



XXIX IFSO World Congress

1-4 September 2026 | Toronto, Canada

Integrated Health Session:

**Guarding the Micronutrient Gap:
Obesity Management Medications and MBS Beyond
the Lab: Rapid Recognition and Treatment of
Micronutrient Deficiencies**

TORONTO 2026

**The Future of Obesity Management:
From Weight Loss to Health Gain**



ifso2026.org

Multidisciplinary Rapid-fire Cases

(How & Who Assesses Micronutrient Status)

From A Physiotherapist Perspective



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PhD in Medicine: Surgical Sciences

MSc in Health Sciences: Cardiology

Specialist in Sports Training

Specialist in Psychomotricity

President of Physical Health and Rehabilitation Committee of the SBCBM (Brazilian Society of Bariatric and Metabolic Surgery)
2016–2017 and Vice-President 2019–2020

Member of Education and Training Committee, IFSO (2023–2026)

Member of IFSOLAC



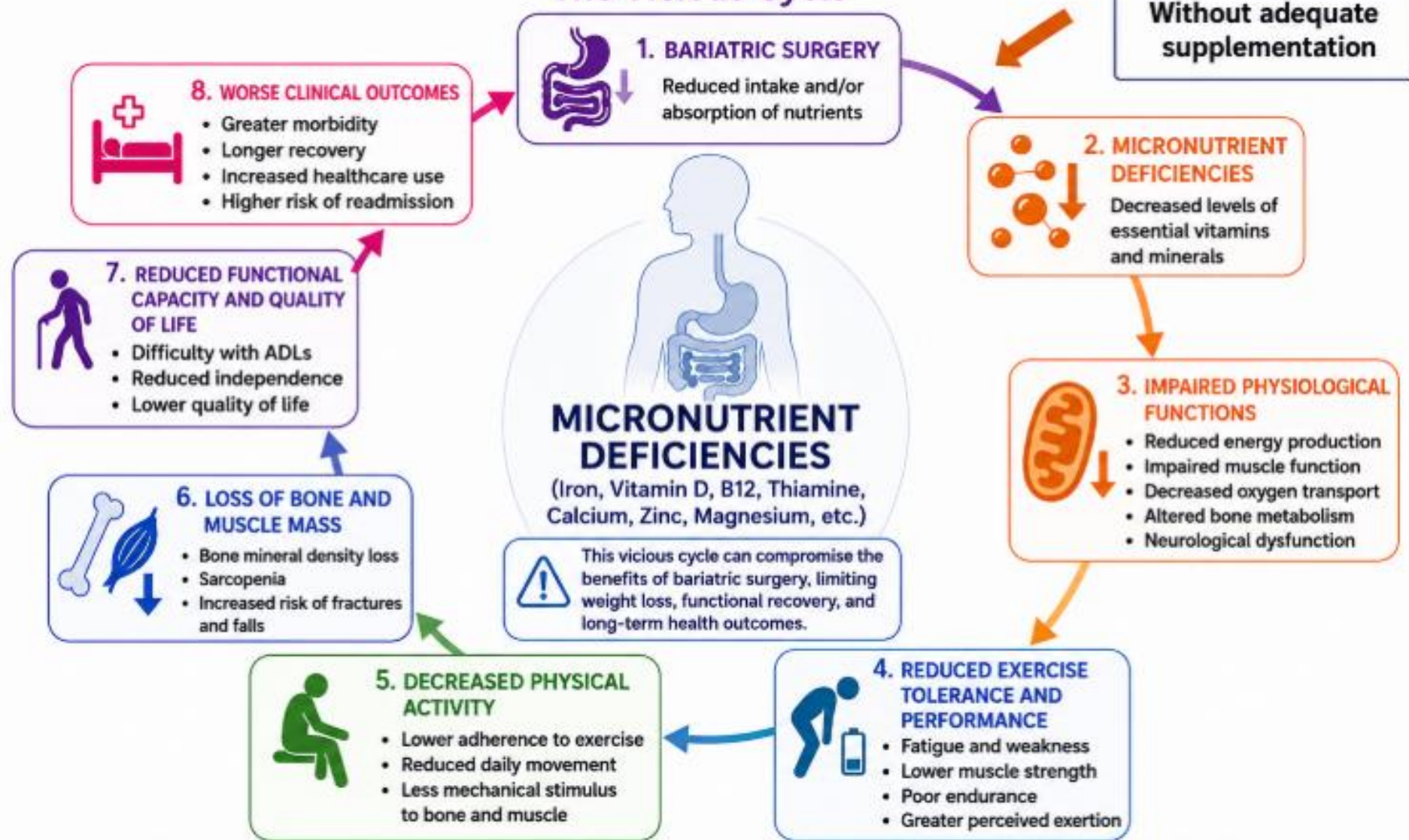
Disclosure Slide

I have no potential conflict of interest to report



MICRONUTRIENT DEFICIENCIES IN THE BARIATRIC POPULATION

The Vicious Cycle



MICRONUTRIENT DEFICIENCY: IMPACT AND CONSEQUENCES FOR EXERCISE

MICRONUTRIENT	IMPACT OF DEFICIENCY	CONSEQUENCES FOR EXERCISE
Fe Iron	- Impaired oxygen transport - Reduced energy production	 Early fatigue
B₁₂ Vitamin B12	- Impaired red blood cell formation - Neurological dysfunction	 Exercise intolerance
B₁ Thiamine (B1)	- Impaired carbohydrate metabolism - Reduced ATP production	 Muscle weakness
D Vitamin D	- Impaired muscle function - Reduced calcium absorption	 Loss of balance
Ca Calcium	- Impaired muscle contraction - Reduced bone mineralization	 Impaired motor coordination
Mg Magnesium	- Impaired energy production - Altered neuromuscular function	 Muscle cramps
