جامعة الملك سعود
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Nutrition in surgery

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Nutrition Therapy

In the surgical patient, the indications for nutritional therapy are prevention and treatment of catabolism and malnutrition. This affects mainly the perioperative maintenance of nutritional state in order to prevent postoperative complications.

Nutrition therapy

Nutrition care for patient undergoing surgery is vary, in related to:

- The type of surgery (Minor, Major, Elective, urgent)
- *The require OF extensive nutrition support.*
- *Route of Nutrition, orally or via TF*
- Postoperative complications such as

obstruction, fistula, or anastomotic leaks, delayed recovery.

How to detect patient at risk

Nutritional risk screening in all patients on hospital admission or first contact:

- ❖ BMI <18kg/m2
- ❖ Combined: weight loss >10% or >5% over 3 months and reduced BMI or a low fat free mass index (FFMI)
- ❖ Preoperative serum albumin < 30 g/l (with no evidence of hepatic or renal dysfunction)

MALNUTRITON

- Malnutrition is a broad term that can be used to describe any imbalance in nutrition; from over-nutrition to under-nutrition.
- Observed up to40-60% of surgical patient on admission/remines under-diagnose in 70% of patient in hospital settings.
- Malnutrition seen in hospitalized patients is often a combination of cachexia (disease-related) and malnutrition (inadequate consumption of nutrients) as opposed to malnutrition alone.

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- Surgery: injury → altered metabolism
  - Stress hormones
  - Inflammatory mediators : cytokines
- Catabolism of
  - Glycogen → glucose
  - Fat → fatty acid, glycerol
  - protein → amino acid
- Substrates for
  - Immune response
  - Physical activity/rehab
  - Healing

} need anabolism

Malnutrition Adverse Effects

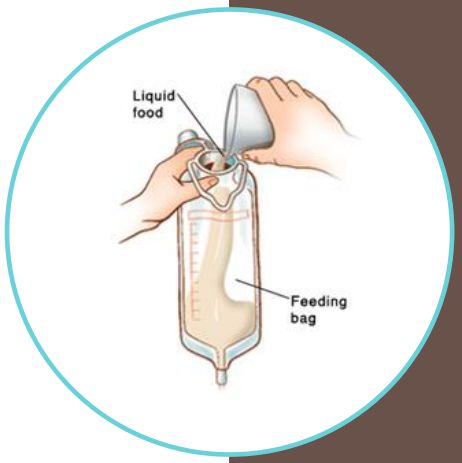
- Impaired wound healing
- Impaired Immune function and increase risk for infection
- Thoracic muscle mass wasting depresses respiratory efficiency and increases the risk for pneumonia
- Albumin level decrease leading to generalized edema.
- Small bowel mucosa atrophy
- Impaired mental function leads to depression
- Postoperative complications rate is higher
- Prolong recovery time and longer hospital stay

ERAS

The ERAS protocol includes a metabolic strategy to reduce perioperative stress and improve outcome.

ERAS guidelines recommend liberal subscription of oral supplements pre- and postoperatively.

ERAS protocols support early oral intake for the return of gut function.



ERAS

From a metabolic and nutritional point of view, the key aspects of perioperative care include:

- Integration of nutrition into the overall management of the patient
- Avoidance of long periods of preoperative fasting
- Re-establishment of oral feeding as early as possible after Surgery
- Start of nutritional therapy early, as soon as a nutritional risk becomes apparent
- Metabolic control e.g. of blood glucose
- Reduction of factors which exacerbate stress-related catabolism or impair gastrointestinal function
- Early mobilization to facilitate protein synthesis and muscle function.

Nutrition status pre/post surgery

Preoperative nutritional care:

Nutritional "metabolic" risk and disease-related malnutrition. Assessment before surgery means risk assessment

Postoperative management of metabolism and gut function:

Insulin resistance is a response mechanism to starvation predominantly caused by the inhibition of glucose oxidation. It is a protein sparing evolutional "survival" mechanism. Some degree of insulin resistance develops after all kinds of surgery, but its severity is related to the magnitude of the operation and development of complications e.g. sepsis.

