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Nutritional Care of the Patients Undergoing Bariatric and Metabolic Surgery

INTRODUCTION:

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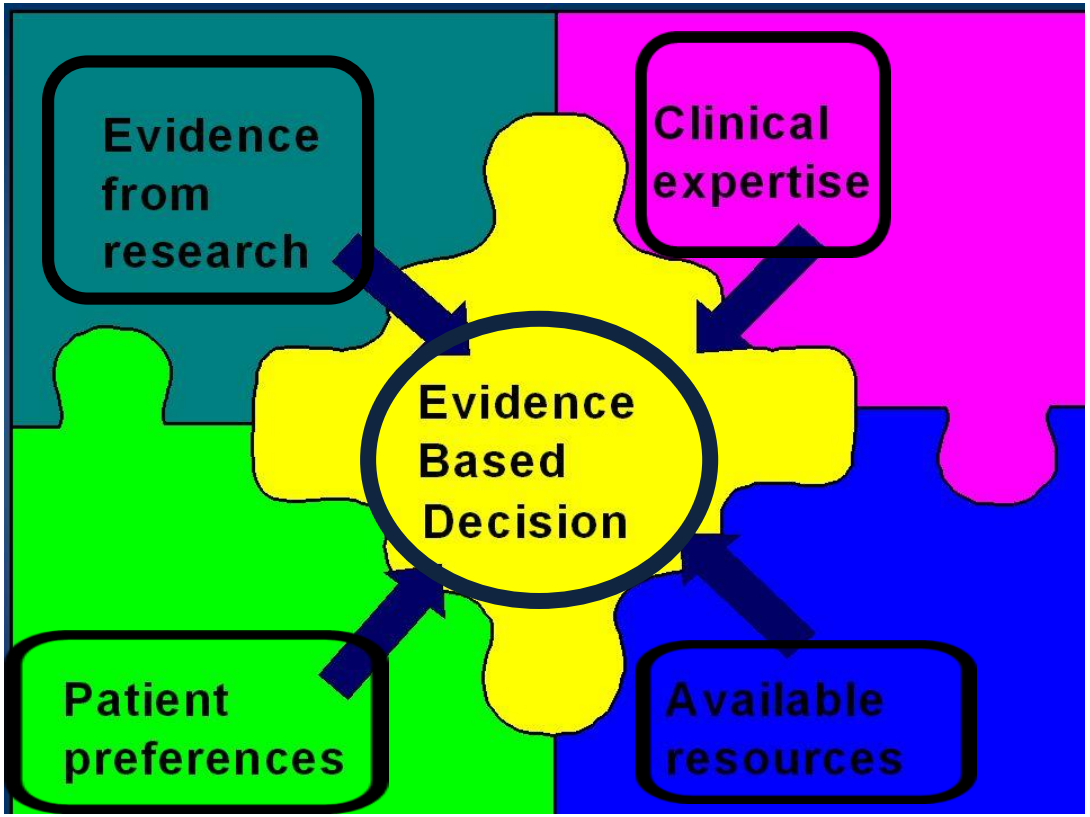
- Prework focused on 'physiology'
- The decision to recommend weight loss surgery should be based on



The Evidence and Resources:

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AND Evidence Analysis Library Bariatric Surgery Nutrition Care 2014-2017

AACE / TOS / ASMBS Medical Guidelines for Clinical Practice for the Perioperative Nutritional, Metabolic, and Nonsurgical Support of the Bariatric Surgery Patient (2009)

AACE / TOS / ASMBS (2013 Update)

ASMBS IH Nutrition 2016 Update: Micronutrients

Endocrine Society Clinical Practice Guideline: Endocrine and Nutritional Management of the Post-bariatric Surgery Patient (2010)

BARIATRIC NUTRITION RESOURCES

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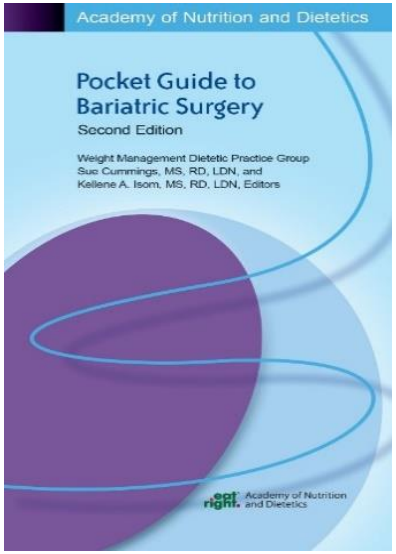

- Pocket Guide to Bariatric Surgery
  - *Eatright.org/shop*

Weight Management
a dietetic practice group of the Academy of Nutrition and Dietetics

- Weight Management DPG
  - ***wmdpg.org***
    - *Bariatric Subunit*
    - *listserve*

Case Study: In Your Packet

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Deb is a 42-year-old female pursuing bariatric surgery. Over the past ten years she has had multiple medical weight loss attempts with little weight loss progress, resulting in overall weight gain.

Past medical history includes:

- Type 2 diabetes, Gastroesophageal Reflux Disease (GERD), and hypertension.
- Medications include Metformin, Prilosec, lisinopril/HCTZ and simvastatin.

Physical exam reveals:

- 64 inches tall and weighing 248 lbs. BMI is 43.
- Blood pressure is 139/87.

She brings her pre-operative labs which show:

- Hgb A1c of 10%
- Triglycerides 200
- iron level is 30 ug/dL
- vitamin B12 level is 450 mmol/L
- vitamin D level is 21ng/mL

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Risk will never be reduced to zero but make every attempt to do so through:

Careful and thorough evaluation

- Medical
- Psychological
- Surgical
- Nutritional

Preoperative preparation period

Additional support as needed:

- psychological
- nutritional

Contraindications to Weight loss Surgery

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Surgical risk too great

- End-stage lung disease
- Unstable cardiovascular disease
- Multi-organ failure
- Gastric varices

Psychiatric Conditions *Believed to be Contraindicated*

- Current drug or alcohol abuse
- Active schizophrenia
- Severe MR
- Multiple suicide attempts
- Active bipolar disorder

Pre-surgery Nutrition Goals

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1. Assess patient knowledge and expectations
   - Emphasizing:
     - Obesity is a chronic disease
       - surgery is not a cure
     - Surgery is an 'adjunct' therapy to a healthier life style not in place of
2. Achieve better control of nutrition-related comorbidities
   - Looking at Deb's labs do you have any concerns?
   - What would you recommend?
3. Improvement of nutritional status:
   - Assess micronutrient status; replete deficiencies

Obesity is a known risk factor for nutrient deficiencies

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- Inflammation associated with obesity **induces** the production of **hepcidin**, an acute phase protein made in the liver, which blocks *iron absorption* in the intestine

- **Metformin**
  - affects the absorption of vitamin B_{12} in the ileum
  - Associated with decreased serum folic acid levels
  - B12 and folic acid depletion also increases homocysteine levels

- **Hyperinsulinemia** is associated with **excessive urinary** ***excretion of zinc***

- The **bioavailability** of vitamin D is **reduced** in the obese state, because ***vitamin D*** **is** ***sequestered in adipose tissue*****.**

- Iron
  - Fe
  - TIBC
  - Hb/hct
- Vitamin B12
  - B12 cobalamin
  - Serum methylmalonic acid (optional)
- Folic Acid
- Homocysteine

- Zinc

- Vitamin D
  - Vitamin D, 25-OH
  - PTH

REPLETE PRE-SURGERY AS NEEDED

Wainwright, Patrick; Diabetes & Primary Care, 2017; 19(2): 63-66. 4p. Curr Opin Clin Nutr Metab Care. 2017 Mar;20(2):138-144.

