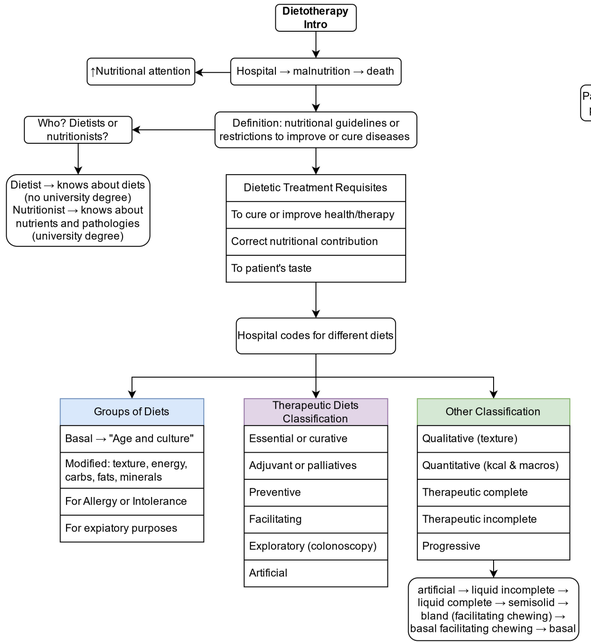
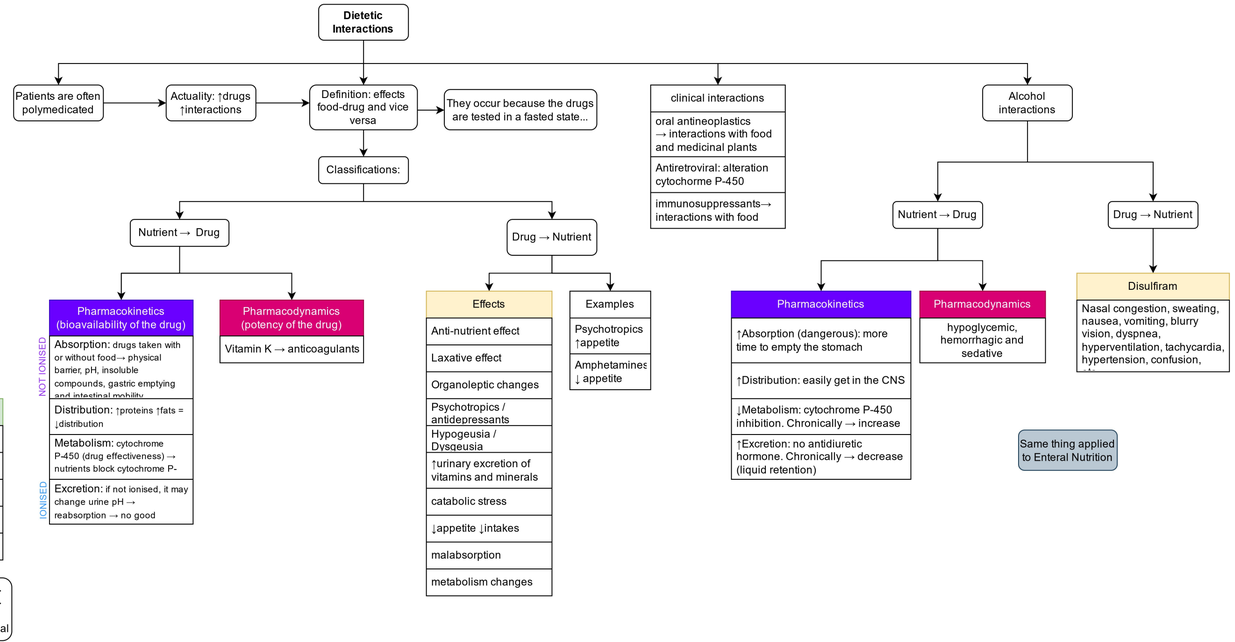
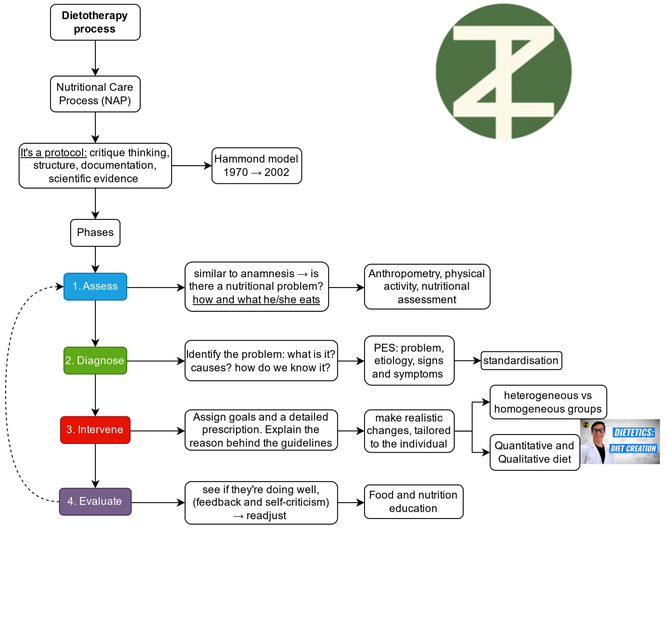