Pre-op:

- ✓Fasting from midnight is unnecessary in most patients
- ✓ALLOW clear fluids until two hours before anesthesia

POST-op

- ✓Oral intake, including clear liquids, can be initiated within hours after surgery in most patients.

Laboratory Measure

SERUM PROTEINS SUCH AS ALBUMIN AND PREALBUMIN

TRANSFERRIN,

NITROGEN BALANCE

ELECTROLYTES

TOTAL CHOLESTEROL

INDICATORS OF INFLAMMATION SUCH AS C-REACTIVE PROTEIN (CRP) AND TOTAL LYMPHOCYTE COUNT (TLC)

nutrition Support

WHO NEEDS

- **Patient at Nutrition risk/or Malnourished**
- Postoperative complications:
  - Ileus more than 4 days
  - Sepsis
  - Fistula formation
  - Massive bowel resection
- Intractable vomiting;

OTHER CONDITIONS :

- Maxillofacial and esophageal surgery

Modes of administration

What Route should be used

EN vs PN

Enteral Tube feeding

Enteral feeding should be used in preference to parenteral nutrition (PN) whenever possible

Indications for Enteral feeding:

- **Malnourished patient expected to be unable to eat adequately for > 5-7 days**
- **Adequately nourished patient expected to be unable to eat > 7-9 days**
- **Adaptive phase of short bowel syndrome**
- **Early oral nutrition cannot be started, (patients undergoing major head and neck or gastrointestinal surgery for cancer , severe trauma, including brain injury, patients with obvious malnutrition at the time of surgery)**

Contraindications:

- ✓**Intestinal obstructions or ileus,**
- ✓**Severe shock**
- ✓**Intestinal ischemia**
- ✓ **High output fistula**
- ✓**Severe GI bleeding**

PARANTERAL NUTRITION

- ✓ **Open peritoneal cavity and enteral nutrition is contraindicated**
- ✓ **Massive small bowel resection**

  (more than 70% of small intestine)
- ✓ **Short-gut syndrome from previous disease**
- ✓ **Active inflammatory disease of the intestine in which malabsorption is present or Enterocutaneous fistulas**
- ✓ **Bowel rest indicated for more than 7 days**
- ✓ **High-output enterocutaneous fistula that is or has been stimulated by enteral nutrition**
- ✓ **Colocutaneous fistula requiring more than 7 days of bowel rest**
- ✓ **Enteral feeding access not possible because of one of the following conditions:**
  - ✓ **Obstructing gastrointestinal lesions**
  - ✓ **(in the pharynx or esophagus)**
  - ✓ **Gastric outlet obstruction**

Contraindications for PN

- Functional gastrointestinal tract
- Colonic ileus (not a dysfunctional gut)
- Awaiting flatus or bowel sounds following surgery (inappropriate practice to evaluate bowel function)

Patient does not want to eat or does not want a feeding tube

- Fewer than 7 days of PN therapy

Nutrition Needs

Energy and protein needs

BMI (kg/m2)	Weight (kg)	Kcal/kg	Protein* (gm/kg)
< 30	Actual	20-25 (minor) 25-30 (major)	1g/kg/day (minor) 1.5-2.0 (major)
30-50	Actual	11-14	1.9-2.0 (IBW)
> 50	Ideal	22-25	2.5 (IBW)

Protein Needs for Adults based on Albumin level and special conditions:

Condition	Albumin level	Protein requirement
Normal nutrition (Healthy adults)	3.5 gm/dL	0.8 to 1 gm/kg/day
Normal nutrition (Elderly adults)	>3.5 gm/dL	0.8 to 1 gm/kg/day
Mild depletion	2.8-3.5 gm/dL	1 -1.2 gm/kg/day
Moderate depletion	2.1-2.7 gm/dL	1.2-1.5 gm/kg/day
Severe depletion	2.1 gm/dl	1.5-2 gm/kg/day