Reported Micronutrient Deficiency rates

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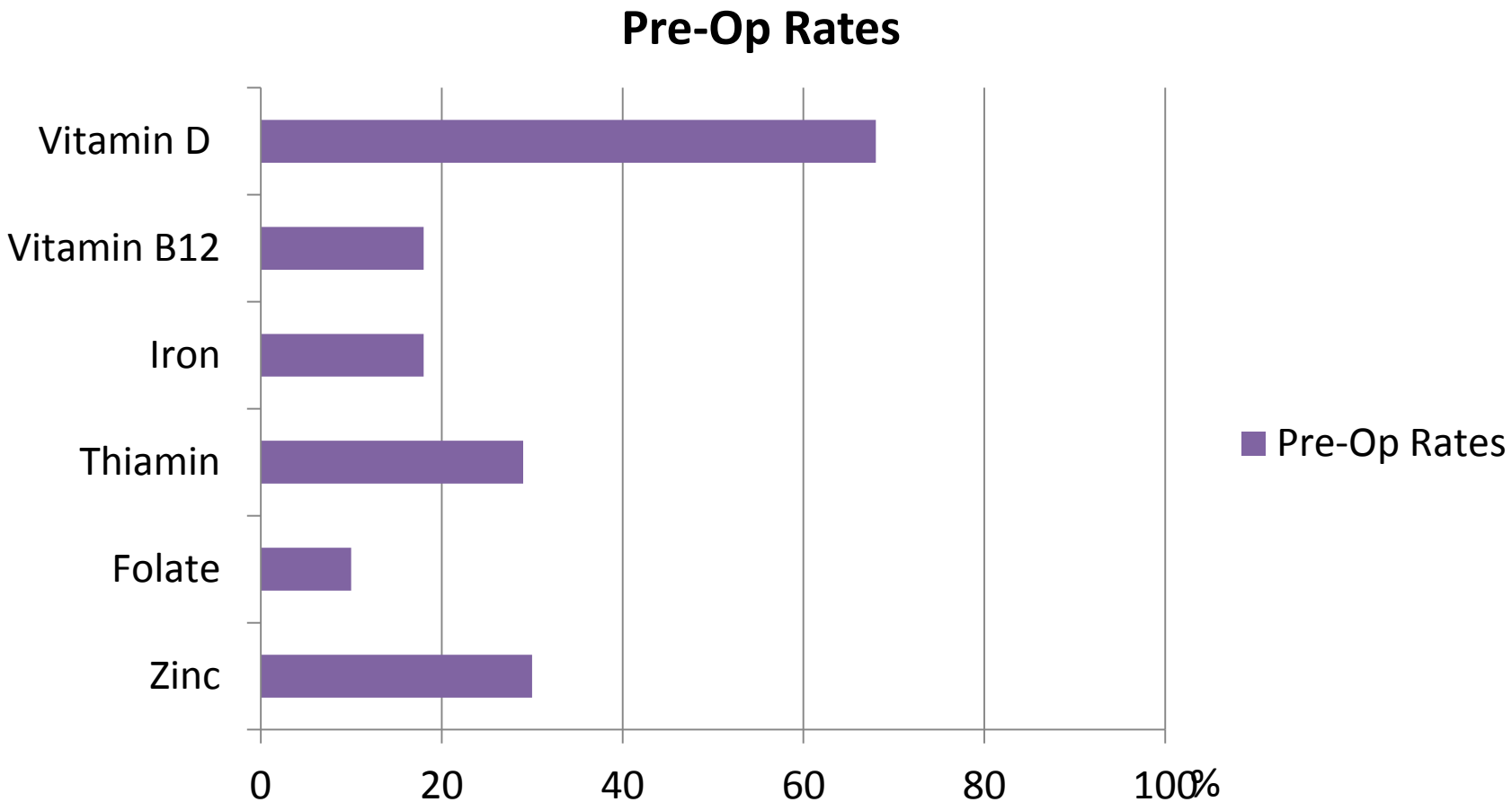

1. Stein et al 2. Parrot et al

Case Study

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Deb meets with her surgeon. They decide to move forward with sleeve gastrectomy. When you meet with her, she mentions that she is most excited for bariatric surgery to cure her GERD and type 2 diabetes. You ask if she discussed this with her surgeon. She says, "No, but I assume he knows I want to get rid of those problems."

You decide to speak with her surgeon.

Role Play

Communicating a conflicting opinion with a surgeon

ROLE PLAY

Case Study: Table Discussion

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1. What are some important factors to consider when discussing patient treatment plans with other providers

2. What went well with the discussion?

3. What would you change about the discussion?

Nutrition Care for Pre-surgery

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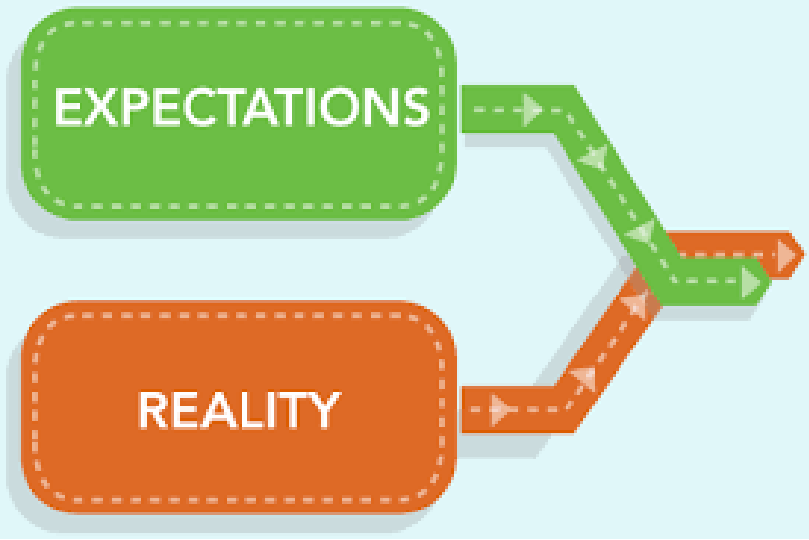
Help patients to

- Develop an understanding of the limitations of surgery
- Manage expectations



Two Kinds of Pre-op Diets

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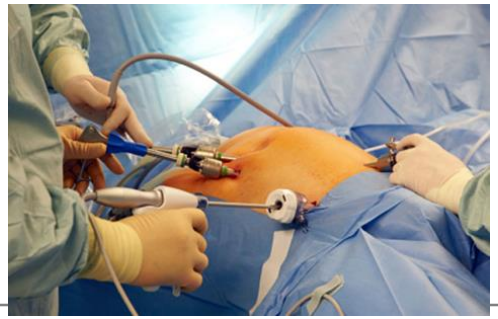
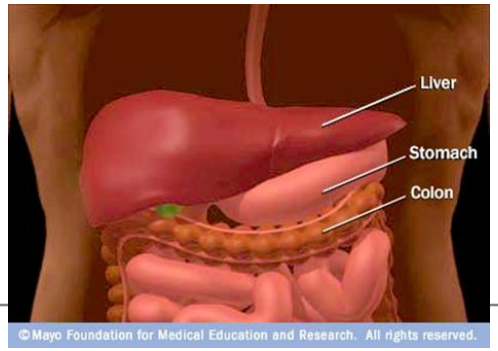
Long-term