Zn Zinc	- Impaired protein synthesis - Reduced immune function	 Reduction in strength and muscle recovery
Cu Copper	- Impaired iron metabolism - Reduced antioxidant defense	 Increased oxidative stress
Se Selenium	- Impaired antioxidant defense - Altered immune function	 Increased muscle damage after exercise
A C E Vitamins A, C and E	- Impaired antioxidant defense - Impaired immune function - Impaired collagen synthesis (Vitamin C)	 Increased susceptibility to infections  Higher risk of falls, fractures, and injuries



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[Review](#) > *Nutrients*. 2025 Feb 20;17(5):741. doi: 10.3390/nu17050741.

Preventing and Managing Pre- and Postoperative Micronutrient Deficiencies: A Vital Component of Long-Term Success in Bariatric Surgery

Claudia Reytor-González ¹, Evelyn Frías-Toral ², Cristina Nuñez-Vásquez ¹, Juan Marcos Parise-Vasco ¹, Raynier Zambrano-Villacres ⁴, Daniel Simancas-Racines ¹, Luigi Schiavo ³

> *Clin Obes*. 2025 Dec;15(8):e70035. doi: 10.1111/cob.70035. Epub 2025 Jul 28.

Nutritional Deficiencies Following Bariatric Surgery: A Rapid Systematic Review of Case Reports of Vitamin and Micronutrient Deficiencies Presenting More Than Two Years Post-Surgery

Sophie Haughton ¹, Sarah Gentry ², Helen M Parretti ²

> *Nutrients*. 2025 Apr 29;17(9):1512. doi: 10.3390/nu17091512.

The Role of Vitamin D Supplementation in Enhancing Muscle Strength Post-Surgery: A Systemic Review

James Jia-Dong Wang ¹, Glenys Shu-Wei Quak ¹, Hui-Bing Lee ², Li-Xin Foo ³, Phoebe Tay ², Shi-Min Mah ³, Cherie Tong ², Frederick Hong-Xiang Koh ¹

[Randomized Controlled Trial](#) > *Obes Surg*. 2024 May;34(5):1704-1716.

doi: 10.1007/s11695-024-07173-w. Epub 2024 Mar 27.

