td>
<td>11.2</td>
<td>0.8</td>
<td>53</td>
<td>32.9%</td>
<td>-0.60 [-0.89, -0.31] 2005</td>
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<td>Hausel (b)</td>
<td>11.66</td>
<td>8.25</td>
<td>80</td>
<td>10.82</td>
<td>8.96</td>
<td>172</td>
<td>9.1%</td>
<td>0.84 [-1.41, 3.09] 2005</td>
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<tr>
<td>Noblet</td>
<td>6.5</td>
<td>2.42</td>
<td>12</td>
<td>12.47</td>
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<td>-5.97 [-12.57, 0.63] 2006</td>
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<td>Kaska</td>
<td>9.07</td>
<td>1.99</td>
<td>74</td>
<td>10.25</td>
<td>3.37</td>
<td>75</td>
<td>24.0%</td>
<td>-1.18 [-2.07, -0.29] 2010</td>
</tr>
<tr>
<td>Mathur</td>
<td>8.68</td>
<td>6.68</td>
<td>80</td>
<td>9.93</td>
<td>11.89</td>
<td>82</td>
<td>5.9%</td>
<td>-1.25 [-4.21, 1.71] 2010</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>319</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>443</td>
<td>100.0%</td>
</tr>
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Heterogeneity: $\tau^2 = 0.47$; $\chi^2 = 15.13$, df = 6 ($P = 0.02$); $I^2 = 60$
Test for overall effect: $Z = 2.68$ ($P = 0.007$)
Immunonutrition
A Meta-Analysis of the Effect of Combinations of Immune Modulating Nutrients on Outcome in Patients Undergoing Major Open Gastrointestinal Surgery

• 26 studies, 2496 patients
• Comparing immunonutrition with isocaloric, isonitrogenous enteral diet.
• L-arginine, L-glutamine, omega-3 fatty acids, and nucleotides
A Meta-Analysis of the Effect of Combinations of Immune Modulating Nutrients on Outcome in Patients Undergoing Major Open Gastrointestinal Surgery


- RR 0.82 (0.71-0.95) for non-infectious comps
- -1.9 (-2.9- -0.9) day overall LOS benefit
'Immunonutrition' Ill-Advised for ICU Patients on Feeding Tube, Study Says

By Mary Elizabeth Dallas, HealthDay Reporter

TUESDAY, Aug. 5, 2014 (HealthDay News) -- Enriching the feeding-tube nutrition of intensive care patients on ventilators with agents that boost the immune system might cause more harm than good, researchers say.

This type of supplementation doesn't reduce risk of infection and could be associated with a higher risk of death, the researchers reported in the Aug. 6 issue of the Journal of the American Medical Association.
Immunonutrition improves functional capacities in head and neck and esophageal cancer patients undergoing radiochemotherapy: A randomized clinical trial

Reduction of Postoperative Ileus by Early Enteral Nutrition in Patients Undergoing Major Rectal Surgery

• 123 rectal cancer patients randomised to early enteral feeding v TPN
• Decreased early post-op ileus rate: 10/61 v 22/62
• Decreased anastomotic leak rate: 1/61 v 9/62
• Decreased Length of Stay- 13.5 (± 2.2) days for the enteral group v 16.7 (± 2)
Summary

- Identification would be a good first step - NRS-2002
- Intervention in malnourished and those at severe risk beneficial - probably need TPN or long delay in surgery
- Carbohydrate loading - needs wider adoption, PROMs
- Immunonutrition - promising but conflicting results
- Early feeding postoperatively - emerging evidence