

**Comprehensive
Management of Childhood
and Adolescent Obesity:
From Lifestyle to
Pharmacotherapy and
Bariatric Surgery**

**Jill Hamilton, MD, FRCPC
Hospital for Sick Children
University of Toronto**

SickKids



Disclosure of Conflict of Interest(s) and Funding

- **Presenter:** [Jill Hamilton](#)
- **Conflict of Interest(s):**
 - Funding supports from Rhythm Pharmaceuticals, Novo Nordisk, Eli Lilly, Sunlife Financial, Mead Johnson
- **Funding:**
 - Rhythm: Industry sponsored grant, Advisory Board
 - Novo Nordisk: Industry sponsored grant, Advisory Board, Speaker
 - Eli Lilly : Industry sponsored grant
 - Sunlife Financial: Education Grant
 - Mead Johnson: unrestricted research funds for the SickKids U of T Mead Johnson Chair in Nutritional Sciences

Learning Objectives



01

**Discuss new clinical
Canadian guidelines
in managing obesity
in the adolescent
population**

02

**Review treatment
approaches of
obesity
management in the
adolescent
population**



Meet Keira

- 15yo girl of Jamaican-Canadian descent.
- Progressive increase in body weight since age 6yrs
- She has been attempting to increase healthy behaviours with your support but she has experienced ongoing weight gain, but at a lower rate
- She has been diagnosed with PCOS, MASLD hyperlipidemia and prediabetes
- Bullied due to appearance, misses school regularly, low mood and feels 'fat'
- She eats at regular times, but will sometimes binge on unhealthy foods when feeling stressed
- She asks you is there anything else that you can do to help her lose weight as she is feeling very frustrated. She is also worried she will get diabetes like her parents

Managing obesity in children: a clinical practice guideline

Geoff D.C. Ball PhD, Roah Merdad MD PhD, Catherine S. Birken MD MSc, Tamara R. Cohen PhD, Brenndon Goodman JD, Stasia Hadjiyannakis MD, Jill Hamilton MD, Mélanie Henderson MD PhD, John Lammey MSc JD, Katherine M. Morrison MD, Sarah A. Moore PhD, Aislin R. Mushquash PhD, Ian Patton PhD, Nicole Pearce, Joshua K. Ramjist MD, Tracy Rhyason Lebel BScEng, Brian W. Timmons PhD, Annick Buchholz PhD, Jennifer Cantwell BEd, Jennifer Cooper BA MEd, Julius Erdstein MD, Donna Fitzpatrick-Lewis MSW, Dawn Hatanaka MA, Patrice Lindsay PhD, Tasneem Sajwani MD, Meghan Sebastianski PhD, Diana Sherifali PhD, Julie St. Pierre MD PhD, Muhammad Usman Ali MD PhD, Jessica Wijesundera MSc MPH, Angela S. Alberga PhD, Christine Ausman MA, Trisha C. Baluyot MSc, Emily Burke MA, Kara Dadgostar MA, Bronwyn Delacruz MD, Elizabeth Dettmer PhD, Maegan Dymarski MA, Zahra Esmaeilinezhad MSc, Ilona Hale MD, Soren Harnois-Leblanc PhD, Josephine Ho MD, Nicole D. Gehring MSc, Marsha Kucera MD, Jacob C. Langer MD, Amy C. McPherson PhD, Leen Naji MD PhD, Krista Oei MD MSc, Grace O'Malley PhD, Angelica M. Rigsby MSc, Gita Wahi MD PhD, Ian S. Zenlea MD MPH, Bradley C. Johnston PhD

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Publish the Protocol



cmajOPEN

Research

Updating the Canadian clinical practice guideline for managing pediatric obesity: a protocol

Bradley C. Johnston PhD, Roah Merdad MBBS MSc, Diana Sherifali PhD RN, Maryam Kebbe PhD, Catherine S. Birken MD MSc, Annick Buchholz PhD, Long Ge PhD, Nicole D. Gehring MSc, Stasia Hadjiyannakis MD, Jill Hamilton MD, Dawn Hatanaka MA, Mélanie Henderson PhD MD, Tracy Lebel, Sarah A. Moore PhD, Katherine M. Morrison MD, Ximena Ramos Salas PhD, Meghan Sebastianski PhD, Ian S. Zenlea MD MPH, Geoff D.C. Ball PhD RD

5 Evidence Reviews



Clinical Assessment

Stasia Hadji
Annick B
Sarah M



Lifestyle & Behavioural



Surgery

Hamilton
Stasia Oei

All 3 Systematic Reviews examined the effect of an intervention on the following outcomes:

- **PROMS:** HRQoL, Anxiety, Depression
- **Cardiometabolic Outcomes:** BP, Insulin Resistance (Fasting Insulin & HOMA-IR), Lipid Profile (Total Cholesterol, HDL-C, LDL-C & Triglycerides), ALT
- **Anthropometric Outcomes:** BMI Z-score, BMI, Weight
- **Adverse Events (AE)**

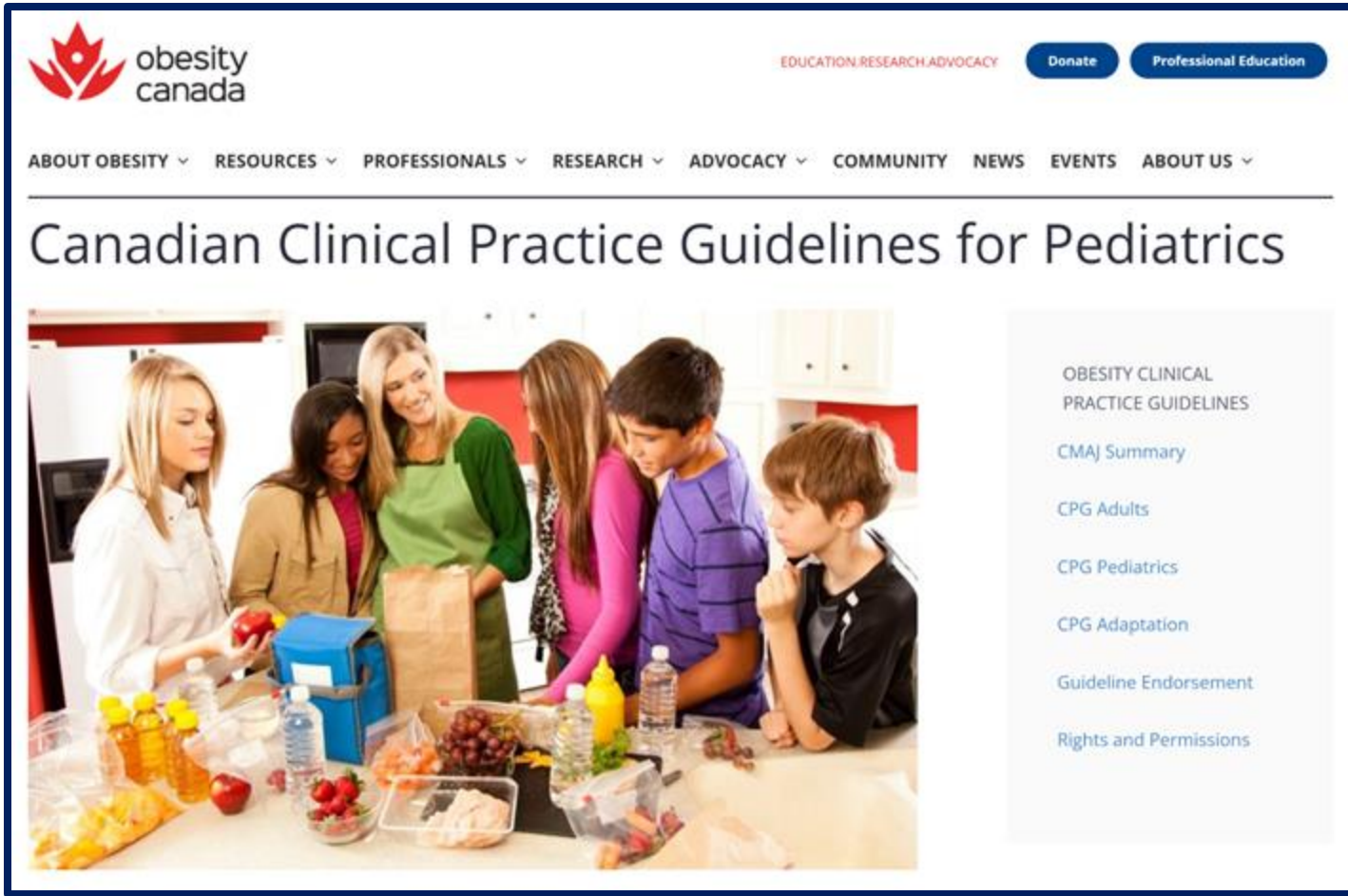
Values & Preferences

Ian Zenlea
Bradley Johnston

Pharmacotherapy

Katherine Morrison
Julie St-Pierre
Gita Wahi

Obesity Canada Clinical Practice Guidelines (CPG)