Dietotherapy Intro
↑Nutritional attention
Hospital → malnutrition → death
Who? Dietists or nutritionists?
Definition: nutritional guidelines or restrictions to improve or cure diseases
Dietist → knows about diets (no university degree)
Nutritionist → knows about nutrients and pathologies (university degree)
Dietetic Treatment Requisites
To cure or improve health/therapy
Correct nutritional contribution
To patient's taste
Hospital codes for different diets
Groups of Diets
Basal → "Age and culture"
Modified: texture, energy, carbs, fats, minerals
For Allergy or Intolerance
For expiatory purposes
Therapeutic Diets Classification
Essential or curative
Adjuvant or palliatives
Preventive
Facilitating
Exploratory (colonoscopy)
Artificial
Other Classification
Qualitative (texture)
Quantitative (kcal & macros)
Therapeutic complete
Therapeutic incomplete
Progressive
artificial → liquid incomplete → liquid complete → semisolid → bland (facilitating chewing) → basal facilitating chewing → basal


Dietetic Interactions
Patients are often polymedicated
Actuality: ↑drugs ↑interactions
Definition: effects food-drug and vice versa
They occur because the drugs are tested in a fasted state...
Classifications:
Nutrient → Drug
Drug → Nutrient
Pharmacokinetics (bioavailability of the drug)
Absorption: drugs taken with or without food→ physical barrier, pH, insoluble compounds, gastric emptying and intestinal mobility
Distribution: ↑proteins ↑fats = ↓distribution
Metabolism: cytochrome P-450 (drug effectiveness) → nutrients block cytochrome P-
Excretion: if not ionised, it may change urine pH → reabsorption → no good
NOT IONISED
IONISED
Pharmacodynamics (potency of the drug)
Vitamin K → anticoagulants
Effects
Anti-nutrient effect
Laxative effect
Organoleptic changes
Psychotropics / antidepressants
Hypogeusia / Dysgeusia
↑urinary excretion of vitamins and minerals
catabolic stress
↓appetite ↓intakes
malabsorption
metabolism changes
Examples
Psychotropics ↑appetite
Amphetamines ↓ appetite
clinical interactions
oral antineoplastics → interactions with food and medicinal plants
Antiretroviral: alteration cytochorme P-450
immunosuppressants→ interactions with food
Alcohol interactions
Nutrient → Drug
Drug → Nutrient
Pharmacokinetics
↑Absorption (dangerous): more time to empty the stomach
↑Distribution: easily get in the CNS
↓Metabolism: cytochrome P-450 inhibition. Chronically → increase
↑Excretion: no antidiuretic hormone. Chronically → decrease (liquid retention)
Pharmacodynamics
hypoglycemic, hemorrhagic and sedative
Disulfiram
Nasal congestion, sweating, nausea, vomiting, blurry vision, dyspnea, hyperventilation, tachycardia, hypertension, confusion,
Same thing applied to Enteral Nutrition


Dietotherapy process
Nutritional Care Process (NAP)
It's a protocol: critique thinking, structure, documentation, scientific evidence
Hammond model 1970 → 2002
Phases
1. Assess
similar to anamnesis → is there a nutritional problem? how and what he/she eats
Anthropometry, physical activity, nutritional assessment
2. Diagnose
Identify the problem: what is it? causes? how do we know it?
PES: problem, etiology, signs and symptoms
standardisation
3. Intervene
Assign goals and a detailed prescription. Explain the reason behind the guidelines
make realistic changes, tailored to the individual
heterogeneous vs homogeneous groups
Quantitative and Qualitative diet
4. Evaluate
see if they're doing well, (feedback and self-criticism) → readjust
Food and nutrition education
DIETETICS DIET CREATION

