



# Preventing and Treating ND Around MBS

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## Preventing and Treating ND Around MBS

# IFSO 2025 Santiago

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# Disclosure Slide

Nothing to disclose



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# Preventing and Treating ND



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Definitions

Risk factors for Nutritional Deficiencies (NDs)

Preoperative stage

Post-operative stage

Conclusion

Shikora S et al, 2023



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# Why ND Matters:

Potential complications of untreated NDs.

Impact on patient quality of life and long-term health.

**Anemia**

**Hair loss**

**Wernicke Encephalopathy**

**Osteoporosis**

**Sarcopenia**

Shikora S et al, 2023



# Definitions

ND: Nutritional Deficiency

**Key difference** between hypo-absorption of **micronutrients** vs. **macronutrients**



CONSENSUS ON DEFINITIONS AND CLINICAL  
PRACTICE GUIDELINES FOR PATIENTS CONSIDERING  
METABOLIC-BARIATRIC SURGERY

Shikora S et al, 2023

# Risk factors of ND



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**Table 3.12** Risk of nutritional deficiencies after bariatric surgery

Nutrient	Gastric banding	Sleeve gastrectomy	Roux-en-Y gastric bypass	One anastomosis gastric bypass	Biliopancreatic diversion with duodenal switch
Protein	+	++	+++	+++	++++
Fat				+	+++
Calcium	+	++	+++	+++	+++
Iron	+	++	+++	+++	+++
Zinc	+	+	+++	+++	+++
Copper	+	+	+++	+++	+++
Magnesium	+	+	+++	+++	+++
Selenium	+	+	+++	+++	+++
Vitamin B1	+	+	++	++	++
Vitamin B2	+	+	+	+	++
Vitamin B3	+	++	+++	+++	++
Vitamin B5	+	+	++	++	+++
Vitamin B7	+	+	++	++	+++
Vitamin B9	+	+	++	++	++
Vitamin A	+	+	++	++	+++
Vitamin D	+	++	+++	+++	+++
Vitamin E	+	+	+	+	+++
Vitamin K	+	+	+	+	+++
Vitamin C	+	+	++	++	+++
Vitamin B12	+	+	+++	+++	+++



+ Low risk of deficiency; ++ Significant risk of deficiency; +++ High risk of deficiency; ++++ Very high risk of deficiency



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# Micronutrient Absorption (risk factors)

- (1) The size of the gastric pouch and the location of the removed/bypassed stomach
- (2) Shortening or bypassing portions of the small intestine
- (3) Length of the common limb channel
- (4) Bile acid production and availability to mix with nutrients

Aills, 2018 - Levison, 2013 - Stein, 2014 - Parrott, 2016

A. G. Bhasker et al., 2025



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# Micronutrient Absorption (risk factors)

Other factors:

Adherence to guidelines/ patient's knowledge, and acceptance

Reduced food intake/food intolerances

## The most prevalent deficiencies

Iron, Vit B12, Vit B1, Vit D, Zinc, Selenium, Copper, Calcium

Protein

Shikora S et al, 2023

A. G. Bhasker et al., 2025





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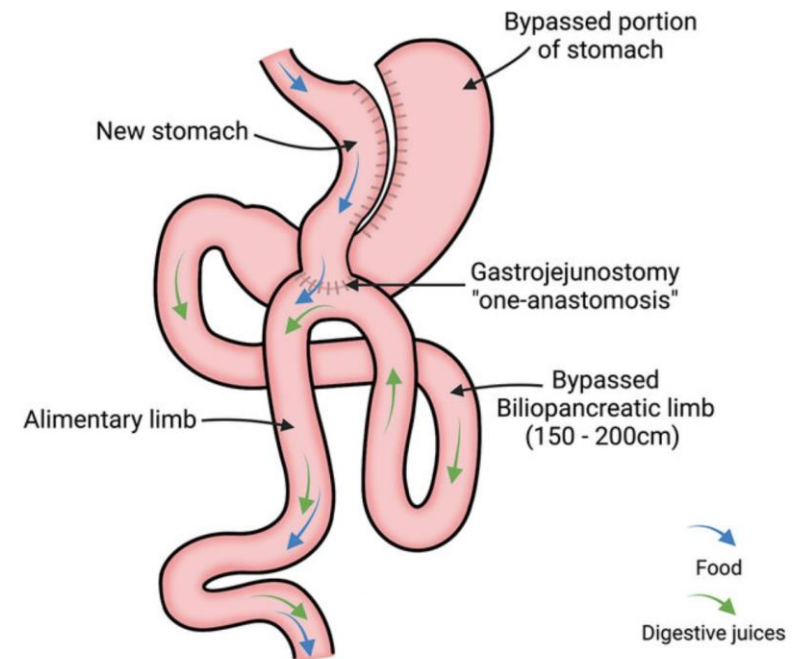
# Risk Factors for NDs

