Obesity Management Medications & Metabolic Surgery Perspectives on Cost-Effectiveness

Ricardo Cohen MD

Director, The Center for Obesity and Diabetes, Hospital Oswaldo Cruz Sao Paulo Brazil

- **President-elect, IFSO Global**
- **Past-President, IFSO LAC**
- **Past-President, Brazilian Society for Bariatric and Metabolic Surgery (2011-2012)**

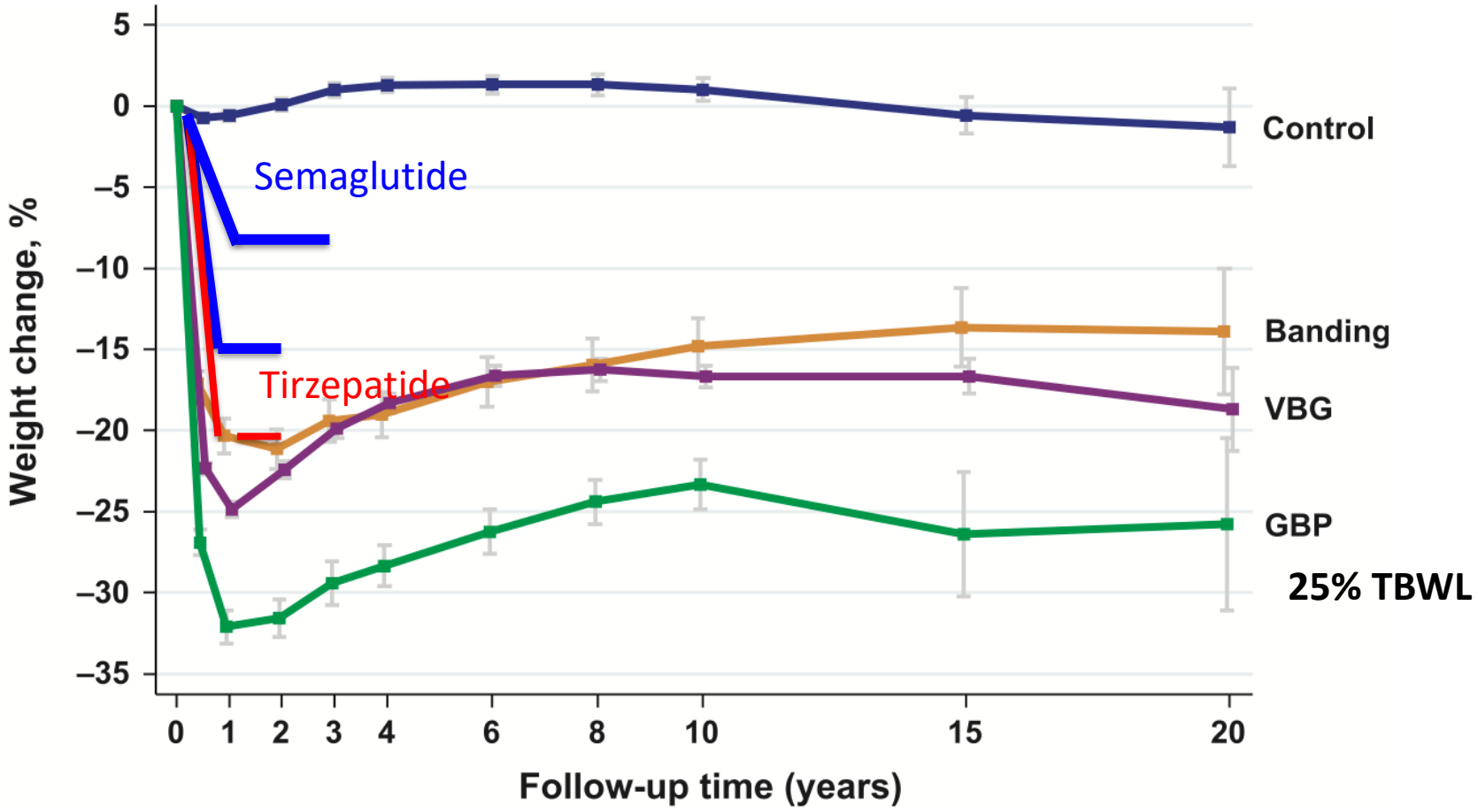
Hospital Alemão OSWALDO CRUZ

Conflicts of Interest

- Research Grant, J&J Medthech, Brasil
- Research Grant, Medtronic
- Research Grant, GI Dynamics
- Research Grant, Hospital Oswaldo Cruz Bioscience Institute
- SAB: GI Dynamics, JJ Medical, Medtronic
- Speaker: J&J Medical, Medtronic, NovoNordisk

Outcomes of MBS and Modern Pharmacotherapy

Weight Loss After Bariatric Surgery Is Sustained for at Least 20 years-Superior to all other Treatments