Diets with modifications

Diets with mineral modification

low sodium diet

hypertension: >160/95
normotension: <140/90
borderline hypertension: in between the above 2
added-risk hypertension: >130/85

it affects the heart, the brain and the kidneys

90-95% idiopathic. Correlated with sodium

EFSA → limit of 2,4 g of Na^+/day ≈ 5g of salt

Swap Salt for spices and condiments. Eat K^+ rich foods

Lower weight, exercise, limit alcohol and lower coffee & tea consumption

Calcium intake modification

most abundant mineral in the human body

renal lithiasis

4% of population. males over 30 y/o

- calcium <u>oxalate</u> 70% + calcium <u>phosphate</u> 6%.
- uric acid 7%.
- struvite 5%.
- cystine 2%.

Crystallisation processes:
1. **solute** saturation of the urine (hypercalciuria)
2. ↓ crystallisation **inhibitors**
3. changes in **pH** (acidity → corrosion of crystals)

↑oxalates ↑proteins ↑vit.C ↑Ca ↓citrates ↓Mg → kidney stones

Solution: ↑water ↓weight ~proteins ↓NaCl ↑citrate ↑Mg ↓stress ↓oxalates <100mg/day. ↓Ca only in <u>phosphocalcic</u> alone ↓Purines in <u>uric acid</u> lithiasis. ↓P & ↓Mg in <u>struvite</u> lithiasis.

osteoporosis

↓mineralisation ↓bone volume

types:
- primary type 1 → low estrogen
- primary type 2 → age
- secondary → disease or drug treatments
- idiopathic → unknown origin

acute pain, hip fractures and bone deformities

body weight and composition, Ca/P ratio 0.5, vitamin D3, vitamin K (mineralisation), high protein diet and Na (Ca lost in urine) and fluoride (fluorohydroxyapatite)

Adequate calcium intake throughout life → trying to compensate in old age is not helpful

Increase Mg intake and do physical exercise (cardio + strength + mobility movements)

rickets and osteomalacia

↓bone mineralisation

rickets in children
osteomalacia in adults

slowed new matrix formation

primary causes: ↓ vitamin D intake or decreased skin synthesis

secondary causes: problems of absorption or metabolism of vitamin D

Iron deficiency anaemia

decrease in haemoglobin quantity

4 successive stages:
1. ↓Fe
2. ↓Fe, ↓ferritin reserves
3. ↓Red blood cell production
4. ↓haemoglobin = ANEMIA

Causes:
- you don't <u>eat</u> enough iron (vegetarian, vegan, no red meat).
- you <u>need more</u> (at certain stages of life)
- you <u>lose</u> too much <u>blood</u> (menstruation, haemorrhage, infections)

from the 12mg ingested, only 1mg is actually absorbed

change the **diet**: liver, legumes + vitamin C, avoid anti-nutrients that reduce absorption and be careful with antacids and antibiotics. Iron **supplements** and **fortification** of foods with iron (flours, salts, cereals).

copper deficiency

enzyme intermediate

problems: deficit or excess (Wilson)

fructose and Zn lower Cu absorption → real problem: low intakes

NO copper → no Fe transitions (no hemoglobin, no ferritin, no eritrocytes)
Copper is the guy that changes the electrons when needed

EFSA → 1.3mg/day♀ and 1.6mg/day♂. Oysters and molluscs, nuts, cereals...

Diets with vitamin modification

Megaloblastic anaemia

decrease in DNA synthesis

Cobalamin deficiency

blood cell formation and folate metabolism

Causes:
- insufficient intake (vegans)
- gastric disturbances (non IF)
- intestinal disturbances (non-separation of proteins)
- interactions with drugs and alcohol

stage 1: reserves exist, serum depletion
stage 2: tissue depletion, metabolic pathways not altered
stage 3: insufficient tissue deposition → reduced DNA synthesis and erythrocyte ↓folate
stage 4: metabolic disturbances → clinical damage. corrected with 5µg

bacterial synthesis, only in animal sources: viscera, egg yolk, salmon, meat, dairy products...