Impact of a Multicomponent Exercise Training Program on Muscle Strength After Bariatric Surgery: A Randomized Controlled Trial

Giorgios Boppo ¹, Florêncio Diniz-Sousa ³, Lucas Veras ³, Andrea Bezerra ³, Vitor Devezas ³, John Preto ³, Hugo Santos-Sousa ³, José Oliveira ³, Helder Fonseca ³



Effects of bariatric surgery on muscle strength and quality: A systematic review and meta-analysis

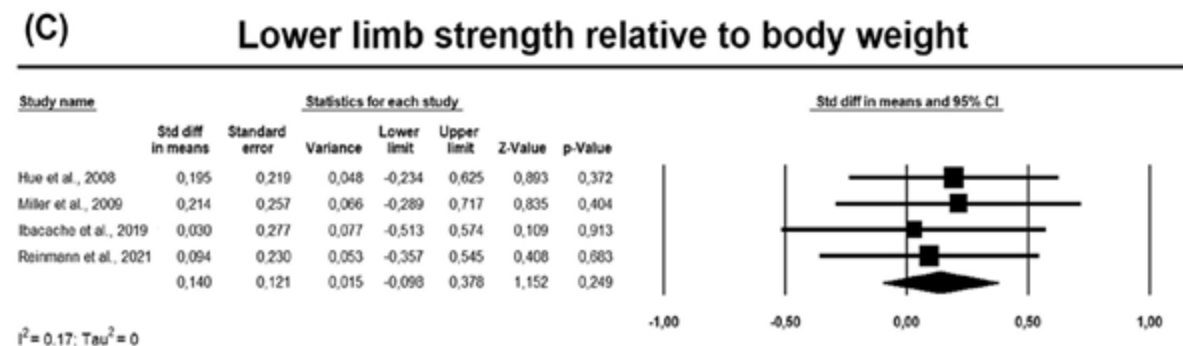
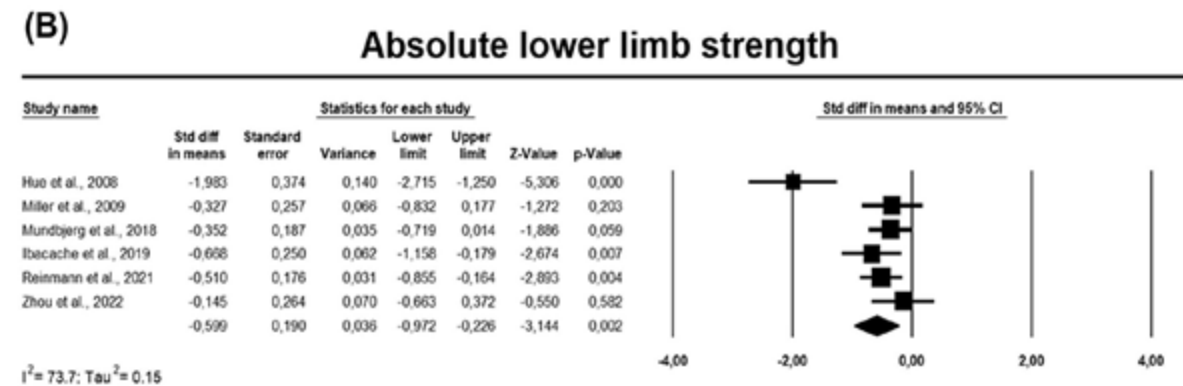
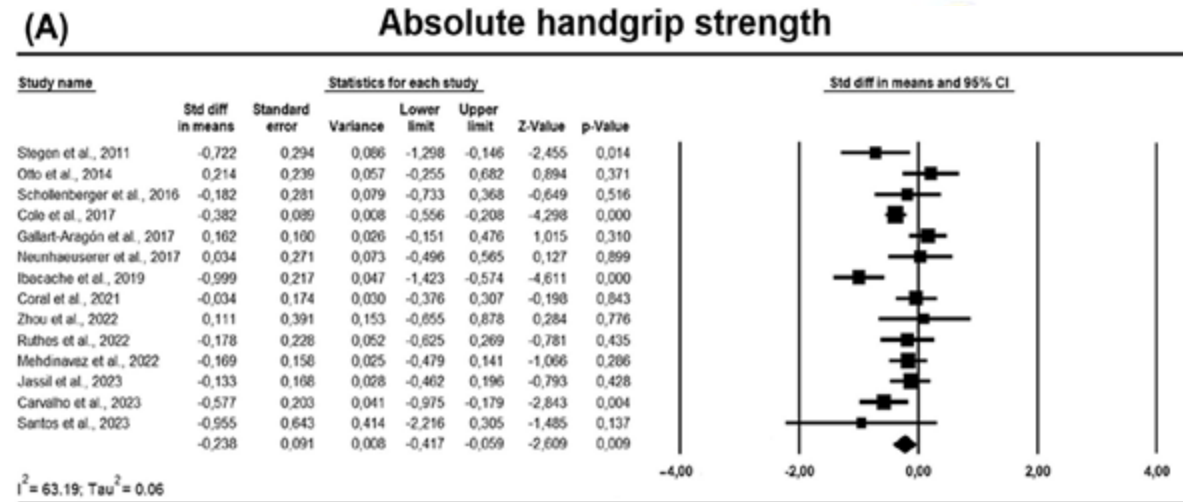
Paulina Ibacache-Saavedra, Elena Martínez-Rosales, Daniel Jerez-Mayorga, Claudia Miranda-Fuentes, Enrique G. Artero, Marcelo Cano-Cappellacci