- Revised CPG for children and adolescents living with obesity
- **10 Recommendations:**
 - 5 Behavioural & Psychological
 - 3 Pharmacological
 - 2 Surgical
- **9 Good Practice Statements**
 - Guiding Principles for HCP

CPG – Behavioural & Psychological Recommendations



1

Use **multicomponent** interventions for managing obesity in children



Include **2 or more** of the following interventions in patient care:



**Foundation
of Care!**

Effectiveness of Pediatric Lifestyle Interventions

Screening for Obesity and Intervention for Weight Management in Children and Adolescents

Evidence Report and Systematic Review for the US Preventive Services Task Force

Elizabeth A. O'Connor, PhD¹; Corinne V. Evans, MPP¹; Britt

[> Author Affiliations](#) | [Article Information](#)

JAMA. 2017;317(23):2427-2444. doi:10.1001/jama.2017.03

Effectiveness

Mandy Ho

Pediatrics

Studies showing interventions providing > 26 hours of treatment over one year are associated with BMI z-score reduction of -0.1 to -0.5 (mean -0.2) or a range of 1.6 to -8.1 kg

AAP guidelines PEDIATRICS Volume 151, number 2, February 2023

DOI: 10.1542/peds.2012-1170

esity in children

nessa A Shrewsbury², Claire O'Malley⁴, Ronald P Stolk³, Carolyn D

egg, University Medical Center Groningen, Groningen, Netherlands, Sydney, Westmead, Australia, ³Department of Epidemiology, University of Medicine and Health, Wolfson Research Institute, Durham University, Wolfson Research Institute, Durham University, Stockton-on-Tees, UK

hospital and Department of Epidemiology, University Medical Center Netherlands. h.oudehuybrechts@bkk.umcg.nl

ublished in Issue 1, 2009.

ystematic Review

ra Stewart, Melinda

ember 19, 2012;

CPG – Pharmacological Recommendations

1 Glucagon-like peptide-1 receptor agonists

Glucagon-like peptide-1 receptor agonists can be considered, in combination with behavioural and psychological interventions, for managing obesity in children aged ≥ 12 years old

- Included studies of exenatide (4), liraglutide (2), semaglutide (1)
- Treatment response varied considerably between different GLP-1RAs
- **Semaglutide** demonstrates the most promising outcomes compared to other GLP-1RAs
 - **Small to very large positive effects** on PROM, Cardiometabolic and Anthropometric outcomes
- Mild-to-moderate GI AE's

GLP-1 RA – Semaglutide

Δ in Wt (kg) **-17.7**
 $\%$ Δ in Wt **-17.4%**

Δ in BMI **-1.0**
 Δ BMI (kg/m²) **-6.0**
 $\%$ Δ in BMI **-16.7%**

The NEW ENGLAND JOURNAL of MEDICINE

N ENGL J MED 387;24 NEJM.ORG DECEMBER 15, 2022

ORIGINAL ARTICLE

Once-Weekly Semaglutide in Adolescents with Obesity

Adolescents

BMI $\geq$ 95th percentile

or

BMI $\geq$ 85th percentile and $\geq$ 1 weight-related coexisting condition

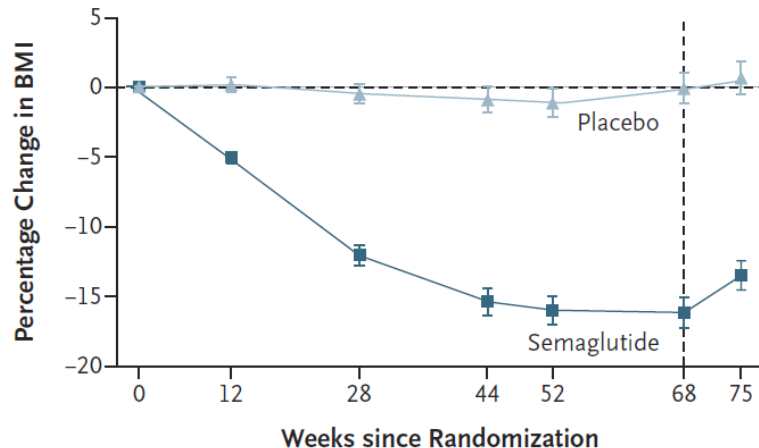
Semaglutide

(N=134)