Used to promote weight loss & reduction in adipose tissue



Short-term

Used to promote reduction in liver volume



Outcomes of Short-term & Long-term Diet

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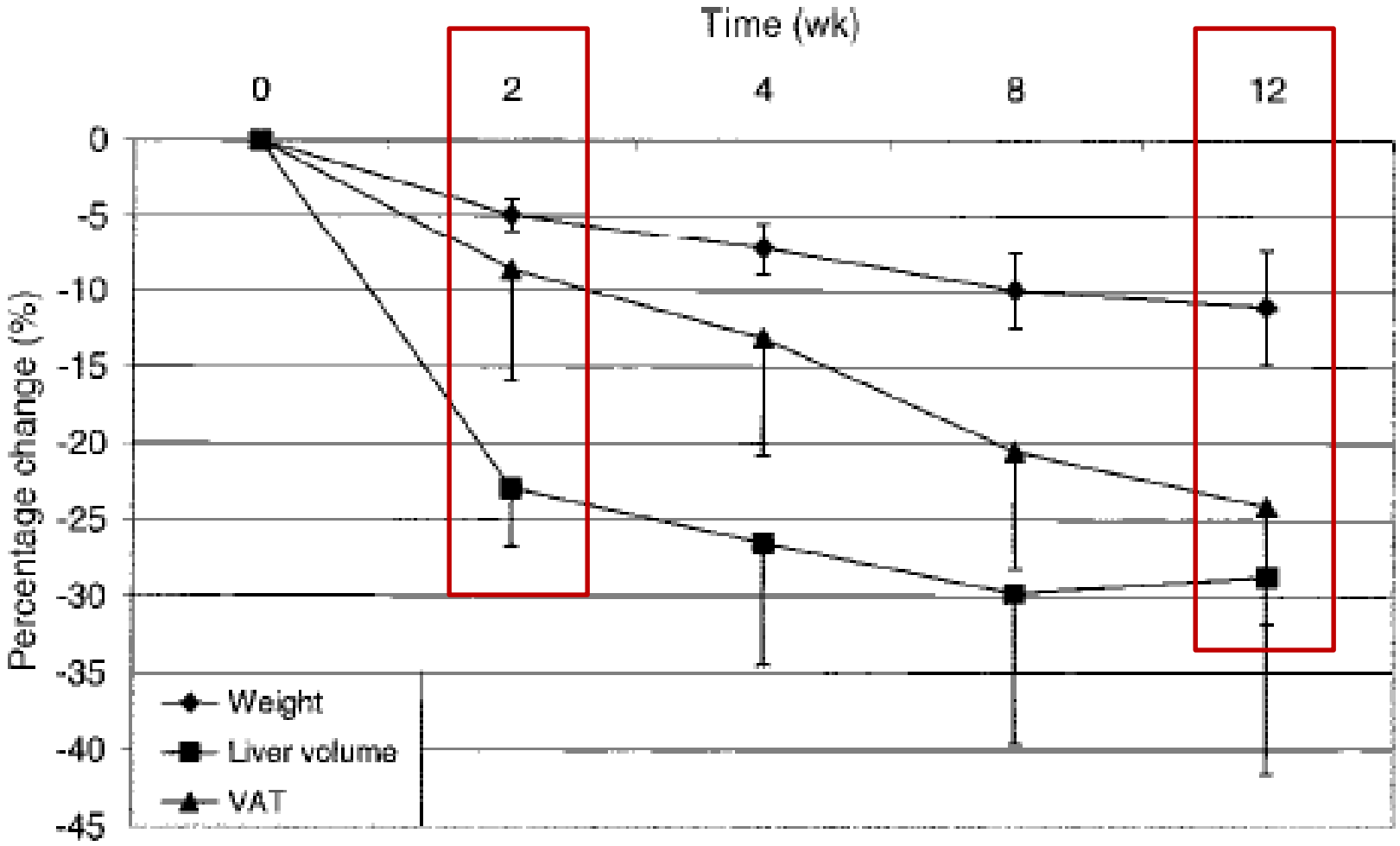
32 patients on 3 Optifast shakes + non-starchy vegetables



Best Practice: Short-term Pre-op Diet

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- 2 weeks
- ~1000 calories, < 50 g carb
- Meal replacements (or could be food-based)
  - Solid or liquid MRs depending on patient preference
- Consider palatability, simplicity, affordability
- Consider patients on hypoglycemic meds

Pre-surgery

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Health plan may require

- Medically supervised 3 - 6 month program
- Monthly documentation from either or both a: Dietitian and a Psychologist

ASMBS Position Statement, 2011

- There are no data from any randomized controlled trial, large prospective study or meta-analysis to support the practice of insurance mandated preoperative weight loss.
- There is no Level I data in the surgical literature, or consensus in the medical literature that has clearly identified any one dietary regimen, duration or type of weight loss program that is optimal for patients with clinically severe obesity.
- Patients seeking surgical treatment for clinically severe obesity should be evaluated based on their initial BMI and co-morbid conditions. The provider is best able to determine what constitutes failed weight loss efforts for their patient

HOSPITAL STAY:

Laparoscopic Adjustable Gastric Band	Less than 24 hours or 1 night
Sleeve Gastrectomy	Less than 24 hours or 1 night
Roux en Y Gastric Bypass	1-2 nights

Post Surgery Diet

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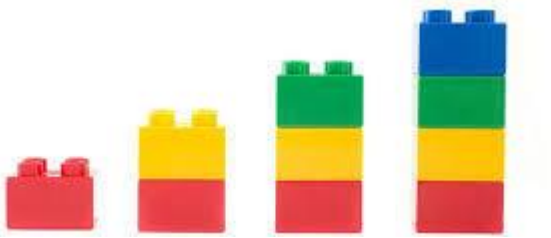
Variation in program approaches to diet transition, however, the diet progression is: (review handout Diet stages)

- *Staged approach* (4-6)
  - **EACH STAGE BASED ON:**
    - nutrient needs
    - texture
- Progression as tolerated
  - Large variation in tolerances
  - Therefore, early and frequent follow-up



Protein

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Post-WLS exact needs not been defined

- Case studies reveal early post-op patients tend to take in less than the ***60-100 grams most commonly recommended***
- Protein ***deficiency is not*** common post-RYGBP
  - Brolin, et al. J Gastrointest surg 2002; 6:195-203

Factors to Consider with Protein Recommendations:

- **Quality of Protein** Castellanos et al Nutr Clin Pract 2006;21:485-504
  - Complete protein concentrates (essential/indispensible amino acids)
    - egg white, soy, milk (casein/whey fractions)
    - Whey: contains varying amounts of lactose
    - Whey protein isolates are lactose free
- **Essential AA supplement** ingestion Katsanos C, et al.
- **Distribution** (vs. skewed) protein intake stimulates muscle protein synthesis to maximal extent). Mamerow M, et al 2014 Jun; 144(6): 876–880.