First published: 10 June 2024 | <https://doi.org/10.1111/obr.13790> | [VIEW METRICS](#)

- The meta-analyses included 24 articles (666 participants)

Results:

- Significant decrease in lower-limb isometric strength at 3–12 months after BMS
- Significant decrease in handgrip strength at 6–12 months after BMS
- Subjects who experienced a more significant reduction in BMI after BMS also suffered a higher loss of absolute muscle strength



Micronutrient Deficiencies and Resistance Training



REDUCED TRAINING CAPACITY

- ↓ Resistance load
- ↓ Repetitions
- ↓ Training volume
- ↓ Training intensity
- ↓ Training consistency
- ↑ Perceived exertion
- ↑ Rest intervals



- ↓ Strength gains
- ↓ Muscle hypertrophy
- ↓ Lean-mass preservation
- ↓ Functional capacity

Meta-Analysis > *Obes Rev.* 2024 Sep;25(9):e13790. doi: 10.1111/obr.13790. Epub 2024 Jun 10.

Effects of bariatric surgery on muscle strength and quality: A systematic review and meta-analysis

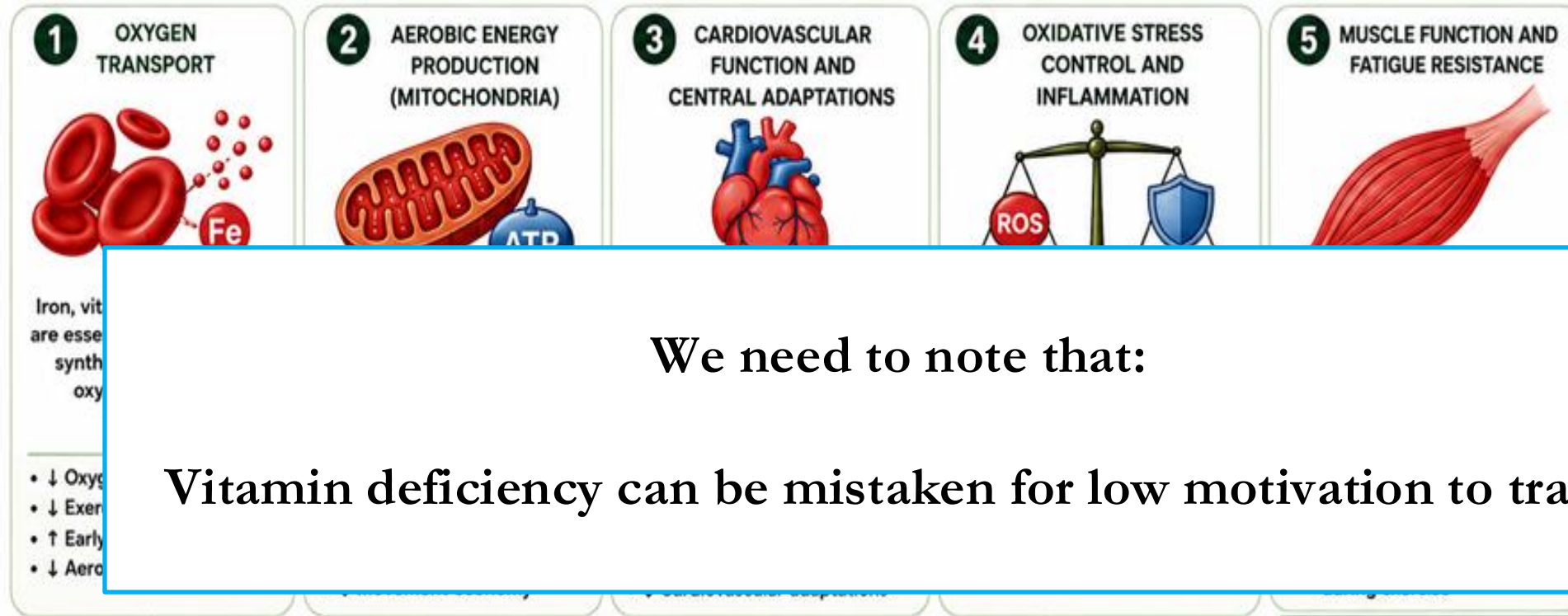
Paulina Ibacache-Saavedra¹, Elena Martínez-Rosales², Daniel Jerez-Mayorga^{1,3},
Claudia Miranda-Fuentes¹, Enrique G Artero², Marcelo Cano-Cappellacci⁴