Fluids needs

Age (years)	ml/kg	
18-65	30-35	Increased Fluid needs (30-35 ml/kg actual BW): short gut syndrome, high output ileostomy or fistula, excessive diarrhea, high NGT output, large draining wounds, chest tube and JP drain losses.
65+	25 -30	

Reference: http:health.qld.gov.au/masters/copyright.asp

Calculating Fluid Needs for Obese (BMI ≥ 30)

Adjusted Weight	Fluid per day	OR 30-35 ml/kg Adjusted body weight with allowances for extra losses via drains (draining wounds, chest tube and JP drain losses)
40-60 kg	1500 - 2000 ml	
60-80 kg	2000 - 2500 ml	
> 80 kg	2500 - 3000 ml	

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Major surgery nutrition-related challenges

Nutrition Intervention following colorectal Surgery

Patients with any type of bowel surgery should be considered at high risk at least until they
are eating a full, regular meal plan without difficulties such as cramping, nausea, vomiting, or diarrhea.

Risk factors to evaluate for determining level of care might include

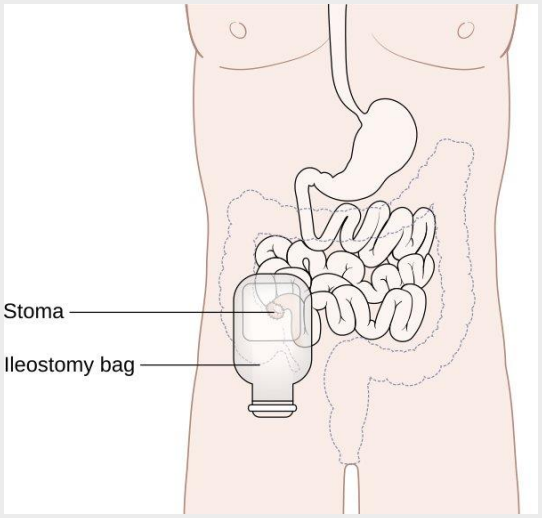
- Impaired oral intake preoperatively
  Nausea, vomiting, or diarrhea
- Failure to advance oral food plan postoperatively
- Underlying diagnosis, including the following:
  - Inflammatory bowel disease
  - Gastrointestinal malignancies
  - Ischemic bowel
- Fluid and electrolyte imbalance
- Evidence of malabsorption
- Weight loss
- Reduced transport proteins indicating underlying inflammation or infection as evidenced by biochemical indices: albumin, prealbumin, retinol-binding protein .

Nutritional goals following bowel surgery include

- Optimize nutritional intake with return to normal intake as soon as possible.
  - Advancing from a clear liquid to a full liquid diet may not be necessary. Full liquid diets are often very high in fat and may not be well tolerated post bowel surgery
  - Modify distribution, type, or amount of food and nutrients within meals or at specified time Formula/ solution (for enteral/ parenteral nutrition)
  - Dietary Modification following colostomy/ileostomy
- Prevent diet-related and nutrition-related consequences (eg, nausea, vomiting, obstruction, diarrhea, dumping, dehydration)
- Correct any preexisting nutritional deficiencies
- Prevent future nutritional deficiencies

Surgery	Nutrition Sequelae	Nutrition Management
Partial colon resection	Loose bowel movements	Initially low-residue nutrition therapy with patient self-determining foods not well tolerated; progress to regular diet as tolerated
Total colectomy	Diarrhea, dehydration, electrolyte imbalance	Low-residue nutrition therapy; adaptation takes place over time and patient can slowly increase fiber as tolerated, increased fluid and electrolyte intake
Rectal with colostomy	Psychosocial issues caused by fear of expelling gas, odor-producing foods	Avoidance of potentially gas- and odor-producing foods
Small bowel resection	Varies depending on length of small bowel resected, potential malabsorption	Determine length and area of bowel resected. If more than 100 cm ileum is resected, increased fluid and electrolyte balance problems; TPN- fluid/electrolyte replacement until patient is able to maintain nutrition orally; slowly increase diet as tolerated to lactose free, complex carbohydrate, moderate fat, six small feedings, long-term vitamin (magnesium, B-12) supplementation