Carbohydrate

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Recommended Amounts: brain function

- Daily Recommended Intake: DRI/RDA = 130 g/day
- Food Agricultural Organization (FAO):minimum 50 g day

Minimum recommend 50 g/day

Fiber:

- No current studies guide practitioners of how much total fiber to recommend to postoperative bariatric patients
- We should be focusing on getting our bariatric patients adequate fiber intake.
- To avoid bezoar formation: Counsel patients on proper chewing behaviors and food preparation

Advancing the diet: All Procedures

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- Transition takes months
- Advance as tolerated
  - Frequent nutrition follow up to assess tolerances, address eating issues, provide support , education
- As hunger comes back and tolerances increase:
  - Trust hunger; respect satiety
  - Incorporate all food groups
  - Focus on 'healthier' food choices
  - Planning: Meal/snack timing
- Life long supplementation

Early Post-op Nutrition Complications

Dehydration

- Dizziness, nausea, fatigue, dark urine
- Weight early indicator
  - >2 lb/d = dehydration; monitor hypertension medications
- Rehydration: 100 mg/day Thiamin in IV

Diarrhea

- Think lactose intolerance first
- Then infection
- Dumping
- ? post cholecystectomy, not tolerating fat

Constipation

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Common Causes

- Dehydration
- Low fiber liquid diets
- Elimination of coffee
- Iron / calcium supplements
- Pain medications (opioids)
- Limited physical activity

Nutrition Intervention

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- Rehydrate
- Stool softeners and/or laxatives
  - Senna or Miralax can initiate bowel movement
- Assess for adequate fiber intake
  - Slow and steady supplementation as needed
  - Soluble fiber bulks stool and *insoluble facilitates movement*
- If pt discontinued caffeine, resume morning dose
- Encourage daily activity

Be Proactive!

Greenstein & O'Rourke 2011; Foxx-Orenstein, McNally, & Odunsi 2008; Rao et al. 1998

Special Considerations

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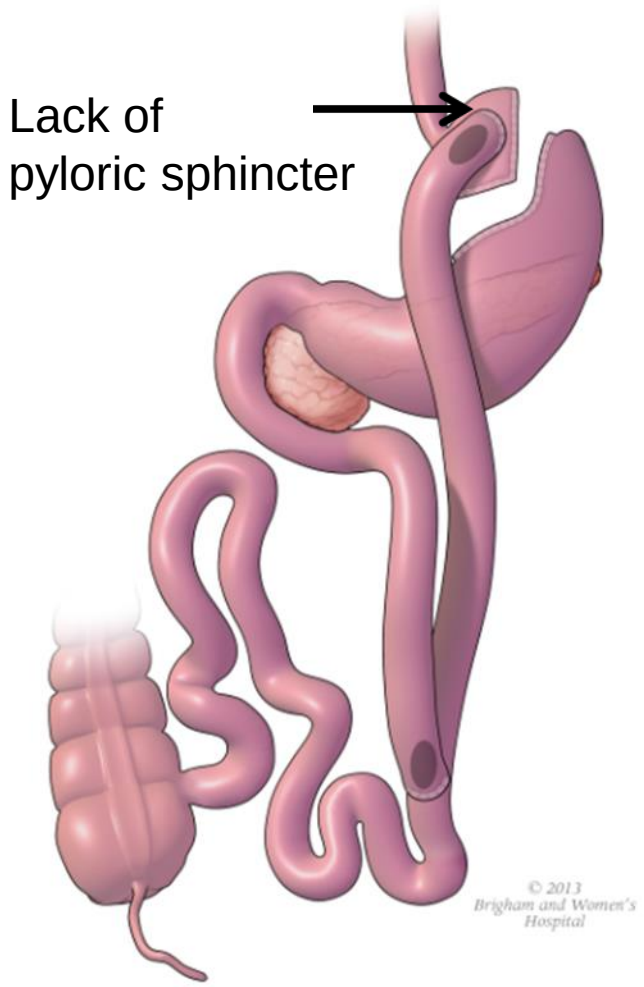
Dumping Syndrome

Caused by a sudden distention of the jejunum by hypertonic solids or fluids.

- Symptoms occur shortly after eating and can last for 30-60 minutes.
- Symptoms include nausea, dizziness, weakness, rapid pulse, cold sweats, feeling very tired, cramps and diarrhea.



Mallory et al Obes Surg 2005

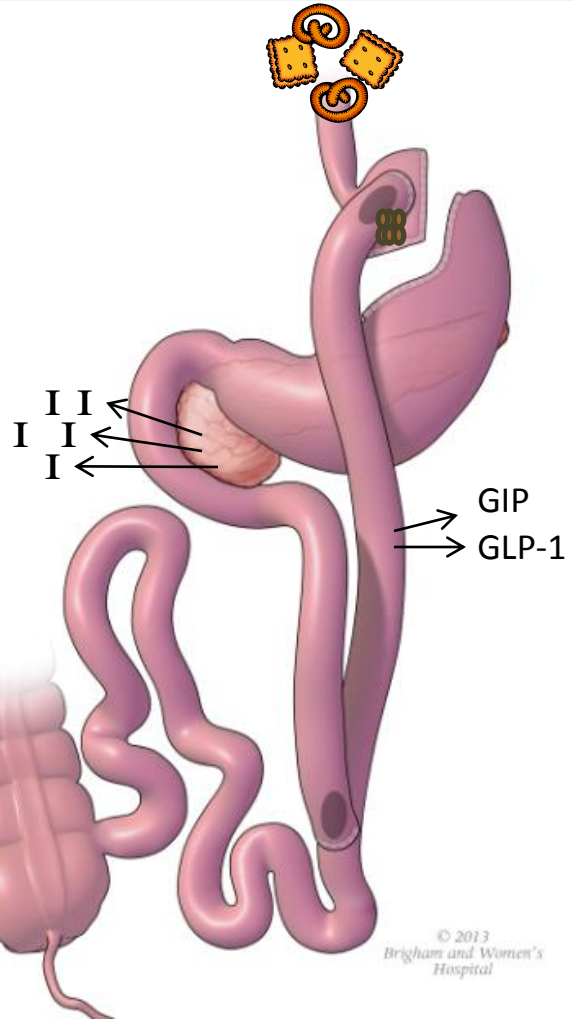
DUMPING SYNDROME: Two types of dumping:

- **Early dumping** which occurs 30-60 minutes after eating and can last up to 60 minutes. (more common post-RYGB)
  - Symptoms include nausea, dizziness, weakness, rapid pulse, cold sweats, feeling very tired, cramps and diarrhea.
- **Late dumping** which occurs 1-3 hours after eating.
  - Symptoms are related to ***reactive hypoglycemia*** (low blood sugar) which include sweating, shakiness, loss of concentration, hunger, and fainting or passing out.

http://asmbs.org/resources/bariatric-surgery-postoperative-concerns-2

Mallory et al Obes Surg 2005

Pathophysiology of Reactive Hypoglycemia



- Rapid hypoglycemia from *exaggerated insulin response*
- Food moves to jejunum quickly; *triggers hormone release (GLP-1 and GIP) which stimulates insulin response*

Ukleja 2006

Post-Operative Hypoglycemia

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Goal: Delay transit of food through GI tract

- Manage with dietary manipulation
  - 6 small meal; protein source at each
  - Avoid fluids 30 minutes post-meal/snack
  - Avoid high sugar/refined carbohydrate foods.
  - Eat very slowly.