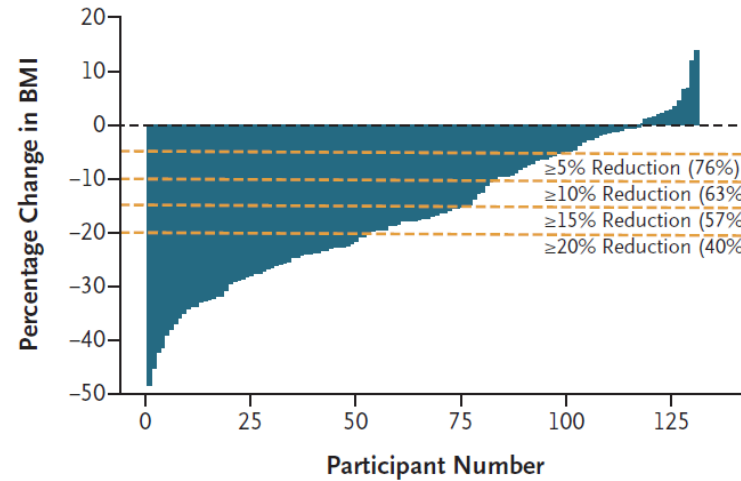
Placebo

(N=67)

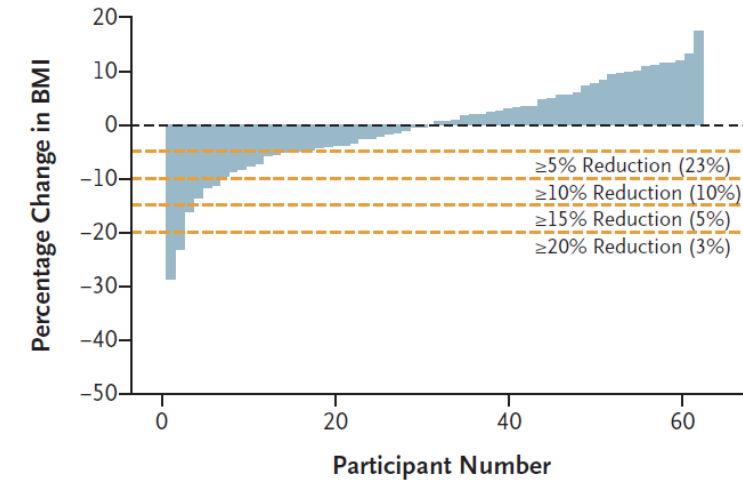
A Change in BMI from Baseline



C Change in BMI at Week 68 in the Semaglutide Group



D Change in BMI at Week 68 in the Placebo Group



Cardiometabolic outcomes:

- Improvements in all lipids (except HDL), HbA1c, ALT, Systolic BP

Adverse Effects:

- GI side effects in 62% (S) vs. 42% (P)
- Cholelithiasis: 5 patients (4%) (S)
- Discontinuation 5% (S) vs. 4% (P)

CPG – Pharmacological Recommendations



2

Biguanides (metformin)

Biguanides can be considered, in combination with behavioural and psychological interventions, for managing obesity in children ≥ 12 years old