Folate deficiency

structure of pteroylglutamic acid (folic acid)

Causes:
- insufficient intake: age
- high requirements: pregnancy
- decreased intestinal absorption
- metabolic disturbances: alcohol and vitamin B12 deficiency

- stage 1: no cellular depletion but serum depletion, no metabolic alterations
- stage 2: erythrocyte folate decrease
- stage 3: impaired erythropoiesis, not enough DNA
- stage 4: megaloblasts macrovalocytes and reduced haemoglobin

monoglutamates 90% → direct absorption
polyglutamates 50% → to be hydrolysed

almost everywhere, mainly in veggies and legumes

Vitamin B6 deficiency

Vitamin B6 (pyridoxal phosphate) → amino acid metabolism

Rare in modern countries, Causes:

cereal-based food → glucoside (non-absorbable)

chronic **alcoholism** → ↓phosphorylation ↑dephosphorylation

treatment with various **drugs**

chronic **haemodialysis**

1.3-1.7mg/day♂ 1.3-1.5mg/day♀ → liver, legumes, nuts and banana

thermal process losses up to 50%.

Diets with water modification

without water there is no life, it is involved in:

- digestion, absorption and excretion
- transport and elimination
- body temperature regulation
- osmotic balance and pH
- cell shape and lubricating fluids.

Water balance

total water intake → from food and beverages
available water = intake + macronutrient oxidation

Water losses

renal losses: ↑protein and mineral intake + diabetes / diuretics → more urine

cutaneous and pulmonary losses: body temperature and environment

gastrointestinal losses: diarrhoea and vomiting → altered thirst sensation (thirst = small dehydration)

Water intoxication

drinking more than the maximum renal excretion (0.7-1.1 L/hour)

causes hyponatremia and possible cerebral edema

Dehydration

Types

by amount: mild 1-2%bw, moderate 3-5%, high 6-8%, severe 9-11%. over 11% → incompatible with life

by speed of loss: if it is sudden it has more severe symptoms

by lost solute/water ratio: isotonic, hypertonic (↑water lost) or hypotonic (↑minerals lost)

adequate water intake: ~1ml/kcal/day

adjust more water in children, athletes (1L per lost kg), pregnant and breastfeeding women and elderly

Dietotherapy in the surgical patient

malnutrition problem in hospitals

perioperative nutritional support → multimodal rehabilitation or **enhanced recovery**

Preoperative fasting may lead to malnutrition

Changes during surgery (aggression)

Increased **energy** expenditure
Protein hypercatabolism with increased urinary excretion of nitrogen.
Hyper**glycaemia** with hyperinsulinaemia
Mobilisation of **fatty acids** and triacylglycerols
Water and **sodium** retention
Mineral urinary losses of zinc, magnesium, phosphorus, and potassium

Anamnesis: need of **screenings** before the surgery + **nutritional assessment** and anthropometry

Preoperative fasting

non-sense → 90 minutes to empty the stomach. Eat up to 6 hours and drink up to 2 hours before the surgery

can lead to mitochondrial dysfunction, metabolic stress and possible insulin resistance.

ERAS guidelines recommend artificial nutrition only at certain times.

Postoperative fasting

non-sense → small intestine 6-12h, stomach 12-24h, colon 48-72h to recover peristalsis

4-24h after surgery: start with liquid diet and progress to solid or directly solid if tolerated

Artificial nutrition if needed → now called nutritional therapy

Gycemia: 150-180mg/dL, RICA→ 110-150mg/dL
ERAS guidelines→ avoid hyperglycemia

nutrition and organ transplantation

transplant receivers have malnutrition, obesity = ↑complications.

Nutritional support in the donor
cadaveric donor: hypercatabolism with elevated catecholamines and inflammatory mediators. had parenteral? continue... enteral effective but poorly tolerated. Maintain
living donor: better survival than cadaver. obesity → poorer survival and worse recovery.

Nutritional support in the receiver
Malnutrition → worsens outcomes and reduces survival
Obesity → increases complications (possible pre-transplant bariatric surgery)
Sarcopenia → important prognostic factor, related to mortality, graft survival, mobility and functional capacity of patients.

Organ preservation→ **Ischemia-reperfusion syndrome:** warm ischemic phase + cold ischemic phase + deleterious metabolic changes (new blood)