(1) SG, RYGB, OAGB with BP limb <150cm

(2) DS, OAGB with BP limb > 150cm, SADI

(1) iron, vit B12, copper, zinc, vit D, B1, calcium

(2) fat-soluble vitamins, trace minerals, protein



Shikora S et al, 2023 A. G. Bhasker et al., 2025

# Surgical procedures & NDs

## Pre-existing nutritional deficiencies



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Adjustable  
Gastric Band (AGB)



Vertical Sleeve  
Gastrectomy (VSG)



Roux-en-Y Gastric  
Bypass (RYGB)



Biliopancreatic  
Diversion (BPD)



Biliopancreatic Diversion  
With a Duodenal Switch (BPD-DS)

Shikora S et al, 2023; O'Kane & Parrot 2025

# Pre-operative Strategies:

Assessment of baseline nutritional status.  
Importance of pre-operative multivitamin supplementation. (+B1 100mg 15 d before) (Patterson, 2025)

Obesity Surgery (2025) 35:1818–1826  
<https://doi.org/10.1007/s11695-025-07853-1>



RESEARCH



## Assessment of Preoperative Multivitamin Use on the Impact on Micronutrient Deficiencies in Patients with Obesity Prior to Metabolic Bariatric Surgery

Johannes Sander<sup>1</sup> · Bart Torensma<sup>2,3</sup> · Jacqueline Siepe<sup>1</sup> · Torsten Schorp<sup>1</sup> · Thilo Schulte<sup>1</sup> · Christine Schmeer<sup>1</sup> · Hannes Gögele<sup>1</sup> · Inga Böckelmann<sup>1</sup> · Andrea Grabenhorst<sup>1</sup> · Ildiko Ockert-Belz<sup>1</sup> · Frits Berends<sup>3</sup> · Edo Aarts<sup>3</sup>

A. G. Bhasker et al., 2025



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# Postoperative Supplementation:



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# Post-operative Strategies:

Focus on **prevention (supplement)** and **repletion** of deficiencies.

## Prevention (supplementation) # Repletion

Prescription will depend on:

- (1) Dietary intake (calcium, protein, vegetarian)
- (2) Procedures
- (3) Signs and symptoms
- (4) Lab exams