JAMA. 2012;307(1):56-65

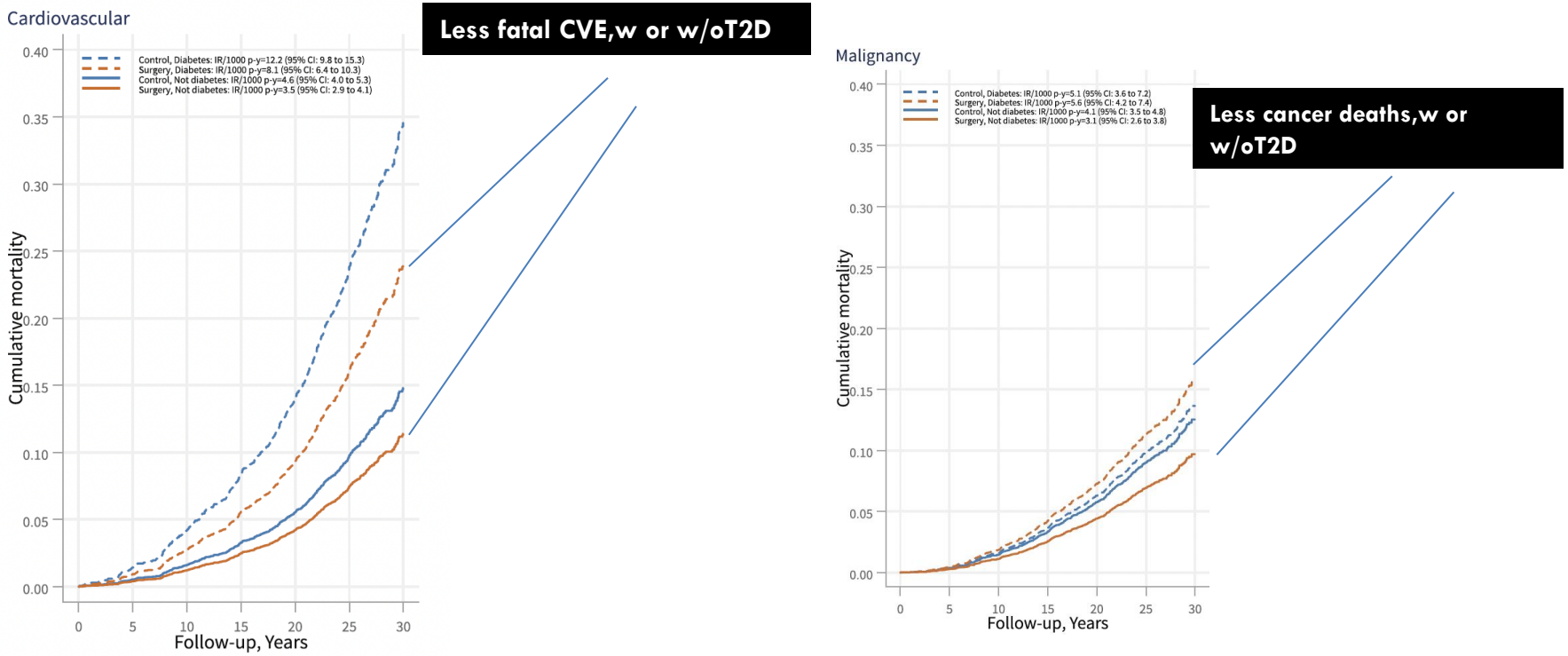
International Journal of Obesity www.nature.com/ijo

Life expectancy after bariatric surgery or usual care in patients with or without baseline type 2 diabetes in Swedish Obese Subjects

July12,2023

Lena M. S. Carlsson[1], Björn Carlsson[1,2], Peter Jacobson[1], Cecilia Karlsson[1,3], Johanna C. Andersson-Assarsson[1], Felipe M. Kristensson[1,4], Sofie Ahlin[1,5], Per-Arne Svensson[1,6], Magdalena Taube[1], Ingmar Näslund[7], Kristjan Karason[1], Markku Peltonen[8] and Kajsa Sjöholm[1]✉