Nutrition Intervention for ostomy (Colostomy/Ileostomy)



- Provision of short-term or long-term enteral or parenteral feeding
- Provision of nutrition education for food choices that will facilitate the following:
  - Decrease risk of obstruction
    Maintain normal fluid and electrolyte balance
  - Reduce excessive fecal output
  - Minimize gas and flatulence
  - Prevent development of oxalate kidney stones

Modified Diet in case of High ouput ostomy;

- Limit fluids with meals/30min before or after.
- Restrict ORAL FLUIDS to 500ml daily (Meet fluid /electrolyte needs intravenously), low osmolality fluids.
- Oral Glucose-electrolyte solution/ORS
- Slowing intestinal transit time via loperamide, pectin, and fibers may promote absorption
- Losses of 2 L to 3 L ostomy output per day can also contribute to losses of magnesium, zinc, bicarbonate, potassium, and sodium.

SELECT FORMULA

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Standard **1kcal/1ml**	**Ensure** **Nutren 1.0** **Osmolite RTF** **Energy zip 1.0** **Jevity** **Trophic with fiber**	**Standard formula can be used via ENETRAL FEEDING OR orally** **- Can be used for all cases**
Dens-calories **1.5g/ml**	**Ensure Plus** **Fortisip** **Resource Plus** **Ensure Two-Cal**	for stressed patients and those requiring low-volume feedings
Modified carbohydrate **1kcal/1ml**	**Glucerna** **Resource Diabetic** **Diamax**	Diabetes Mellitus, Hyperglycemia, Glucose Intolerance
Low elctrolyets **1.5-2kcal/1ml**	**Novasource Renal** **HD Max**	Dialysis / Renal Failure / Renal Disease, Electrolyte and Fluid restriction

Semi-Elemental	**Perative 1.3** **Pivot 1.5** **Peptamen Complete** **Alitraq**	Malabsorption syndrome, impaired gastrointestinal function, short bowel syndrome, inflammatory bowel disease, pancreatic insufficiency, chronic diarrhea, radiation enteritis, HIV/AIDS-related malabsorption, transition diet from TPN
Protein **6g per scoop**	**Beneprotein** **Prosource**	Protein-calorie malnutrition, wound healing e.g. burns, pressure ulcers
Prebiotics	**Banatrol**	Diarrhea and loose stool associated with tube feeding, antibiotics , oncology treatment and Clostridium difficile

Branched-Chain Amino Acid 1.5kcal/1ml	**Nutrihep**	Hepatic Encephalopathy, Nutrition support for hepatic disease with elevated ammonia level
Low carbohydrate 1.5kcal/ml	**Oxepa** **Pulmocare**	modulate the inflammatory response in critically ill, mechanically ventilated patients, especially those with SIRS (systemic inflammatory response syndrome, eg, sepsis, trauma, burns), ALI (acute lung injury) or ARDS (acute respiratory distress syndrome)
Nutrient Dense/ Immunonutrients 1.2-1.6kcal/ml	**IMPACT RECOVERY** **FORTICARE**	For faster recovery (before and after surgery),Severe trauma/injury, support colonic health, Pressure ulcer/wound, Dietary mgt of Cachexia in cancer , pancreatic cancer, lung cancer undergoing chemotherapy
Clear Liquids with Protein/ Fat-Free 1.5kcal/ml	**Resource Breeze** **Fortijuice**	Clear Liquid High Protein, bowel prep, fat malabsorptive/fat restricted, pre or post-surgical , nausea/vomiting/oncology

THE END