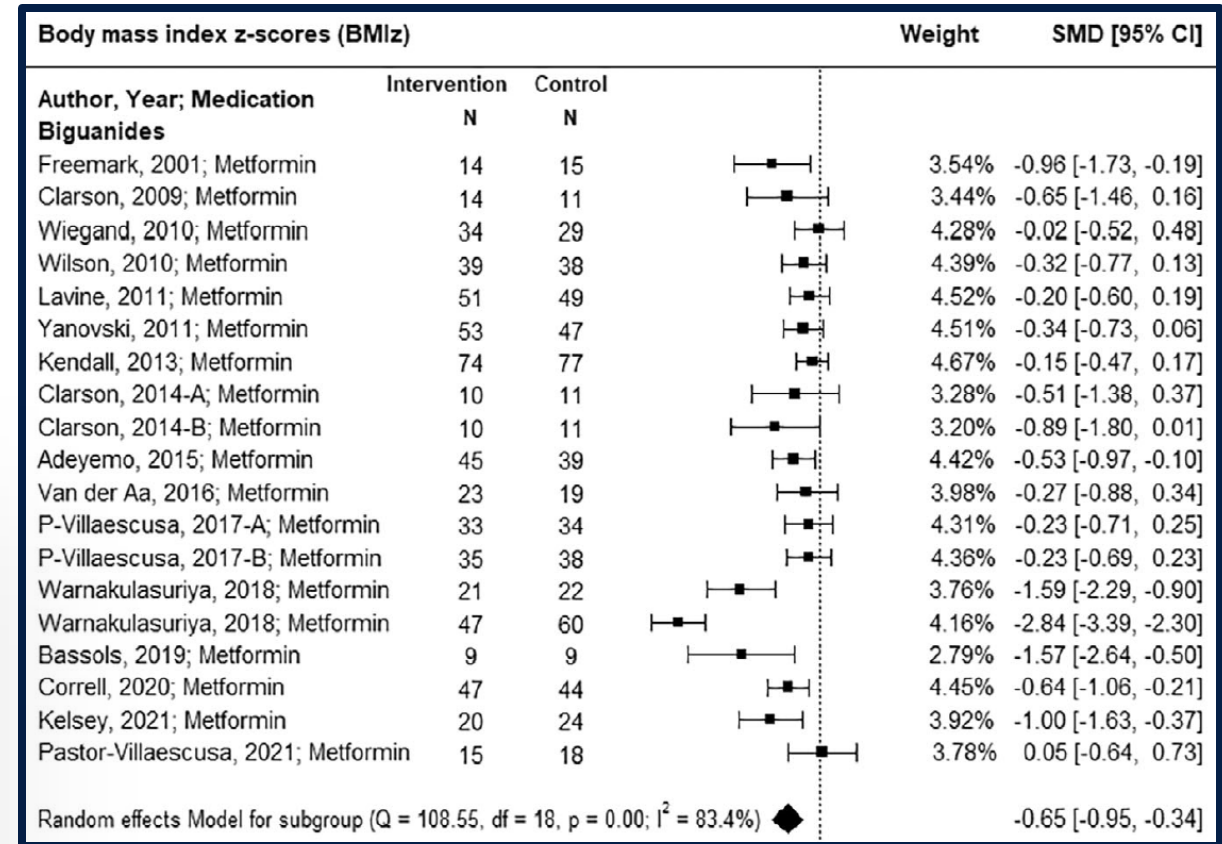
- All studies examined **Metformin**
- **Moderate positive effects** on PROM, Cardiometabolic and Anthropometric outcomes
- Mild-to-moderate GI AE's

Biguanides – Metformin

- Technically, NOT approved for obesity treatment
- Mechanism:** Reduces hepatic glucose production, increases insulin sensitivity and potentially reduces appetite

Outcomes

- PROMS:** no impact on HRQoL
- Metabolic:** Improves insulin sensitivity, reduces TG, reduces ALT
- Anthropometric:**
 - $\Delta \text{BMIz MD} = -0.26 \text{ kg/m}^2$
 - $\Delta \text{BMI MD} = -1.49 \text{ kg/m}^2$
- A/E: GI upset**



BMI Z-score SMD: -0.65 (95% CI -0.95 to -0.34)

CPG – Pharmacological Recommendations



3

Lipase Inhibitors (orlistat)

*Lipase Inhibitors are **NOT** suggested for managing obesity in children*

- All studies examined **Orlistat**
- Insufficient evidence on all critical outcomes (HRQoL, anxiety, depression, BMIz)
- Little to no effect on cardiometabolic outcomes
- **Undesirable effects** (mostly GI AEs) **outweighed the desirable effects**

Pediatric Considerations

Combined with lifestyle management

Age – lower limit?