26 years FU, SOS study



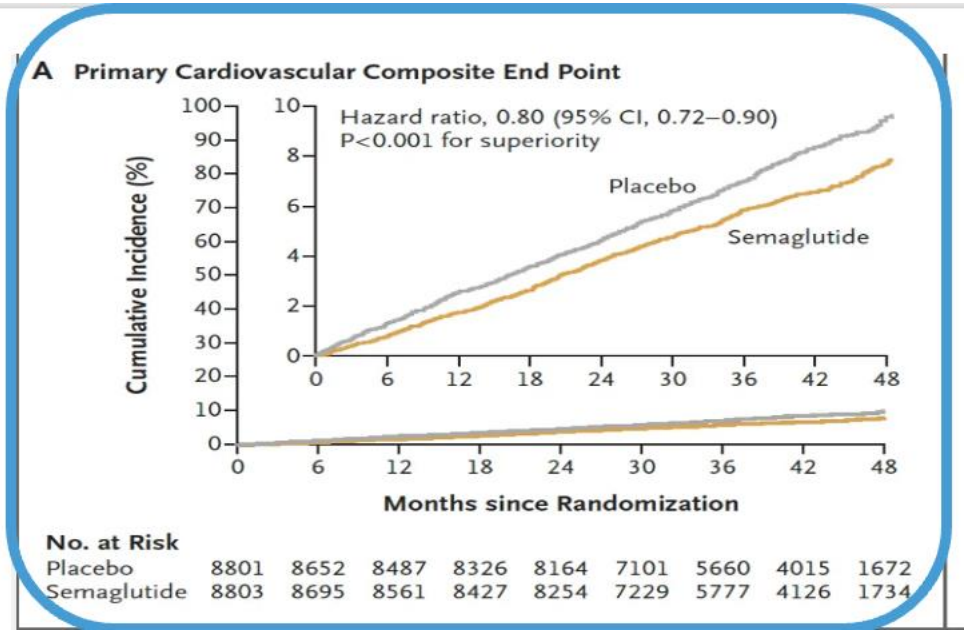
ORIGINAL ARTICLE

Semaglutide and Cardiovascular Outcomes in Obesity without Diabetes

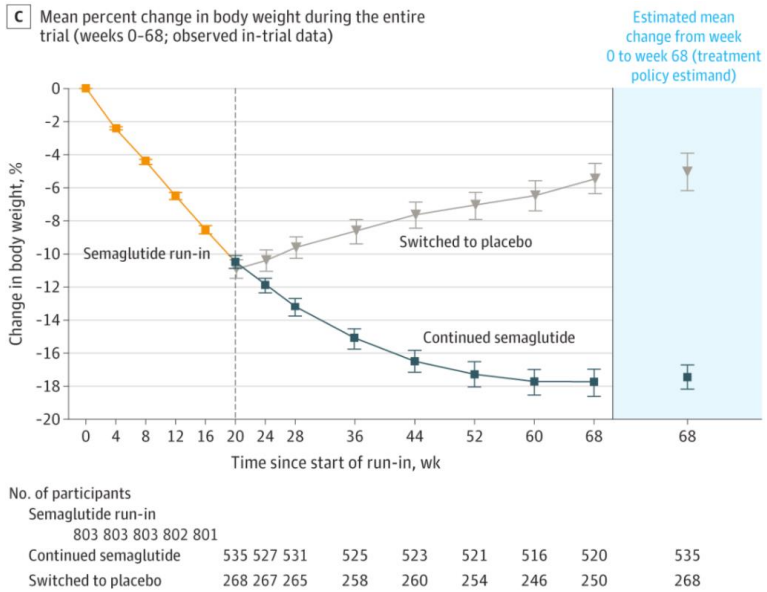
A. Michael Lincoff, M.D., Kirstine Brown-Frandsen, M.D., Helen M. Colhoun, M.D., John Deanfield, M.D., Scott S. Emerson, M.D., Ph.D., Sille Esbjerg, M.Sc., Søren Hardt-Lindberg, M.D., Ph.D., G. Kees Hovingh, M.D., Ph.D., Steven E. Kahn, M.B., Ch.B., Robert F. Kushner, M.D., Ildiko Lingvay, M.D., M.P.H., Tugce K. Oral, M.D., Marie M. Michelsen, M.D., Ph.D., Jorge Plutzky, M.D., Christoffer W. Tornøe, Ph.D., and Donna H. Ryan, M.D., for the SELECT Trial Investigators*