> *J Acad Nutr Diet.* 2025 Jun;125(6):761-784.e6. doi: 10.1016/j.jand.2024.09.007. Epub 2024 Sep 19.

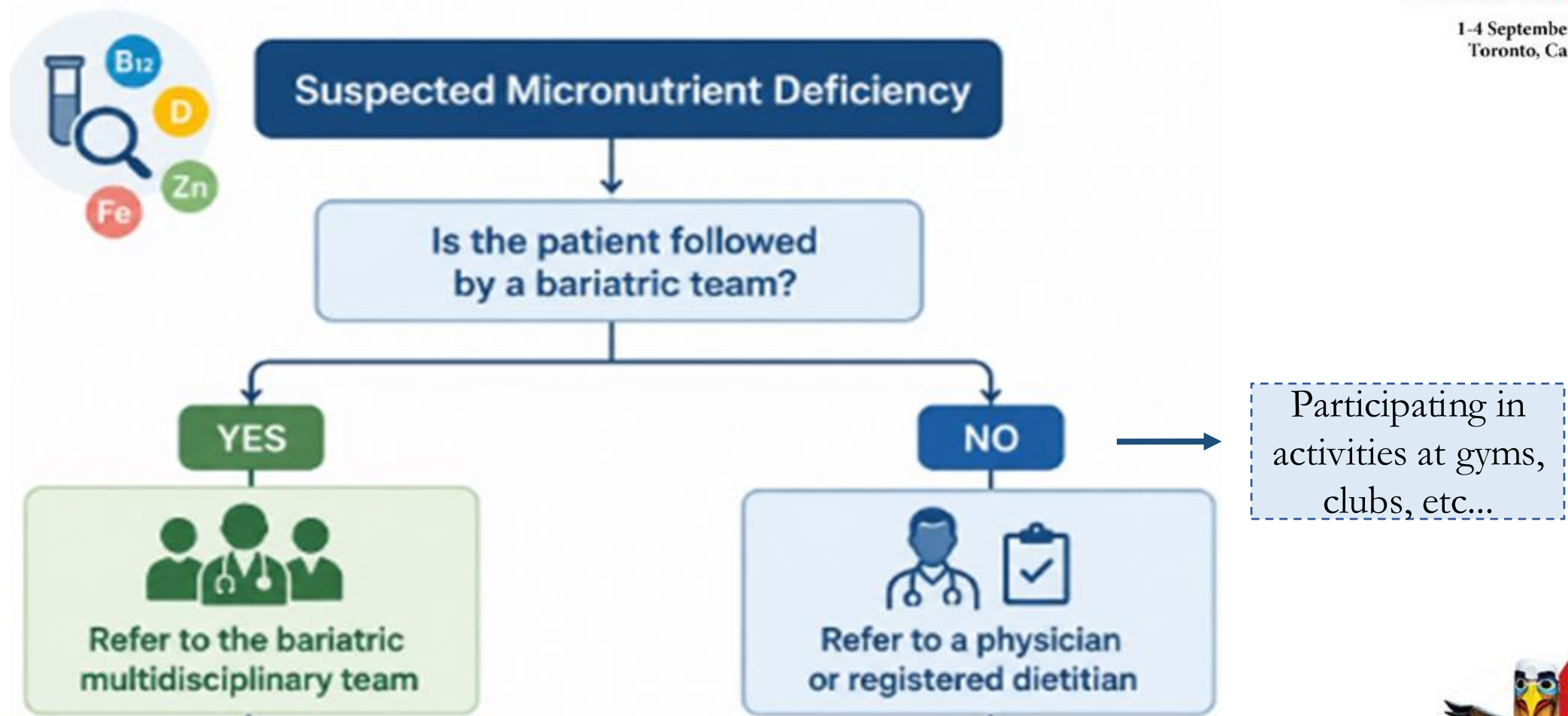
Preoperative Micronutrient Repletion Strategies in Metabolic and Bariatric Surgery: A Systematic Review