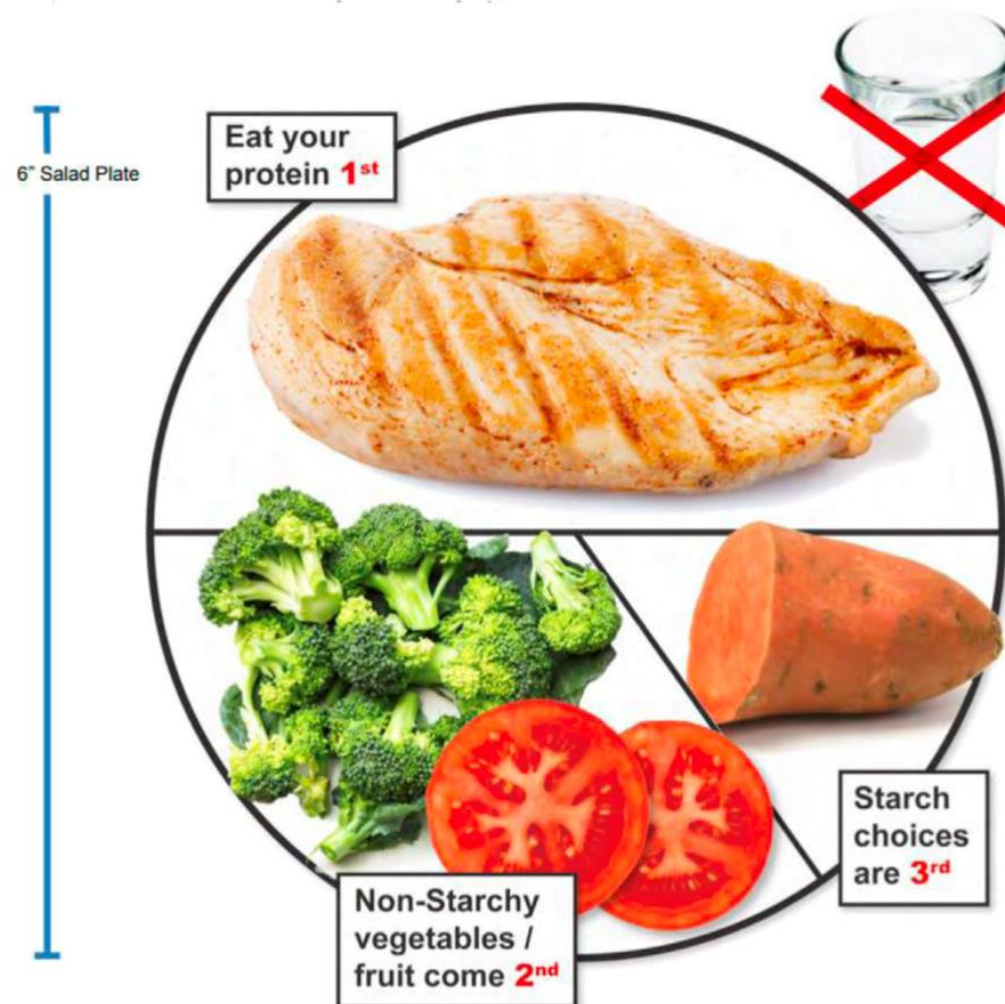
A. G. Bhasker et al., 2025; O'Kane & Parrot, 2025



# Post-op supplementation

## (1) Dietary intake

- Protein
- Calcium
- Intolerances



Shikora S et al, 2023; O'Kane & Parrot 2025



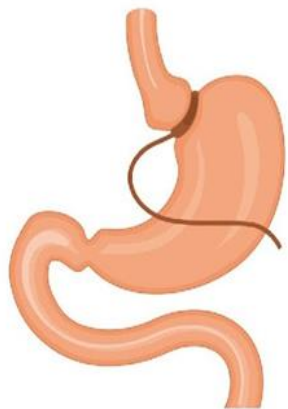
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# Post-op supplementation

## 2) Procedures

SG,RYGB, OAGB <150 cm	OAGB > 150 cm, SADI, DS
MVI (multivitamin)	MVI (multivitamin)
+ Iron	+ Iron
+ B1	+ B1
+ B12	+B12
+ Vit D	+Vit D (higher)
+ Calcium	+ Calcium
	+ Vit A,E,K, Zn, Selenium



Adjustable  
Gastric Band (**AGB**)



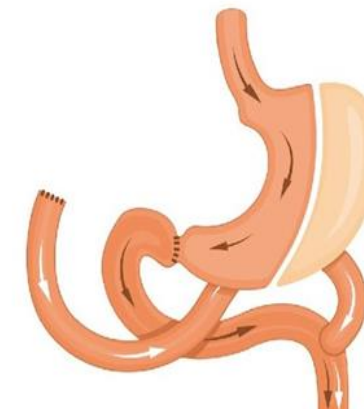
Vertical Sleeve  
Gastrectomy (**VSG**)



Roux-en-Y Gastric  
Bypass (**RYGB**)



Biliopancreatic  
Diversion (**BPD**)



Biliopancreatic Diversion  
With a Duodenal Switch (**BPD-DS**)



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# Monitoring – (3) Signs and Symptoms:

## Examples of specific questions to ask with possible identified nutrient deficiency

Skin	Hair
<ul style="list-style-type: none"><li>+ Does your skin tend to be dry?<ul style="list-style-type: none"><li>• Vitamin A</li></ul></li><li>+ Do you have the appearance goosebumps that won't go away?<ul style="list-style-type: none"><li>• Vitamin A or C</li></ul></li><li>+ Have you noticed any purple or blue spots appearing under your skin?<ul style="list-style-type: none"><li>• Vitamin C</li></ul></li><li>+ Any problems with wound healing?<ul style="list-style-type: none"><li>• Vitamin C or zinc</li></ul></li><li>+ Any change in skin color?<ul style="list-style-type: none"><li>• Iron or vitamin B<sub>12</sub></li></ul></li></ul>	<ul style="list-style-type: none"><li>+ Have you noticed any changes to your hair lately (only ask this question if the patient is more than 6 months postsurgery)?</li><li>+ Any changes to your natural hair color or shine?<ul style="list-style-type: none"><li>• Manganese, selenium, copper, protein, or calorie malnutrition</li></ul></li><li>+ Can you pull out a strand of hair without it hurting?<ul style="list-style-type: none"><li>• Protein or protein-calorie malnutrition</li></ul></li></ul>

Cassie Storie, 2020





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# Monitoring – (3) Signs and Symptoms:

## Iron

Fatigue, hair loss, impaired immune function, glossitis, dysphagia, rapid heart rate, craving ice, dyspnea

## Folate

Pigment changes or ulcers in skin, nails, or oral mucosa; weakness, lethargy; visual disturbance

Cassie Storie, 2020





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# Monitoring – (3) Signs and Symptoms:

## Calcium

**Symptoms:** Leg cramping, muscle weakness and/or hyperexcitability

## Vitamin D

**Symptoms:** bone pain, muscle weakness, tetany, tingling, cramping

Cassie Storie, 2020





# Monitoring – (3) Signs and Symptoms Vitamin B12

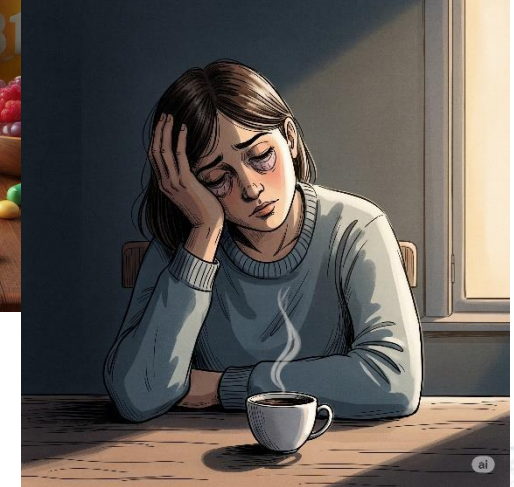


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## Symptoms:

Pale, fatigue, anorexia, diarrhea, glossitis; tingling or numbness in hands or feet; tinnitus; rapid pulse; cognitive changes; visual disturbances; ataxia



O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,



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# Monitoring – (3) Signs and Symptoms:

Nutrient	Symptoms (common)
Vitamin A	Loss of taste (zinc also related); hyper keratinization of the skin, night blindness
Vitamin E	Hyporeflexia, muscle weakness, nystagmus, gait ataxia
Vitamin K	Easy bruising, bleeding gums (vitamin C also related) delayed blood clotting, petechia, ecchymosis
Zinc	Rash, acne, change or lack of taste, increased infections
Copper	Hypopigmentation of hair, skin, nails, hypercholesterolemia, hypochromic anemia
Selenium	Cardiomyopathy, myopathy, muscle wasting, loss of skin and air pigmentation, and progressive encephalopathy
Protein	Fatigue, muscle wasting, oedema, hair loss



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# Monitoring – (4) Lab Exams