Select Trial

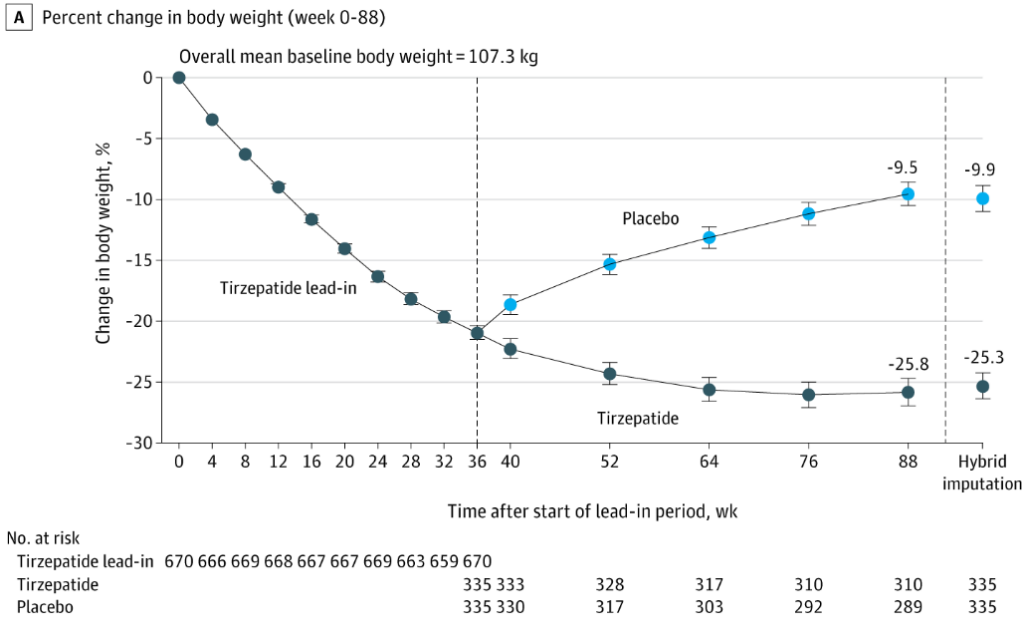
NEJM, Nov 2023



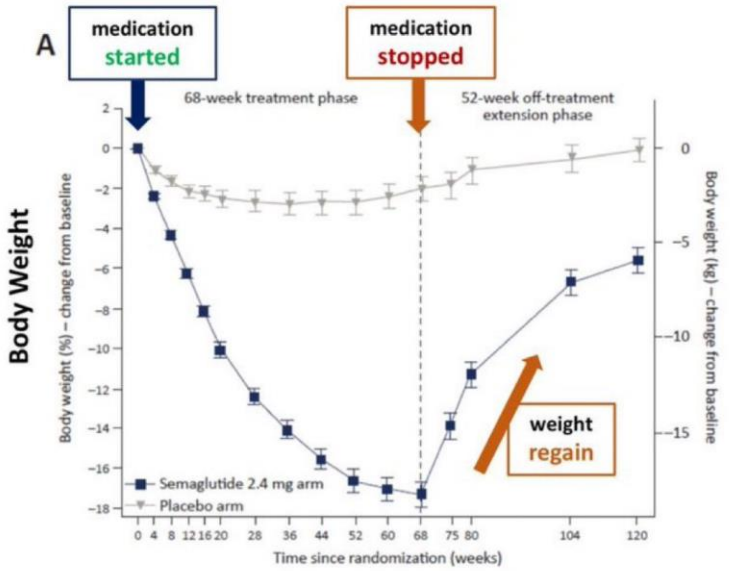
20% CV events risk



Aaron, JAMA,2023



Aronne, NEJM,2023



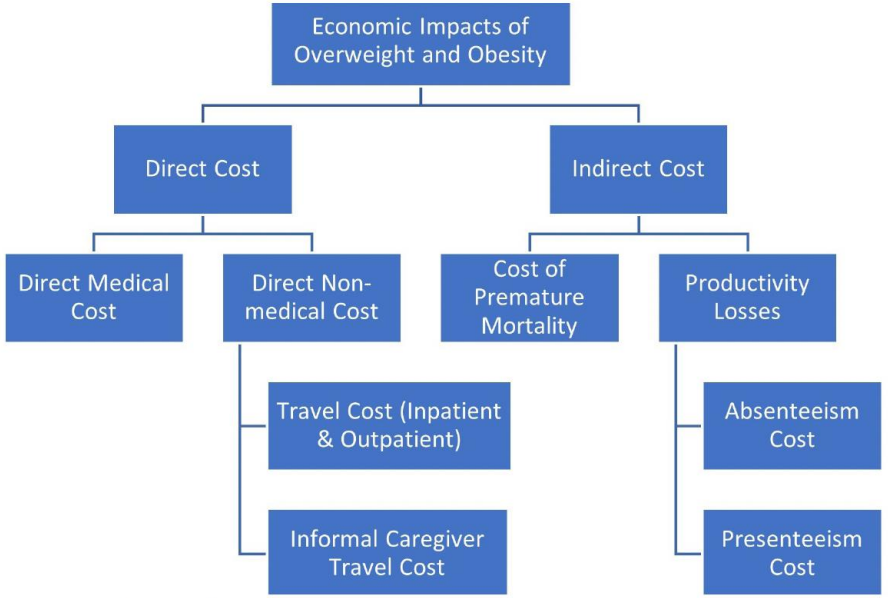
Wilding, 2022

BMJ Global Health

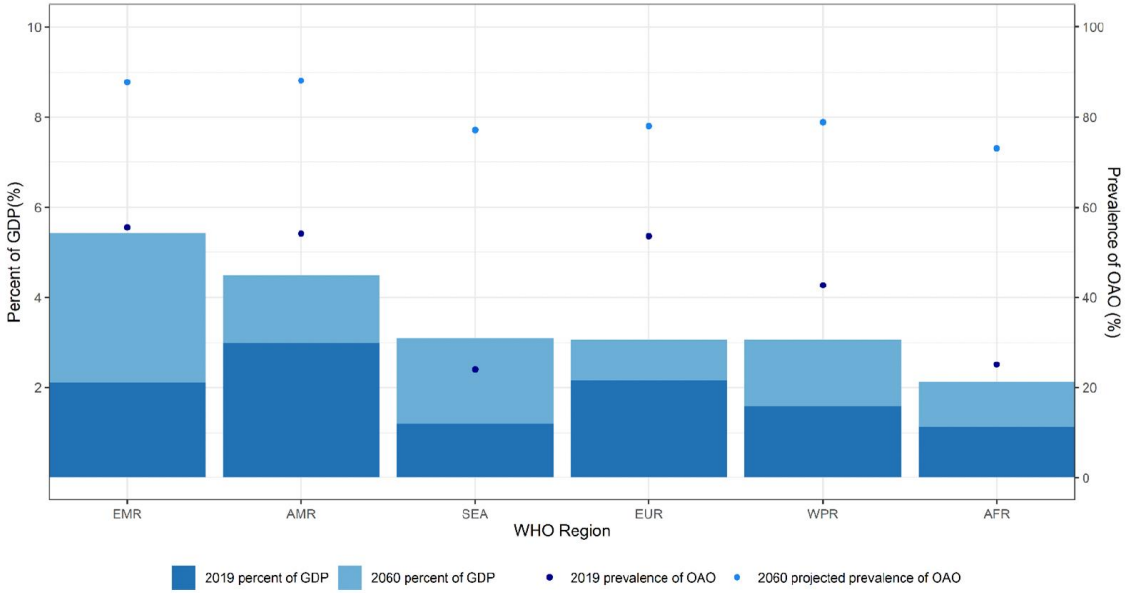
Economic impacts of overweight and obesity: current and future estimates for 161 countries