Xueying Tang¹, Dianne P Reidlinger², Megan Crichton³, Lillian Craggs-Dino⁴,
Flavia Fayet-Moore⁵, Skye Marshall⁶

Micronutrient Deficiencies And Aerobic Training



Role of the Exercise Professional



What should I do regarding exercise while waiting for the assessment?



- Decision should be individualized
- Reassessed after clinical evaluation



Why adapt physical training instead of suspending it?

- Sedentary behavior remains highly prevalent after MBS
- 11% of patients meet the general recommendations of 150 min/week of moderate to vigorous intensity PA one year after surgery.



JMIR RESEARCH PROTOCOLS

Bone et al

Protocol

App Technology to Support Physical Activity and Intake of Vitamins and Minerals After Bariatric Surgery (the PromMera Study): Protocol of a Randomized Controlled Clinical Trial

Stephanie Erika Bone¹, PhD; Marc Flab^{1,2}, MD; Kristina Spetz^{1,2}, MSc; Marie Lof^{1,2}, PhD; Ellen Andersson^{1,2}, MD, PhD; Mikael Wern¹, MD, PhD; Ylva Trolldenier Lagergren^{1,2}, MD, PhD

JMIR Res Protoc. 2020 Aug 14;9(8):e19624. doi: [10.2196/19624](https://doi.org/10.2196/19624)

Physical Exercise in Obesity and Metabolic Bariatric Surgery: The First Latin American Consensus

Herrera –Santelices, et al: Obesity Surgery , 2026

Expert-based physical activity guidelines for metabolic and bariatric surgery patients: a systematic review of randomized controlled trials

Melissa Fernández-Alonso, R.D.^a, Geronimo Bejarano, M.P.H.^b, David B. Creel, Ph.D.^c, Harold W. Kohl, Ph.D.^{d,e,f}, Sarah E. Messiah, Ph.D.^g, Maria S. Altieri, M.D., M.S.^h, Pavlos Papasavas, M.D.ⁱ, Carah Horn, M.B.A., R.N.^j, Elisa Marroquin, Ph.D.^k

Surg Obes Relat Dis. 2025 May ; 21(5): 606-614. doi:10.1016/j.soand.2024.11.005.

Low-intensity exercises

- Modest increases in PA significantly impact morbidity and mortality
- Reduce sedentary behavior, perceived exertion, and fatigue
- Improve functional capacity and overall levels of PA
- Foster long-term adherence

► *Arq Bras Endocrinol Metabol.* 2011 Jun;55(5):331-8. doi: 10.1590/s0004-27302011000500006.

[Impact of a minimum program of supervised exercises in the cardiometabolic risk in patients with morbid obesity]

[Article in Portuguese]
Emilian Regiane Marcon ¹, Iseu Gus, Cristina Rolim Neumann

Affiliations + expand
PMID: 21881816 DOI: 10.1590/s0004-27302011000500006

Mixed comparison of different exercise interventions on physical functioning in adult patients with morbid obesity following bariatric surgery: a systematic review and network meta-analysis

Chen Hu^{1,2}, Dong Sun^{2*}, Yufei Fang¹, Xuazhen Cen¹,
Yining Xu^{1,2}, Julien S. Baker³ and Yaodong Gu^{1,2*}
DOI 10.3389/fendo.2024.1465718

As recovery progresses - along with improvements in nutritional intake and supplement use - we can advance to higher-intensity training.



Depending on the deficiency found, I can adapt the exercises.