Co-morbid conditions

Degree of obesity

Special populations

Duration of therapy

Response to therapy

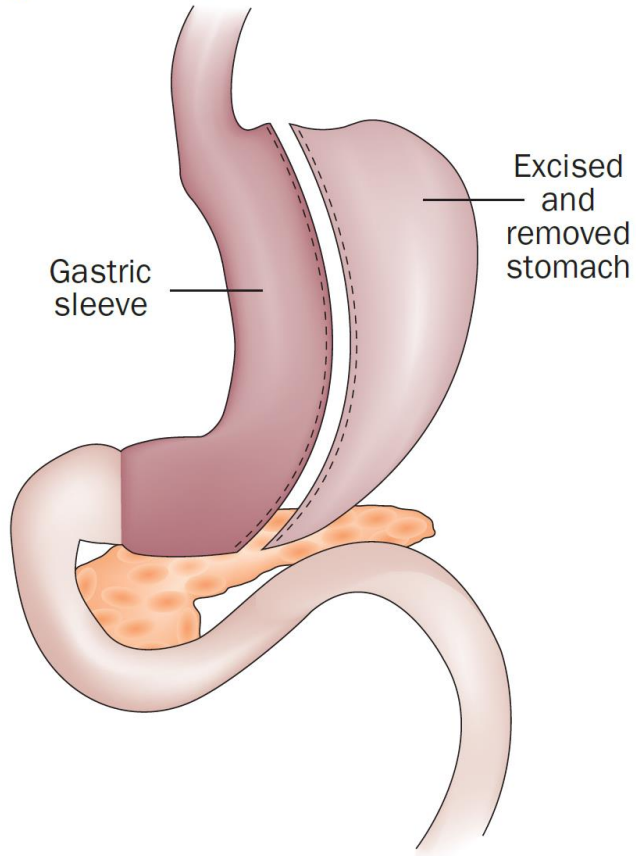
Risk for Development of Eating Disorder

Cost and Coverage

Bariatric Surgery – Primary Techniques

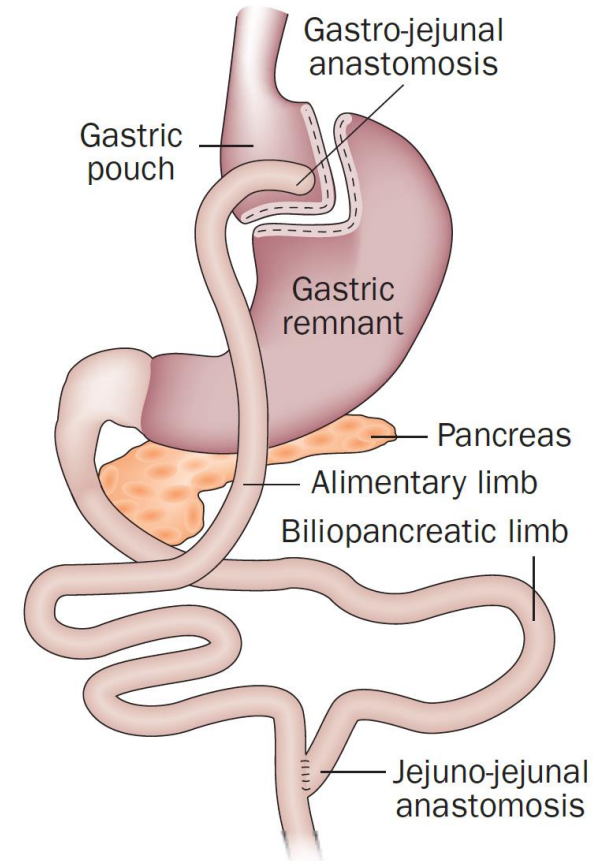
LSG

Laparoscopic Sleeve Gastrectomy



RYGB

Roux-en-Y Gastric Bypass



CPG – Surgical Recommendations



1

Laparoscopic sleeve gastrectomy (LSG)

Laparoscopic sleeve gastrectomy can be considered, in combination with behavioural and psychological interventions, for managing obesity in children ≥ 13 years old who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team

- Recommended **primary** surgical intervention
 - **Large beneficial effect** on HRQoL, weight, BMI, SBP, HDL-C, Triglycerides, fasting insulin, HOMA-IR and ALT
 - Small-to-moderate beneficial effect on total cholesterol and LDL-C
 - Little-to-no incidence of severe AEs; Mild-to-moderate incidence of moderate AEs

CPG – Surgical Recommendations



2

Roux-en-Y gastric bypass (RYGB)

Roux-en-Y gastric bypass surgery can be considered, in combination with behavioural and psychological interventions, for managing obesity in children ≥ 13 years old who are deemed eligible candidates based on a comprehensive health assessment by a specialized, multidisciplinary team