2022

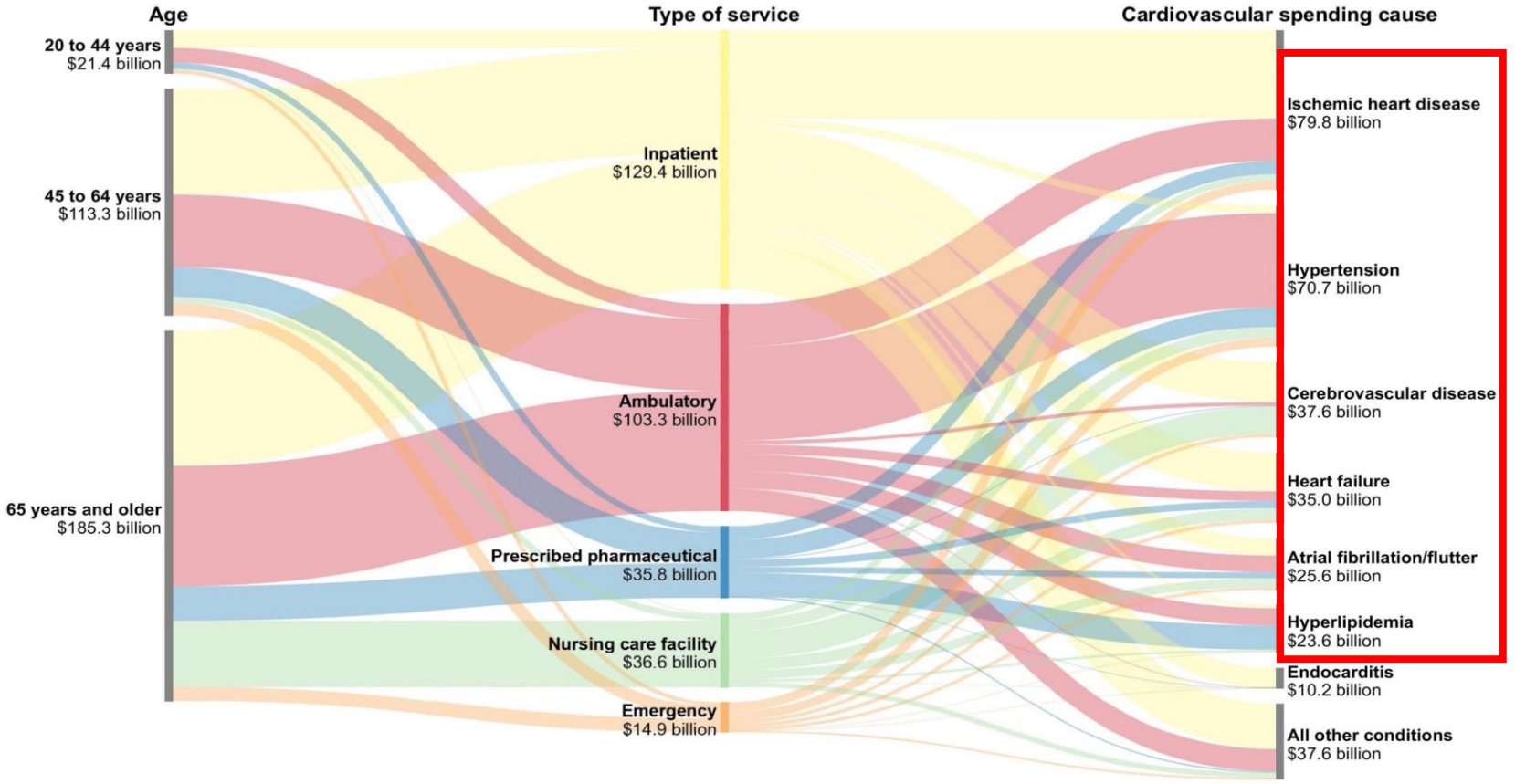
Adeyemi Okunogbe ,[1] Rachel Nugent,[2] Garrison Spencer,[2] Jaynaide Powis,[3] Johanna Ralston,[3] John Wilding[3]



Cost components framework.