Micronutrient Deficiency	Main Exercise Concern	Exercise Prescription
Iron	Fatigue, reduced O ₂ transport, ↓ aerobic capacity	Low-to-moderate intensity aerobic exercise; shorter bouts; gradual progression; avoid high-intensity intervals if symptomatic.
Vitamin B1 (Thiamine)	Severe fatigue, weakness, neurological/cardiovascular complications	Avoid vigorous exercise in severe or symptomatic deficiency; prioritize correction of the deficiency and clinical evaluation.
Vitamin B12	Fatigue, weakness, neuropathy and balance impairment	Low-to-moderate intensity aerobic + resistance training; balance exercises if neurological symptoms are present.
Vitamin D	Muscle weakness and neuromuscular impairment	Resistance training + weight-bearing activities; start at low-to-moderate intensity and progress according to tolerance.
Magnesium	Weakness, cramps and neuromuscular impairment	Resistance training + low-to-moderate intensity aerobic exercise; monitor cramps, weakness and fatigue.
Calcium	Alteration of muscle contraction and bone health	Resistance training + weight-bearing activities; avoid excessive impact when bone health is compromised.
Folate	Anemia, fatigue and reduced exercise tolerance	Low-to-moderate intensity aerobic exercise; gradual progression after correction of anemia.
Multiple deficiencies	Fatigue, weakness and ↓ functional capacity	Prioritize safety and functional training, with gradual progression during the treatment of deficiencies.



What does it mean to adapt physical training?

- Implementing progressive adjustments to training load
- Regular monitoring of progress
- Adaptation to the individual's physical condition, functionality, and contextual resources.
- Supervised exercise sessions are extremely important.



Physical Exercise in Obesity and Metabolic Bariatric Surgery: The First Latin American Consensus

Herrera –Santelices, et al: Obesity Surgery , 2026

> Clin Obes. 2025 Jun;15(3):e12733. doi: 10.1111/cob.12733. Epub 2024 Dec 27.

Characteristics of interventions with exercise according to the adherence of adults with obesity: A systematic review

Anne Ribeiro Streb ¹, Willen Remon Tozetto ¹, Caroline Soares da Silva ¹, Cecilia Bertuol ¹, Giseli Minatto ¹, Giovanni Firpo Del Duca ¹

JMIR RESEARCH PROTOCOLS

Shen et al

Protocol

App Technology to Support Physical Activity and Intake of Vitamins and Minerals After Bariatric Surgery (the PromMera Study): Protocol of a Randomized Controlled Clinical Trial

Stephanie Enika Boser¹, PhD; Mari Huh^{2,3}, MD; Kristina Spertus^{4,5}, MSc; Marie Lof^{6,7}, PhD; Ellen Andersson^{8,9}, MD; PhD; Mikael Wiese¹⁰, MD, PhD; Ylva Tiedje-Lagergren¹¹, MD, PhD

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Surg Obes Relat Dis. 2025 May ; 21(5): 606–614. doi:10.1016/j.sorcd.2024.11.005.

When to stop physical exercise?

- Disproportionate dyspnea
- Dizziness
- Syncope
- Palpitations
- Chest pain
- Marked weakness
- Neurological changes



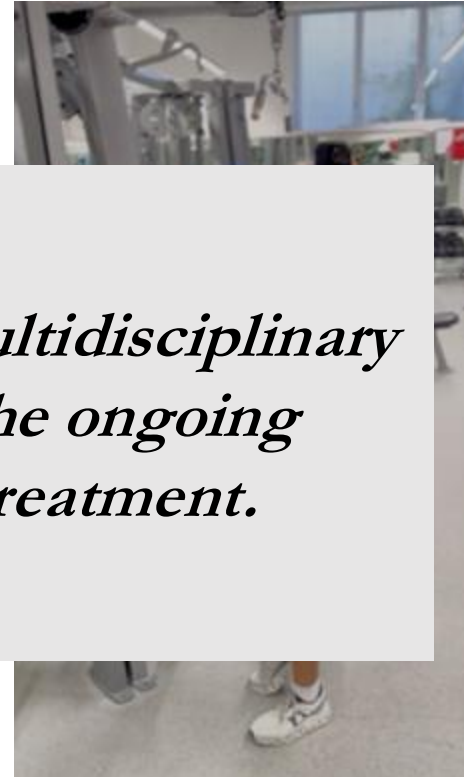


124 kg

Surgery
2023/December

- Shows symptoms of vitamin deficiency
- (fatigue)
- We refer
- I refer
- The patient
- The patient
- We refer

The integrated work of the multidisciplinary team is always crucial to the ongoing management of obesity treatment.



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2026 / August

TORONTO2026 The Future of Obesity Management:
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Thank You!



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