7:30 AM	Breakfast
10:00 AM	Snack 1
12:30 PM	Lunch
3:00 PM	Snack 2
5:30 PM	Dinner
8:00 PM	Snack 3

Reactive Hypoglycemia: lack of diet response

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Pharmacological Treatments			
Drug	**Administration**	**Mechanism of Action**	**Side Effects**
Acarbose	Oral	• Delays the breakdown of starch into sugar	• Bloating • Flatulence • Diarrhea
Somatostatin analogs-octreotide	Injection	• Delay gastric emptying • Slow transit through the bowel • Inhibit the release of gastrointestinal hormones, insulin secretion and postprandial vasodilation	•Gall stone formation •Pain at injection site •Steatorrhea

IF DIET AND/OR MEDICATIONS DO NOT RESOLVE ISSUE; REFER TO ENDOCRINOLOGIST; ASSESS FOR NESIDIOBLASTOSIS

Post-Operative Complications

Nausea/Vomiting

- Nausea:
  - Dehydration
  - Pace of eating
  - Rule out pregnancy
- Vomiting
  - Rule out stenosis
  - Hyperemesis: may need rehydration

Coomplications: Micronutrient Deficiency

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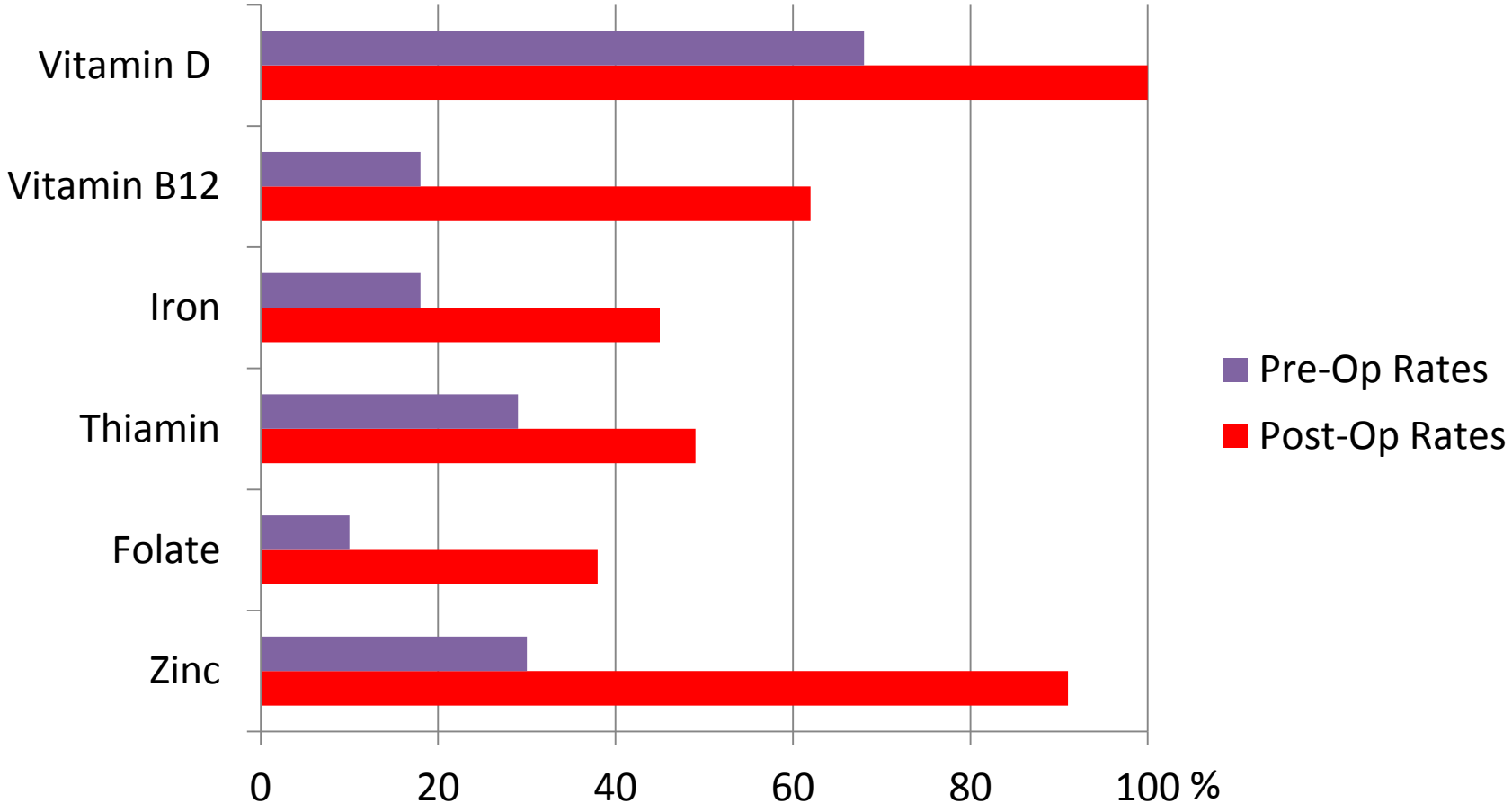
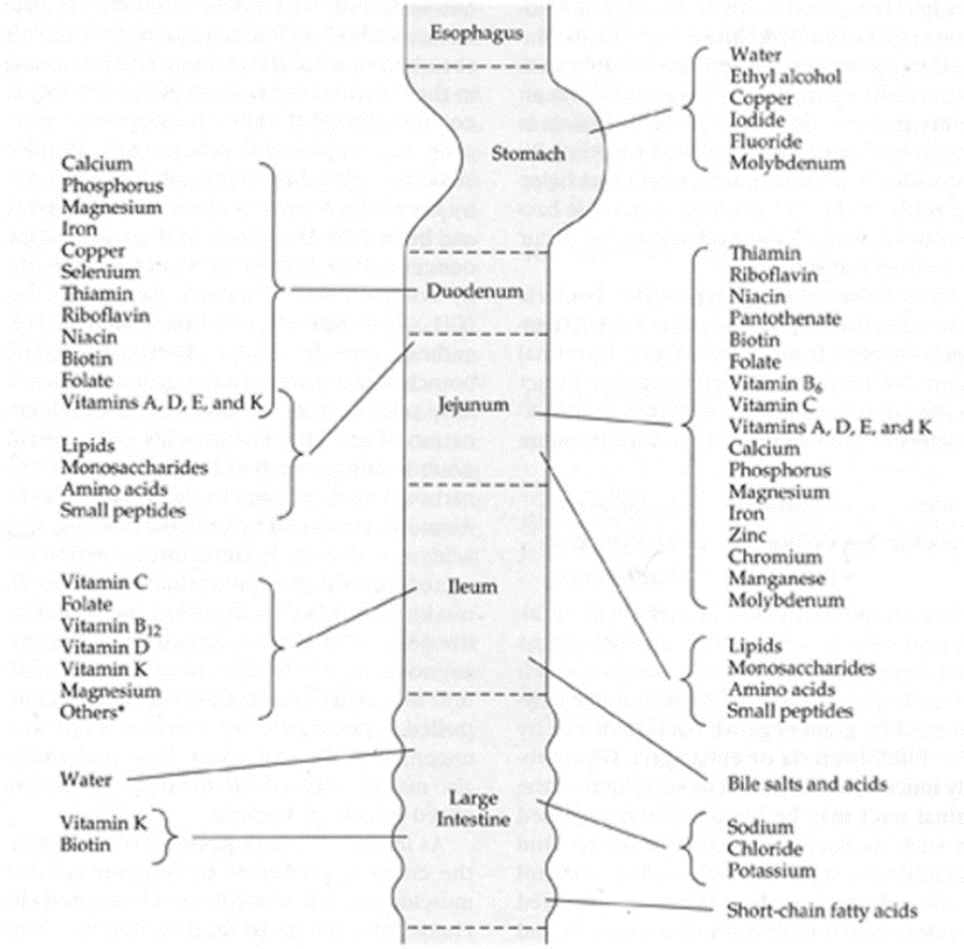
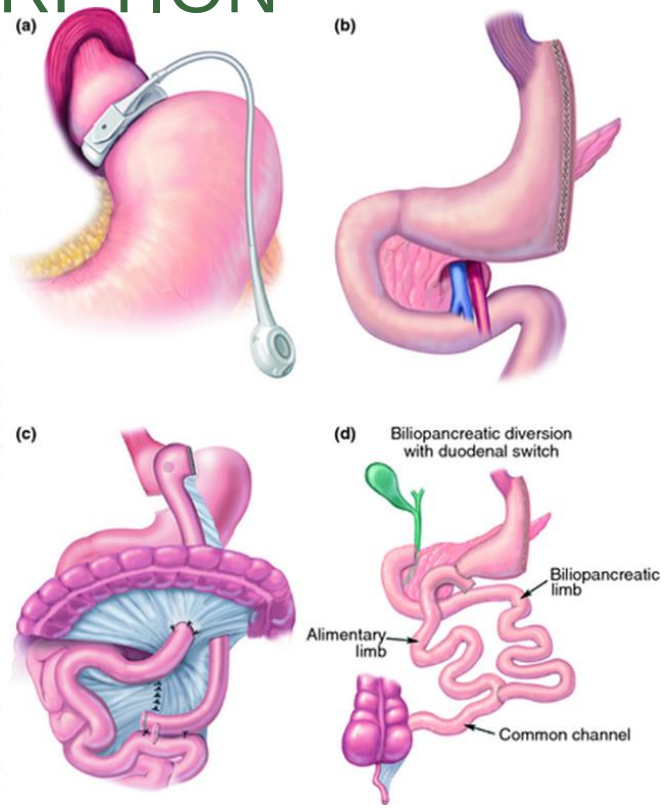