Trasplant type	Liver	Kidney	Pancreas	Lung	Cardiac	Intestinal	haematopoietic precursor cells
pre-transplant	protein 1.2-1.5 g/kg/day. Carbs 50-60% and fats 30-35%. avoid prolonged fasting periods.	Obesity is not an absolute contraindication (increases complications), possible bariatric surgery prior to transplantation.	previous kidney transplantation, ↓protein-calorie intake and ↓weight. obesity worsens graft and individual survival.	Emphysema → malnutrition. Cystic fibrosis ↑kcal burned → ↑respiration. 30-50% malnutrition → oral or enteral nutrition to ↑muscle mass.	90-110% of ideal weight, ↓Na+ to 2g, ↑protein (1.5-2g/kg/day), possible oral nutritional supplements	Short bowel syndrome due to mesenteric vasculopathies, trauma and Crohn's disease. infectious complications are the main cause of morbidity and mortality. parenteral or enteral tube feeding. progressive bowel rehabilitation. oligomeric or polymeric enteral diet, lipids are introduced from the fourth week onwards.	chemotherapy → individual assessment → screening → dietary advice or oral nutritional supplements
transplant	early enteral nutrition although complementary parenteral nutrition may be necessary.	do not require specific nutritional support.	immediate functioning, no insulin treatment required. restart oral intake in 2-3 days.	oral feeding usually begins after 1-2 days. Pancreatic enzyme administration (cystic fibrosis)	basal energy expenditure x 1.3-1.5 and protein 1.2-2 kg/day. oral nutritional supplements may be necessary.		no hard, acidic or extreme temperature foods. hygiene and "very clean food". Enteral > parenteral nutrition (risk of infections).
post-transplant	↑Kcal & ↑Protein, moderate in fat, 1,500 mg of calcium and multivitamins until nutritional recovery.	frequent weight gain (possible diabetes) ↑ fat ↓muscle ↓bone. Undesirable gain not in everyone (avoid malnutrition).	recovers the functionality of both organs, general population recommendations. obesity leads to diabetes recurrence	Severe cases: enteral nutrition via gastrostomy or gastro-jejunostomy In cystic fibrosis use of oral nutritional supplements.	calorie adjustment of diet and gradual exercise, keeping weight within recommended limits		Acute→ diet to control symptoms- chronic→ treat diarrhoea, ↓fat ↓residues, oral supplements. Severe? artificial nutrition

Dietotherapy in eating disorders

altered eating behaviour that compromises health status.

13% prevalence of ED, majority age group: **15-19** years old with **female** predominance.

multifactorial: biological, neurological, psychological, developmental and socio-cultural factors.

anorexia nervosa: pathological fear of weight gain

diagnostic criteria:

ICD-10 criteria

- **BMI**<17.5,
- avoidance of **food** consumption
- abuse of **anorexigenic** drugs
- body **image** distortion
- female amenorrhoea, male ↓sexual desire+impotence
- **puberty:** no growth, girls primary amenorrhoea, boys infantile genitalia

DSM-5 criteria

criterion A: restriction of energy intake
criterion B: fear of gaining weight
criterion C: distortion in perception of body image

restrictive type: last 3 months no binge eating or purging behaviors
binge/purge type: last 3 months yes binge eating or purging behaviors

partial remission: criterion A not met for a prolonged period of time **complete remission:** no criterion is fulfilled for a prolonged period of time

bulimia nervosa: compensatory measures such as self-induced vomiting

diagnostic criteria:

ICD-10 criteria

- continuing **concern**
- attempt to **counteract** weight gain
- morbid **fear** of gaining weight

DSM-5 criteria

- eating a lot of food in a short period of time
- loss of control during ingestion
- **binge eating and compensatory behaviors** 1/week for 3 months

partial remission: some criteria continue to be met **complete remission:** no criterion is fulfilled

binge eating disorder: binge eating without subsequent purging behaviours

diagnostic criteria:

DSM-5 criteria

- eating a lot of **food** in a short period of time
- loss of **control** during ingestion
- **binge eating:**
  - eating too fast and too much
  - getting unpleasantly full
  - eating alone and feeling disgusted with oneself
- weekly **distress** and binge eating for 3 months
- **no compensatory** behaviors

partial remission: less than one episode a week **complete remission:** no criterion is fulfilled

mild 1-3, moderate 4-8, severe 9-13, extreme 14

clinical history: anamnesis, physical exploration, anthropometry, blood test...

Artificial nutrition to regain the ideal weight using special formulas

Avoid the refeeding syndrome using an adequate nutritional plan (mainly in anorexia)

Dietotherapy for allergies and intolerances

Allergy

elimination of food that causes the allergy

patient education

personalised and adequate diet

Milk allergy

Ca and Vit.D supplementation

human breastfeeding > milk formulas

celiac disease

gluten free diet

Intolerance

enzymatic

lactose, fructose, sorbitol, sucrose

treatment
lactose → find tolerable amount and stick to it
fructose → remove completely from the diet
sorbitol → reduce until there are no symptoms
sucrose → remove from the diet

pharmacological

histamine

reduce histamine rich foods

undetermined

irritable bowel syndrome, gluten intolerance

avoid FODMAP and gluten