Nutrition in peri-operative period

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Vilnius university
up to 65% of patients undergoing gastrointestinal surgery are malnourished

Corish CA, Kenedy NP. 2000
Stratton RJ et al. 2004

two-thirds of patients lose weight during hospitalization

McWrhirter JP, Pennington CR. 1994
35% of surveyed UK hospitals did not have a nutrition support team
The admitting teams failed to recognize malnutrition in 43% of admissions
Nutritional assessment was not undertaken in 73% of patients admitted with an acute abdomen

Wilkinson K et al. 2010
Patient SK 80 years old

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 05</td>
<td>beginning of disease (intestinal bleeding)</td>
</tr>
<tr>
<td>2013 06 14</td>
<td>adenocarcinoma rectum diagnosis</td>
</tr>
<tr>
<td></td>
<td>prostatic cancer (6 years)</td>
</tr>
<tr>
<td></td>
<td>2 points (NRS-2002)</td>
</tr>
<tr>
<td></td>
<td>radiotheraphy</td>
</tr>
</tbody>
</table>

Vilnius university hospital “Santariškių Klinikos”
Patient SK 80 years old

2013 07 04 3 points (NRS-2002)
## Assessment and screening of malnutrition

### Nutritional Risk Screening (NRS 2002)

#### Final screening

<table>
<thead>
<tr>
<th>Points</th>
<th>Impaired nutritional status</th>
<th>Points</th>
<th>Severity of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal nutritional status</td>
<td>0</td>
<td>Normal nutritional requirements</td>
</tr>
<tr>
<td>1</td>
<td>Wt loss &gt; 5% in 3 months or Food intake below 50-75% of normal requirement in preceding week</td>
<td>1</td>
<td>Hip fracture</td>
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<td></td>
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<td>Chronic patients in particular with acute complications: cirrhosis, COPD</td>
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<tr>
<td>2</td>
<td>Wt loss &gt; 5% in 2 months or BMI 18,5-20,5 or Food intake 25-50% of normal requirement in preceding week</td>
<td>2</td>
<td>Major abdominal surgery</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Stroke</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe pneumonia, hematologic malignancy</td>
</tr>
<tr>
<td>3</td>
<td>Wt loss &gt; 5% in 1 month or BMI &lt; 18,5 or Food intake 0-25% of normal requirement in preceding week</td>
<td>3</td>
<td>Head injury</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bone marrow transplantation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intensive care patients (APACHE &gt; 10)</td>
</tr>
<tr>
<td>?</td>
<td>+</td>
<td>?</td>
<td>=</td>
</tr>
<tr>
<td>Age</td>
<td>if ≥ 70 years, add 1 to total score above</td>
<td></td>
<td>= age-adjusted total score</td>
</tr>
<tr>
<td>Score ≥ 3</td>
<td>The patient is nutritionally at-risk and a nutritional care plan is initiated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score &lt; 3</td>
<td>Weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Patient SK 80 years old

2013 07 04  3 points (NRS-2002)

2013 07 05  Resection of rectum. Ileostomy

Ileus. Sepsis.

2013 08 16  Discharged from the hospital

Spend in the hospital 54 days

Vilnius university hospital “Santariškių Klinikos”
2013 08 25  Readmission to the hospital

Ileus. Malnutrition.

6 points (NRS-2002)

2013 08 28  Laparotomy. Closing of ileostomy.

7 points (NRS-2002)

2013 09 14  Still in the hospital

Vilnius university hospital “Santariškių Klinikos”
Effects of malnutrition on peri-operative outcomes

Disease-related malnutrition is associated with increased morbidity, mortality and length of hospital stay

Studley HO. 1936
Meguid MM et al 1988
Validated nutritional tools are better predictors of LOS in gastrointestinal cancers requiring surgery than in nonsurgical gastrointestinal cancer patients.

Correcting malnutrition may decrease the LOS and perhaps even lower the rate of hospital readmissions in this population.