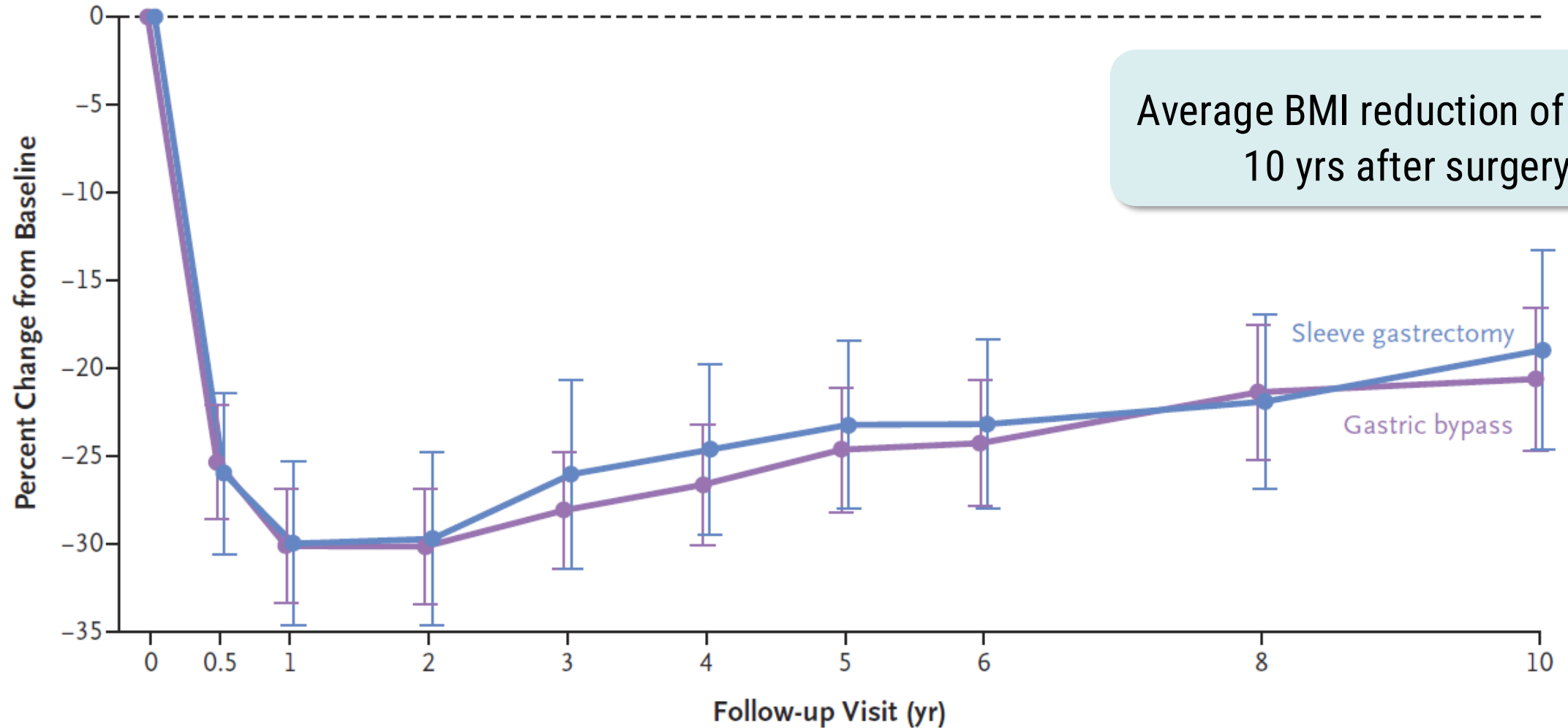
- Recommended **alternative** surgical intervention
 - **Very large-to-large beneficial effect** on HRQoL, weight, BMI, BMIz, HDL-C, LDL-C, triglycerides, fasting insulin, HOMA-IR and ALT
 - Small-to-moderate beneficial effect on anxiety, depression, SBP and DBP
 - **Larger incidence of serious and moderate AEs**

CPG – Surgical Recommendations

- Surgery (LSG & RYGB recommended) can be considered for **severe obesity** (BMI > 40 kg/m² or BMI > 35 kg/m² with comorbidities) when behavioural, psychological, and pharmacological interventions are *ineffective*
- Healthcare providers should present data to families who are considering bariatric surgery when behavioural and psychological interventions alone are *ineffective* at improving obesity-related health outcomes
- **Important to highlight potential risks and complications** with families; these may include infections, leaks, bleeding, nutritional deficiencies (Fe, B12 and Ca) and psychological and adherence challenges
- Surgical interventions showcase **improved anthropometric and cardiometabolic outcomes up to 10-years post-surgery**

BMI Outcomes at 10 yrs (Teen-LABS)