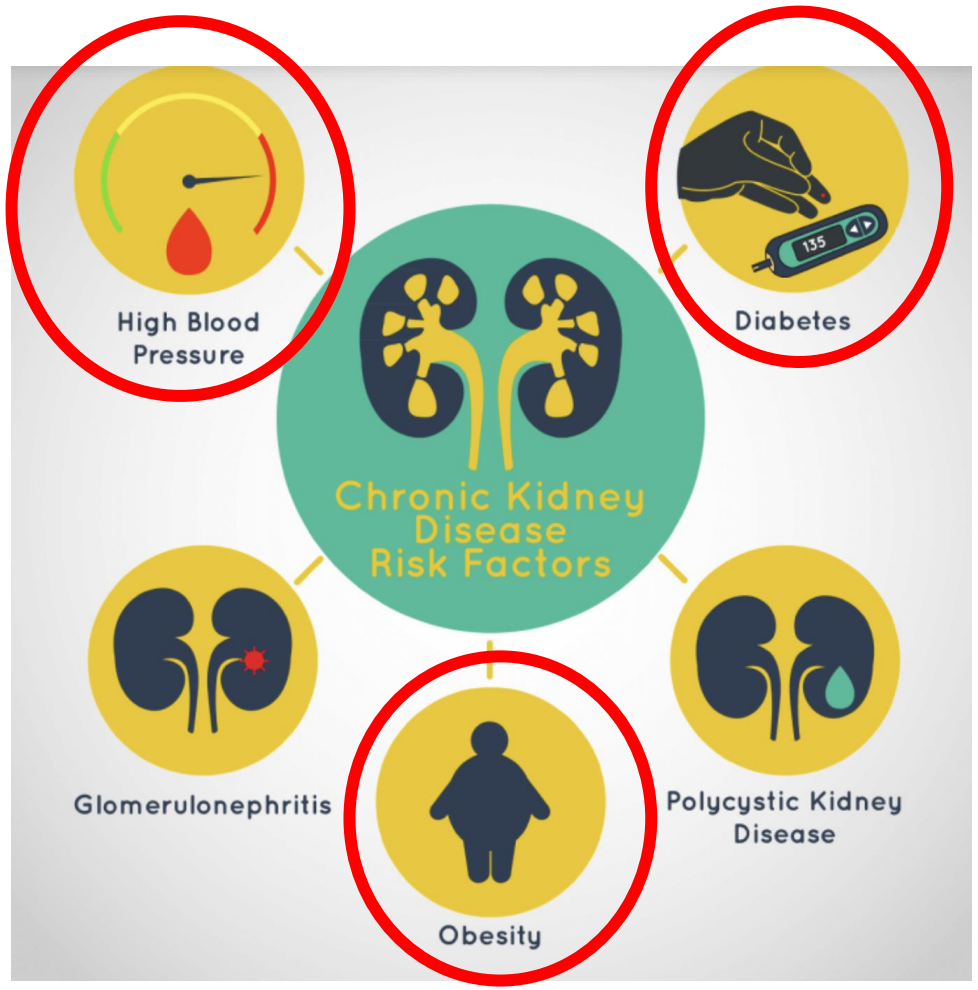


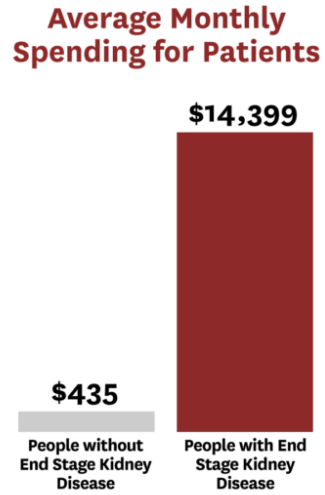
Costs of the CV complications of obesity

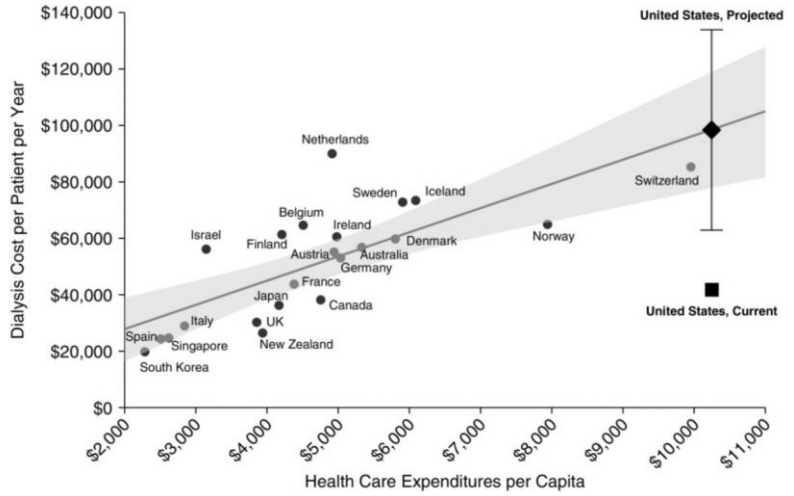


Maxwell Birger. Circulation. Spending on Cardiovascular Disease and Cardiovascular Risk Factors in the United States: 1996 to 2016, Volume: 144, Issue: 4, Pages: 271-282, DOI: (10.1161/CIRCULATIONAHA.120.053216)

Costs of kidney complications







Pockros et al. J Am Soc Nephrol. 2021

Glossary

- **Cost-effectiveness analysis-** In a CEA, new therapies are compared with existing ones, or with placebo/no treatment, on both effectiveness and efficacy.

- **QALY** is an expression of how much life of years in good quality of life is gained by using a new treatment.

- **ICER** [Incremental cost-effectiveness ratio]. The additional cost of the more expensive intervention as compared with the less expensive intervention divided by the difference in effect or patient outcome between the interventions, e.g., additional cost per QALY

- **Willingness-to-pay (WTP**) threshold reflects the amount that a payor is willing to pay for health benefits offered by a treatment – a treatment that has an incremental cost-effectiveness ratio below this WTP threshold is considered cost-effective

- **The incremental net monetary benefit (INB**), which is the difference in net monetary benefit between the new intervention and the standard intervention

Accepted QALY thresholds

- *Low (>$150 000)*
- *Intermediate ($50 to $150 000)*
- ***High (<$50 000) value per QALY compared with the alternative***

Ann Intern Med. 2022 October ; 175(10): 1392–1400. doi:10.7326/M21-2941.