Micronutrient	SG	RYGB/OAGB <150	BPD/DS
Complete blood count (3,6 m, yearly)	✓	✓	✓
Thiamine B <sub>1</sub> (3,6m, yearly)	✓	✓	✓
Iron Profile (6m, yearly, as needed)	✓	✓	✓
25OHD (6m, yearly)	✓	✓	✓
PTH		✓	✓
B <sub>12</sub> (6m, yearly)	✓	✓	✓
Folate (6m, yearly)	✓	✓	✓
Zinc (yearly)		✓	✓
Copper (yearly)		✓	✓
Vitamin A (yearly)			✓
Albumin/Prealb (3,6m, yearly)	✓	✓	✓
Bone Status (every 1-2 years)		✓	✓
Nutritional Counseling (3,6, 9m, yearly, as needed)	✓	✓	✓

AACE/TOS/ASMBS  
Guidelines 2013; ASMBS  
Guidelines 2016



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# Post-Op: MVI (Multivitamin)

## Prescription

100-200% RDI (1-2/d)

+ Additional doses

(Monitoring: SS + exams)



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O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,

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# Post-Op: Additional Doses

Iron, Vitamin B12, Thiamine, Vitamin D3, Zinc, Copper, Calcium



O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,

# Nutrient - Iron:

- **Prevention:** 18mg (men)
- **Population > Risk:** 45-100mg \*  
(women at a fertile age, pregnant, athletes, adolescents)
- **Repletion** up to 300 mg or IV



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# Nutrient - Vitamin B1:

- **Prevention:** 12mg/d (50mg/d)
- **Initial beriberi:** 20-30mg/d
- **Vomiting:** 100 to 150mg/EV per 7d
- **Repletion** 100 mg 3x per day
- **WKS:** 500mg IV 3x daily, 250mg/d
- 100g/d oral



O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,



# Nutrient - B12:

- **Prevention:** 500-1000 mcg/d (oral)
- **IM** 1000mcg/month
- **Repletion:** 1000mcg IM for 8 weeks
- Neurological symptoms: 1000mcg parenteral/5 days followed by monthly injections



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O’Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,



# Nutrient - Folate:

## Nutrient - Folate:

Prevention: 400-800 mcg/d  
(800-1000 mcg/d pregnant women)

(5mg/d for DM)



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O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,

# Nutrient - Calcium:



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## Prevention

RYGB/SG: 1.200-1.500mg/d

SADI/DS: 1.500-1800mg/d

citrate x carbonate

## Repletion – vit D

O’Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2016



# Nutrient - Vitamin D:



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**Prevention** 3,000-6,000 IU (vit D 30-60 ng/mL)

**Repletion** 6,000-10,000IU \* 50,000 IU weekly (up to 3x per week)

O'Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,

# Prevention and Repletion doses



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NUTRIENT	RECOMMENDATION
Vitamin A	<b>Prevention:</b> BPGYR/SG: 5,000-10,000UI/d BGA: 5,000UI/d DBP: 10,000UI/d
	<b>Repletion</b> 50,000-100,000 UI IM
Vitamin E	<b>Prevention</b> 15mg/d
	<b>Repletion</b> 100-400UI/d
Vitamin K	<b>Prevention</b> - BGA/SG/BPGYR: 90-120 µg/d DBP: 300 µg/d
	<b>Repletion</b> up to 10mg/parenteral

Van Der Beet, 2015  
Homan J, 2015  
Weng Tc, 2015  
Gesquiere , 2014  
Parrot 2016

O’Kane & Parrot 2025, A. G. Bhasker et al., 2025, Parrot, 2017,



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# Prevention and Repletion doses



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NUTRIENT	RECOMMENDATION
<b>Zinc</b>	<b>Prevention</b> BPGYR: 8-22mg/d SG/BGA: 8-11 mg/d DBP: 16-22mg/d
<b>Copper</b>	<b>Prevention</b> BPGYR/DBP: 2mg/d SG/BGA: 1mg/d
<b>Protein</b>	Min 60g/day 1,5g/ Kg IBW

Van Der Beet, 2015  
Homan J, 2015  
Weng Tc, 2015  
Gesquiere , 2014  
Parrot 2016



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# Conclusion

Nutritional deficiencies can be prevented and treated with adequate nutritional care

**Monitoring Lab exams and evaluating signs and symptoms** can help HCPs to adjust additional doses of micronutrients for patients who have MBS

The cornerstone of the supplementation is adherence and individualization.



# Thank You



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