1. Stein et al 2. Parrot et al

MICRONUTRIENT DEFICIENCIES

SITES OF NUTRIENT ABSORPTION



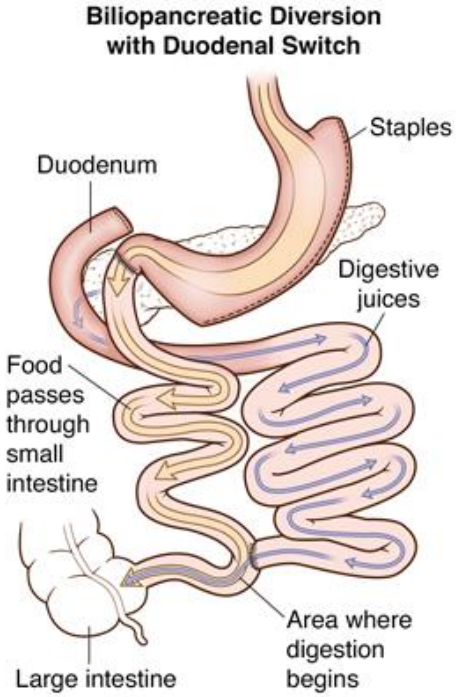


Stein, et al

https://virtualmedic.wordpress.com/2011/03/05/sites-of-nutrients-absorption-along-the-git-physiology/

Biliopancreatic Diversion with Duodenal Switch (D/S)

- Pylorus intact, so dumping not an issue
- No CHO malabsorption
- Approx. 72% fat malabsorption
  - ***Need ADEK supplementation BID***
- Approx. 25% protein malabsorption
  - **Higher protein needs (≥120 g/day)**
- May need > 2400 mgs Ca++ (as citrate)
- Vit D deficiency common
- Monitor Cu++, Zn++



Monitoring Labs Lifelong

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- Some deficiencies can manifest in days while others take years

- Use physical signs/symptoms to detect deficiencies (see handout: important to assess and match with laboratory data)

Routine Nutrient Supplementation*

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Supplement	Dosage
Multivitamin/multi-mineral 1-2 daily	should contain 100-200% RDA **Zn and Cu** **Folate:** 400-800 mcg of folate/day; women childbearing age: 800-1,000 mcg; **Thiamin** 12 mg/day

*Patients with preoperative or post-operative biochemical deficiency states are treated beyond these recommendations

Post Op Complications: Micronutrients Deficiencies

- Data suggest *micronutrient deficiencies increase* over time
- Number of patients *monitored over time significantly declines*

Challenges: Vitamin Supplementation

- Standard supplementation may not be sufficient to prevent nutritional deficiencies
- Proper supplementation can be burdensome and expensive which may challenge patient compliance
- Cost, feasibility and practicality must be taken into consideration
- Yearly monitoring of nutritional labs imperative

Educate Primary Care Providers

Pre and Post-WLS nutrition biochemical surveillance				
	Pre-Surgery	2 Months Post-Surgery	Post Month 6	Post Yearly
Iron Status Serum folate Ferritin TIBC	√	√	√	√
Thiamin (B1)	√	√	√	√
B12 cobalamin methylmalonic acid (opt	√	√	√	√
Fola				
Vita Seru PTH Alka				
Vitamin A	√	X	BPD/DS	√
Vitamin E*	√	X	X	√
Vitamin K*	√	X	X	√
Hemoglobin A1c	√	√	√	√
Phosphorus	√	√	√	√
Magnesium	√	x	√	√
Zinc	√	x	√	√
Copper*	√	x	RYGB; BPD/DS	RYGB; BPD/DS
Selenium*	x	x	RYGB; BPD/DS	RYGB; BPD/DS

Provide patient to give to Primary Care Provider

* = with specific findings;
Shaded areas indicate that it is not necessary unless indicated by physical assessment/specific findings; there is not data regarding copper or selenium post-SG, Source adapted from Mechanick, et al, SOARD 2013.9:159-191; Moize, et al; Parrott et al, SOARD 2017

Case Study

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Deb cancels some of her appointments and you don't see her again until about 2 years post-op.

She tells you that she takes a one-a-day multivitamin and feels well overall. She can just tell her age is catching up with her because she feels more tired than before and notices changes to her vision.