Role of nutritional status in predicting the length of stay in cancer: a systematic review of the epidemiological literature.
Digant Gupta Pankaj G Vashi et al. 2011
Effects of malnutrition on peri-operative outcomes

Colorectal surgery

nutritional risk identified by NRS-2002 was an independent predictor of postoperative complications

Schwegler et al. 2010
Effects of malnutrition on peri-operative outcomes

Merli et al. 2009

Elective liver transplantation
Skeletal muscle depletion (sarcopenia) predicts morbidity and mortality in patients undergoing digestive surgery.

Overall survival rate in patients with low skeletal muscle mass was significantly lower than in patients with normal/high skeletal muscle mass (p<0.001).

Perioperative nutritional therapy significantly increased survival in patients with low skeletal muscle mass (p=0.009).

Survival time of moderate and severe malnourished patients

Survival time of rest of the patients

15.7 months

9 months

p<0.001

Effects of malnutrition on peri-operative outcomes

Moderate to severe malnutrition – one of 5 independent prognostic factors for survival outcome

Elective resection of pancreatic Ca

Kanda et al. 2009
Post-operative metabolism

Reactions to the surgery:
- release of stress hormones,
- inflammatory mediators,
- insulin resistance
  (key phenomenon)

Catabolism of glycogen, fat and protein

Starvation in perioperative period
Post-operative metabolism

Reactions to the surgery:
- release of stress hormones,
- inflammatory mediators,
- insulin resistance
  (key phenomenon)

Catabolism of glycogen, fat and protein

Starvation in perioperative period

Pharmaconutrition to modulate metabolic response and limit oxidative stress

Nutritional support
Main goal:
reduce incidence of postoperative complications; the length of postoperative hospitalization and operative mortality

Cano N. Perioperative nutrition. 223. From nutrition support to pharmacologic nutrition in the ICU. Springer-Verlag 2002 Berlin
Perioperative fluid therapy
Pre-operative nutritional support
Avoidance of pre-operative fasting and minimizing of insulin resistance
Post-operative nutritional support
Enhanced recovery after surgery (ERAS)
Assessment and screening of malnutrition
Appropriate fluid and electrolyte prescriptions may be administered orally, enterally, subcutaneously, or intravenously, depending on the clinical situation. Before any prescription is written it is important to ask a number of questions:

- Does the patient need any prescription at all today?
- If so, does the patient need this for resuscitation, replacement of losses, or just for maintenance?
- What is the patient’s current fluid and electrolyte status.
- Which is the simplest, safest, and most effective route of administration?
- What is the most appropriate fluid to use and how is that fluid distributed in the body?
Perioperative fluid therapy

There’s nothing like nature’s own clean, fresh spring water ...
Patient volume status:
- peripheral perfusion; pulse rate/BP; JVP/CVP; flow based measurements; urine output; consider insensible fluid loss

Hypovolaemia
- Consider the nature of fluid loss
- Aim to replace with appropriate fluid
  - balanced crystalloid
  - colloid
  - blood
- Rate of fluid administration
  - fluid bolus 200 ml
  - monitor clinical response
  - prescribe further infusion
- Review volume status

Euvolaemia
- Daily maintenance fluid requirements
  - Fluid 1500-2400 ml/24 hour
  - Sodium 50-100 mmol/24 hour
  - Potassium 40-80 mmol/24 hour
- Assess current daily fluid intake
- Enteral intake

Hypervolaemia
- Assess fluid intake including drugs and nutrition
- Restrict sodium and fluid intake or stop i/v fluids altogether, consider nutritional support

Yes
- Ensure oral intake sufficient to meet daily fluid requirements
- Stop i/v

No
- Nasogastric tube
- Intravenous infusion

Yes
- Ensure i/v infusion sufficient to meet daily fluid requirements, avoid salt and water overload
- Salt poor fluid

No
- Hypovolaemia
Avoidance of preoperative fasting and minimizing insulin resistance

Preoperative fasting → induce metabolic stress, impair mitochondrial function, produce insulin resistance

Awad S et al. 2010
Awad S et al. 2009
Ljungqvist O. 2009
Lassen K et al. 2009
Avoidance of preoperative fasting and minimizing insulin resistance

Insulin resistance (decreased responsiveness of tissues to the actions of insulin) → prolonged hospital stay morbidity mortality

Thorell A et al. 1999
Van den Berge G et al. 2001
Sato H et al. 2010
Avoidance of preoperative fasting and minimizing insulin resistance