A Changes in BMI from Baseline

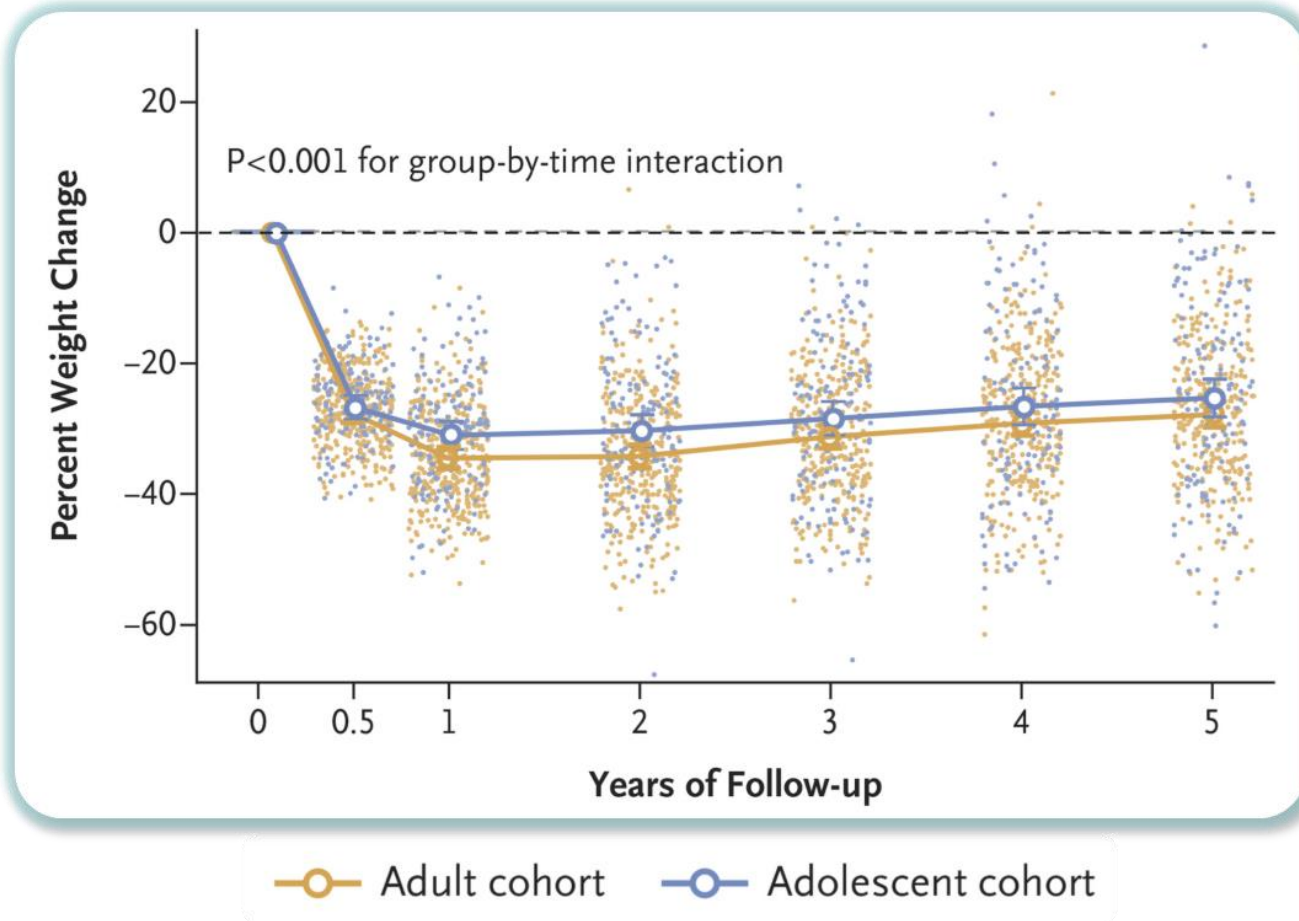


Remission of Coexisting Conditions Post-Surgery

Condition	Prevalence of Remission 3 years Post-Surgery
Type 2 Diabetes	95%
Pre-Diabetes	76%
Dyslipidemia	66%
Hypertension	74%
Abnormal kidney function	86%

Adolescents vs. Adults

5 years after surgery:



% Weight Change:

- **Adolescents:** -26% [95% CI -29,-23]
- **Adults** -29% [95% CI -31,-27] ($p = 0.08$)

Remission T2D:

- **Adolescents:** 86%
- **Adults:** 53%

Surgical Complications:

- Slightly higher in teens (approx. 13%)
- Higher rates of B12, ferritin, vitamin D deficiencies in teens

Considerations in Adolescents



Does the rapid weight loss of surgery increase the development of eating disorders in this age group?



Psychological and Emotional Maturity level



Cognitive ability to consent



Physical Maturity (Tanner IV)



Efficacy in those with Hypothalamic Obesity and individuals with developmental delay



Summary

- Weight Management is family-based, in partnership with HCP, focusing on healthy behaviour change
- Unique considerations to consider in pediatrics: developmental stage, risk for eating disorders
- Outcomes should focus on improvements in HRQOL, cardiometabolic outcomes with less emphasis on weight loss
- Newer medications and surgery demonstrate incredible improvements in cardiometabolic outcomes and should be considered for those with evidence of prediabetes etc
- Long term studies need to be ongoing



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Living Clinic**