Case Study

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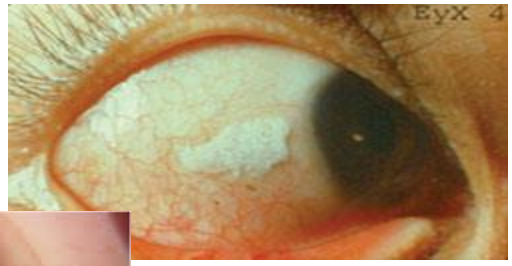
Her Lab results and signs and symptoms:

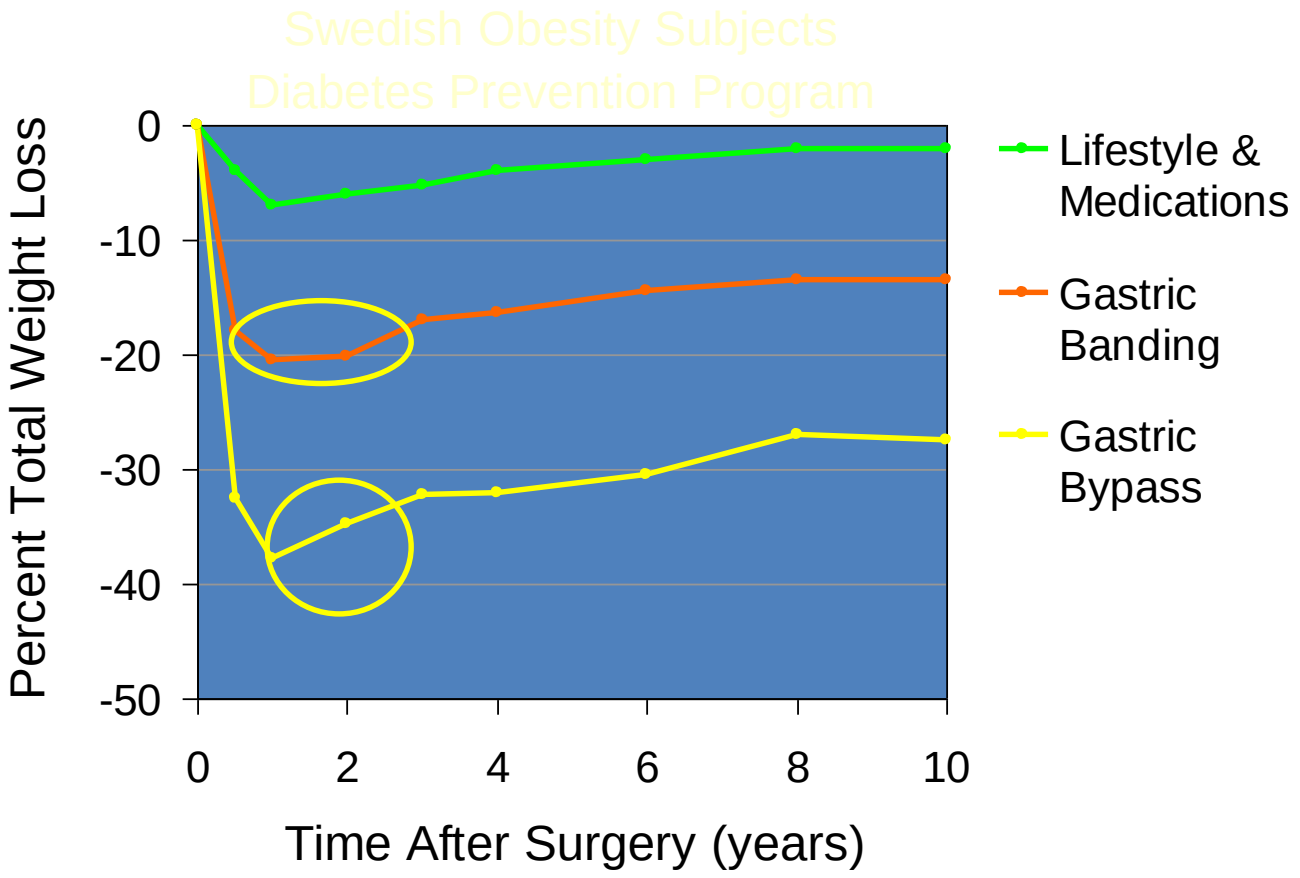
- Vitamin B12: 550
- Folate 500
- Fe 34
- Fer 15
- Ceruloplasmin 80
- Retinol 7
- Zinc 80



Case Study

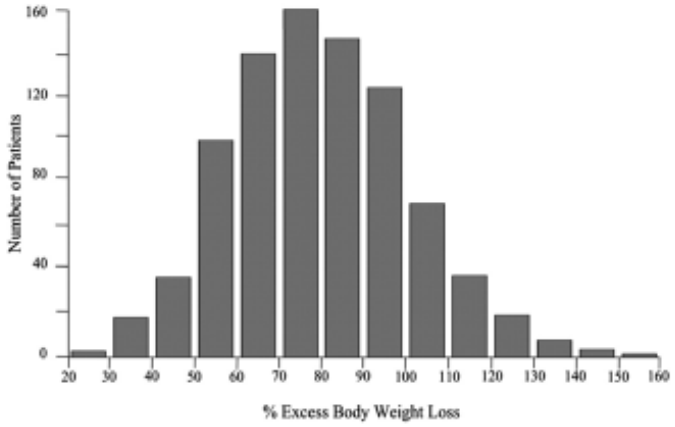
- Deb continues to see you on an erratic basis over the next couple years, often cancelling appointments due to work demands.
- She returns nearly 4 years after her surgery.
- She discloses that she has been avoiding the office because she is embarrassed about *regaining 40 lbs* in the past 18 months.

Weight loss and Regain expectations

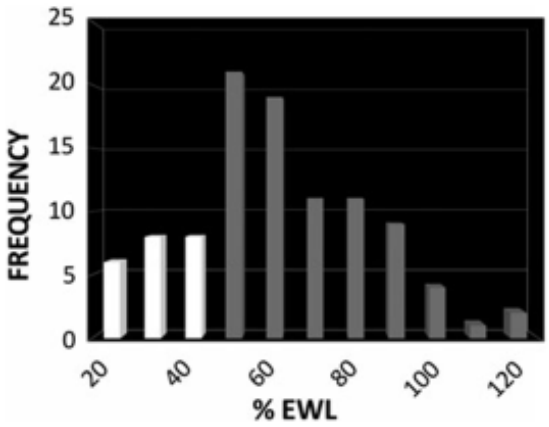


Weight Loss Variability

Every bariatric procedure studied demonstrates similar wide variations in outcome among patients.



Gastric Bypass



Sleeve Gastrectomy

Approximately *10-20% of patients* fail to lose a significant amount of weight postoperatively.

20-25% of the lost weight regained over a period of 10 years (Sjostrom, N Eng J Med 2007;Pajecki,Obes Surg, 2007)

Postoperative complications: Weight Regain

You take an extensive history and identify some potential contributors to her weight gain. She changed jobs about two years ago and now commutes 60 minutes per day instead of 15 minutes. In addition, 9 months ago she was started on *propranolol* for migraines. She has strayed from meal and snack planning and now finds herself "grazing" throughout the day.