First-Line Therapy for Type 2 Diabetes With Sodium–Glucose Cotransporter-2 Inhibitors and Glucagon-Like Peptide-1 Receptor Agonists:

A Cost-Effectiveness Study

Markov simulation model, drug-naïve pts based on the NHANES data 2013-2016 – 7.3 million people

ICER= $327 000 per QALY

ICER= $823 000 per QALY.

Above the WTP threshold

To be cost-effective, GLP1 RA should cost under $6 per day

Annals of Internal Medicine

REVIEW

Cost-Effectiveness of Newer Pharmacologic Treatments in Adults With Type 2 Diabetes: A Systematic Review of Cost-Effectiveness Studies for the American College of Physicians

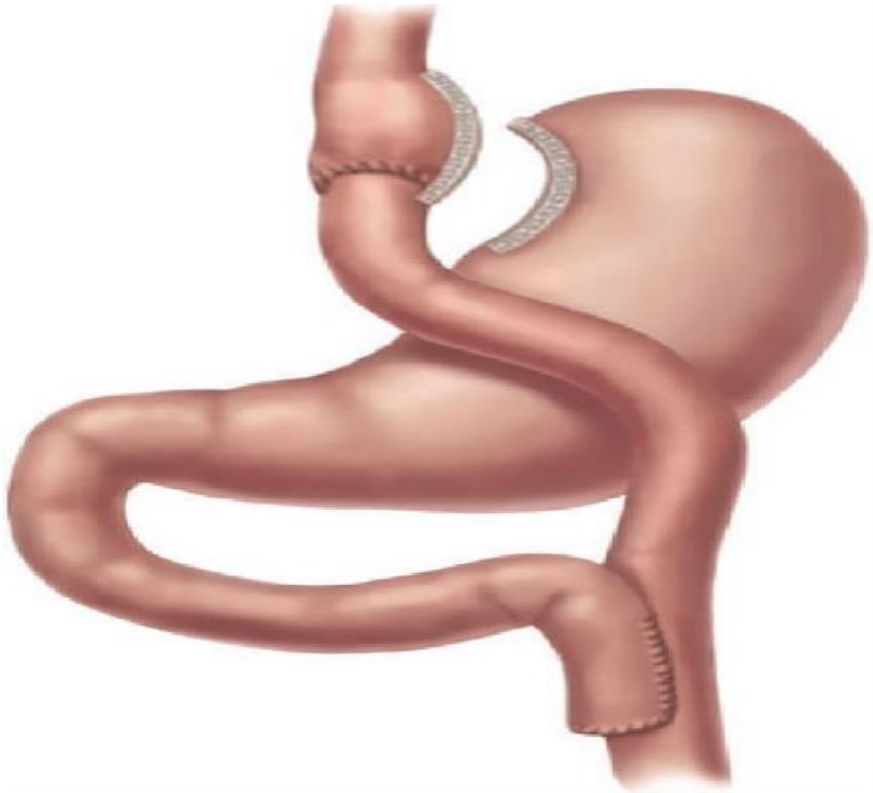
John T. Schousboe, MD, PhD; Adrienne Landsteiner, PhD, MPH; Tyler Drake, MD; Shahnaz Sultan, MD, MHSc; Lisa Langsetmo, PhD; Anjum Kaka, MD; Maylen Anthony, MPH; Charles J. Billington, MD; Caleb Kalinowski, MS; Kristen Ullman, MPH; and Timothy J. Wilt, MD, MPH

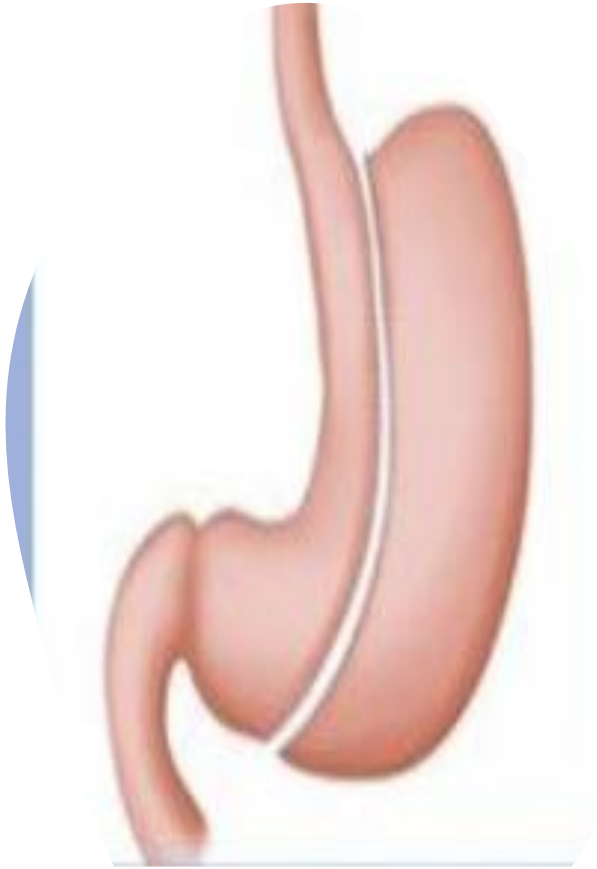
April 19,2024

1st line GLP1 RA, oral or injectable, *had an incremental cost-effectiveness ratio of $1 089 000 per QALY*