Insulin resistance (decreased responsiveness of tissues to the actions of insulin)

Preoperative ingestion of carbohydrate-based drinks 2–3 h before surgery

Nygren J et al. 1998
Soop M et al. 2001
Avoidance of preoperative fasting and minimizing insulin resistance

Insulin resistance (decreased responsiveness of tissues to the actions of insulin)

Enhanced recovery after surgery (ERAS)

Enhanced Recovery After Surgery

**Mid-thoracic epidural anesthesia/analgesia**
- No nasogastric tubes
- Prevention of nausea and vomiting
- Avoidance of salt and water overload
- Early oral nutrition
- Non-opioid oral analgesia/NSAIDS
- Early mobilization
- Stimulation of gut motility

**Preoperative**
- Preadmission councelling
- Fluid and carbohydrate loading
- No prolonged fasting
- No/selective bowel preparation
- No premedication

**Intraoperative**
- Short-acting anesthetic agents
- Mid-thoracic epidural anesthesia/analgesia
- No drains
- Avoidance of salt and water overload
- Maitenance of normothermia (body warmer/warm i/v fluids)

**Postoperative**

Donat et al. 1999
ERAS advantages:

Reduction in complications and hospital stay
Improvements in cardiopulmonary function
Earlier return of bowel function
Earlier resumption of normal activities

Eskicioglu C et al. 2009
Lassen K et al. 2009
ERAS limitations:
Colorectal surgery
Vascular surgery
Thoracic surgery
Urology
Pre-operative nutritional support

Routine nutritional support in patient undergoing major surgery

- Severe nutritional risk prior major surgery
  - (weight loss > 10-15% within 6 months or BMI < 18.5 kg/m² or SGA Grade C or serum albumin below 30 g/l)

Nutritional support (preferable enteral) for 7-14 days before surgery (A level)

- Severe undernutrition in patients who cannot be fed adequately orally or enterally

Parenteral nutrition for 7-10 days before surgery (A level)

Huhmann MB, August DA. 2009
Braga M et al. ESPEN Guidelines on parenteral nutrition 2009
Early enteral nutrition

early enteral feeding within 24 h of intestinal surgery demonstrated a significant reduction in mortality, a trend towards decreased length of stay

Lassen K et al. 2009
Lewis SJ et al. 2009
Mining L et al. 2009
Parenteral nutrition recommended in patients who cannot meet their caloric requirements orally or enterally within 7–10 days

Braga M et al. 2009
Post-operative nutritional support

Parenteral glutamine supplementation

higher doses of glutamine (4.2 g glutamine/kg) were more effective in reducing mortality

reduction in mortality (p=0.07)
reduction in infections (p=0.03)
reduction in organ failure (p=0.04)
in ICU patients
reduction in infection (p<0.001)
after surgery

Avenell A. 2009
Post-operative nutritional support

- Do not give any glutamine, neither EN or PN

- Is the patient in shock or have MOF?
  - Yes
  - No

- Is EN possible?
  - Yes
  - No

- Is the patient: burn? trauma?
  - Yes
  - No

- Patient is PN dependent?
  - Yes
  - No

- Give i/v glutamine 0.35 g/kg/day
  - Yes
  - No

- Give EN glutamine 0.35-0.5 g/kg/day as long as they are on EN
  - Yes
  - No

Heyland 2013
Peri-operative nutrition. Conclusions

Assessment of nutritional risk/status, please...
Peri-operative nutrition. Conclusions

- Mild-moderate malnutrition: Enteral Immuno-nutrition (5–7 days)
- Severe malnutrition: EN/PN (7–14 days), enteral Immuno-nutrition (5–7 days)

Pre-operative, please...

Peri-operative nutrition. Conclusions

- mild-moderate malnutrition
- severe malnutrition

Oral carbohydrate drinks 2 h pre-induction

Pre-anaesthetic, please...

Peri-operative nutrition. Conclusions

ERAS, early nutrition within 24 h of surgery, parenteral glutamine supplementation, enteral immuno-nutrition

mild-moderate malnutrition

severe malnutrition

Post-operative, please...

Thank you 😊