Environmental Modulators of Energy Balance

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Patients have continued exposure to obesogenic environment

Physiology and Life Style factors

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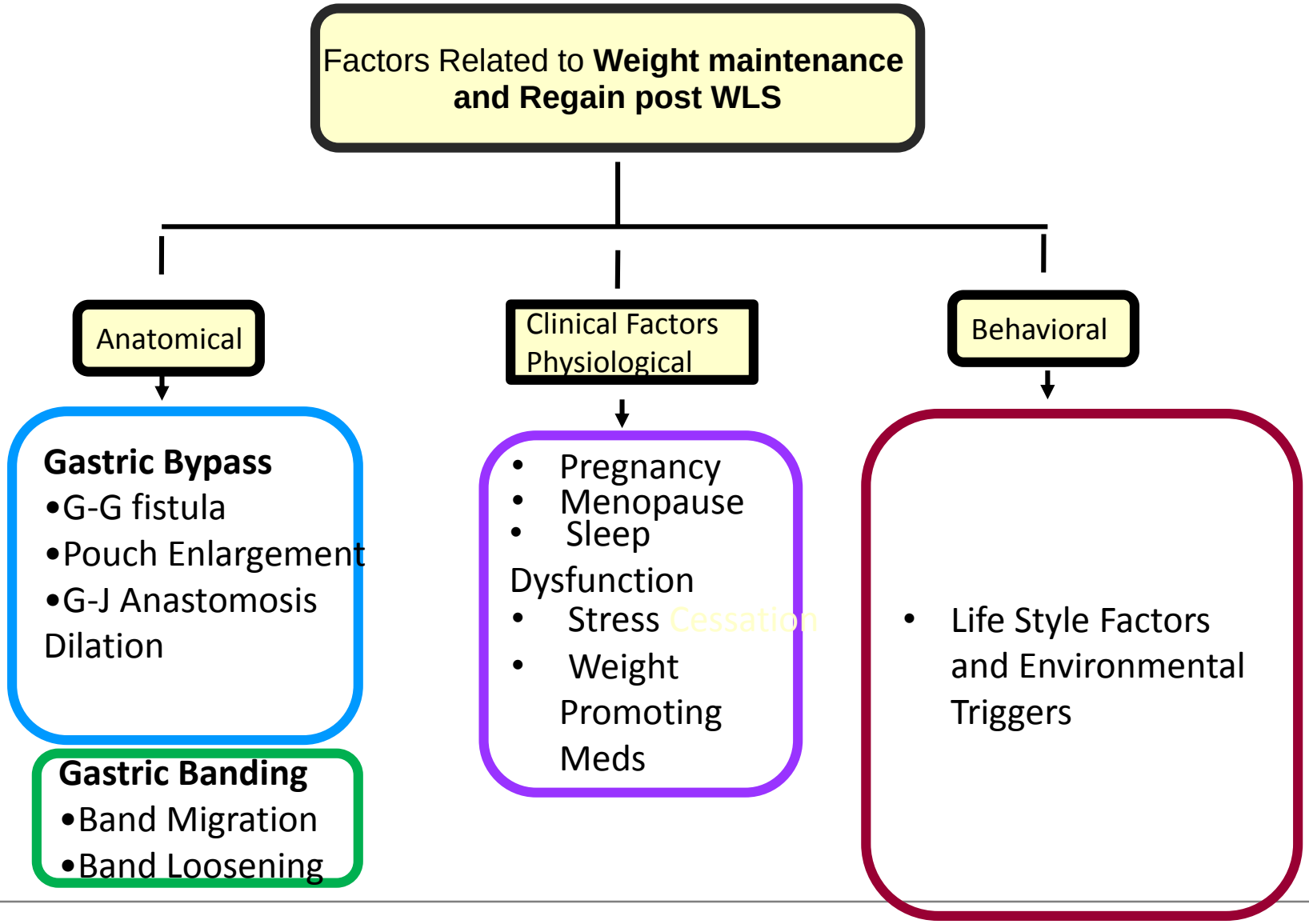
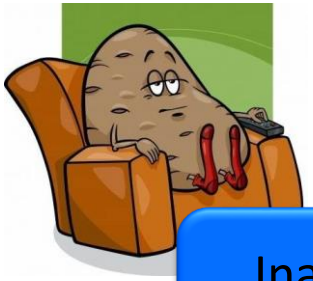


Environmental and Developmental Factors



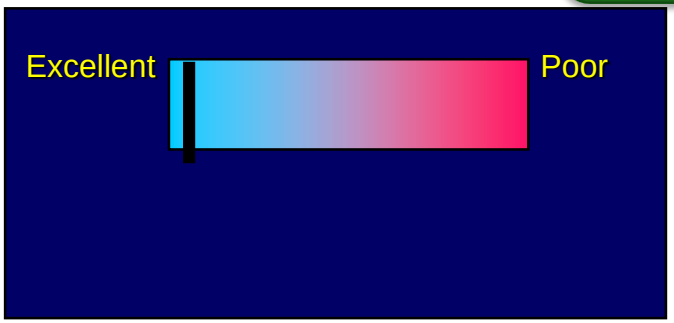
Inadequate sleep

Stress

Inadequate physical activity

Weight promoting medications

Processed diets
Irregular eating pattern



Life changes (aging, pregnancy, menopause)

FACTORS RELATED TO WEIGHT REGAIN

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OUTCOMES
• Higher dietary fat intake • Higher levels of anxiety
• Poor diet quality characterized by excessive intake of calories, snacks, sweets, and fatty foods was statistically higher • Poor nutritional counseling follow-up
• Poor diet quality • Lack of nutritional counselling • Grazing behaviors
• Diet quality • Postoperative time

Nutrition (2016) 32 (3):303-308
OBES SURG (2013) 23: 922
Nutrition (2012) 28, (1):53-58
Nutrition (2016) 32(11): 1250-1253

Guidelines and Strategies

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- *Eat* as close to the *'real' food* as possible
- *Establish* set *meal patterns*
- *Shift workers*: Focus on *meal planning, protein at each meal and snack*
- Address *sleep hygiene*
- Strategies/Techniques: *stress management*
- *Move* more*; planned exercise*
- *Monitoring, Support and follow-up*

Key Points:

- ✓ Patients seeking bariatric surgery require a thorough pre-operative nutritional evaluation including screening for medical complications and micronutrient deficiencies, assessing weight loss expectations, and identifying potential weight loss barriers within current lifestyle
- ✓ Patients with obesity face an increased risk of micronutrient deficiencies
- ✓ Bariatric surgery can cause micronutrient deficiencies, particularly RYGB or duodenal switch
- ✓ No standardized guidelines for pre-operative weight loss exist, but both long term and short term preoperative diets can be beneficial
- ✓ All patients require some type of vitamin and mineral supplementation after bariatric surgery and routine screening for nutritional deficiencies
- ✓ Up to 25% of patients fail to lose significant weight postoperatively (inadequate weight loss discussed in prework) or experience premature weight regain
- ✓ Weight regain following bariatric surgery requires careful evaluation and consideration of multiple influences including physical activity, food choices and timing of meals, medications, sleep and stress.