WTP threshold

To fit in the WTP of worldwide health systems, we need a decrease in 70% (oral) to 90% (injectables) of GLP1RA cost





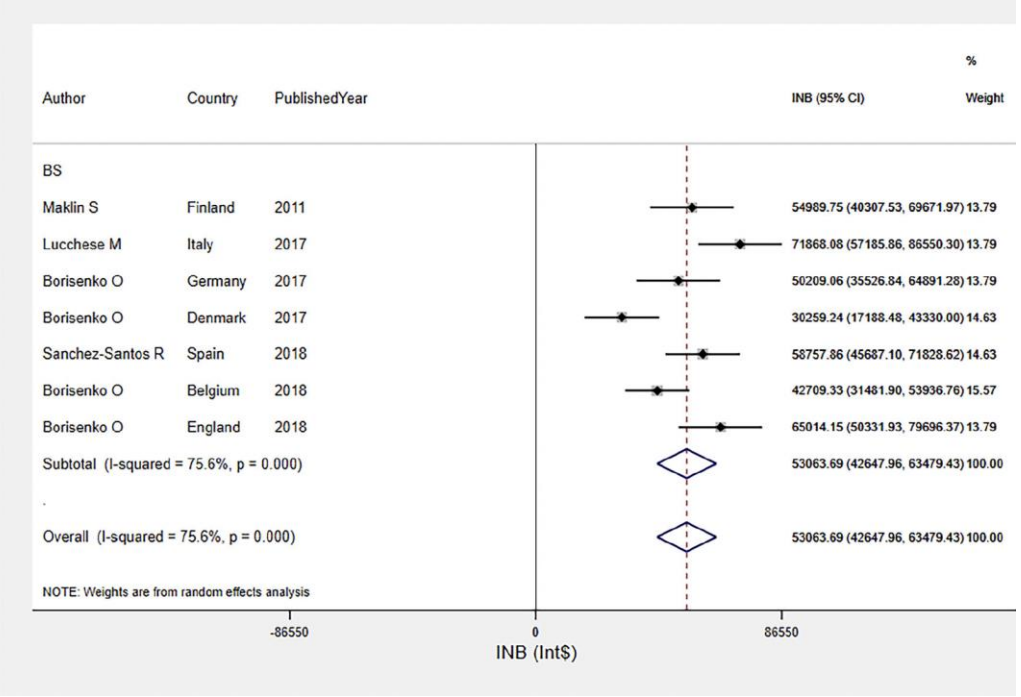
Obesity Surgery (2021) 31:3279–3290
https://doi.org/10.1007/s11695-021-05415-9

REVIEW

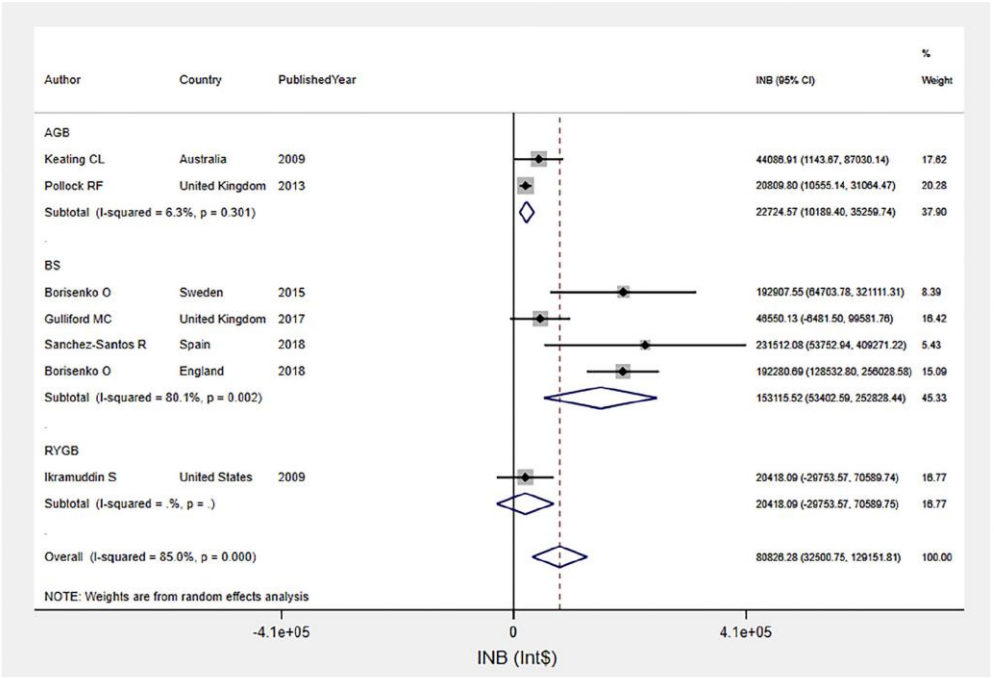
Incremental Net Monetary Benefit of Bariatric Surgery: Systematic Review and Meta-Analysis of Cost-Effectiveness Evidences

Prapaporn Noparatayaporn [1,2] · Montarat Thavorncharoensap [1,3] · Usa Chaikledkaew [1,3] · Bhavani Shankara Bagepally [4] · Ammarin Thakkinstian [1,5]

The incremental net monetary benefit (INB), which is the difference in net monetary benefit between the new intervention and the standard intervention



Without T2D



With T2D

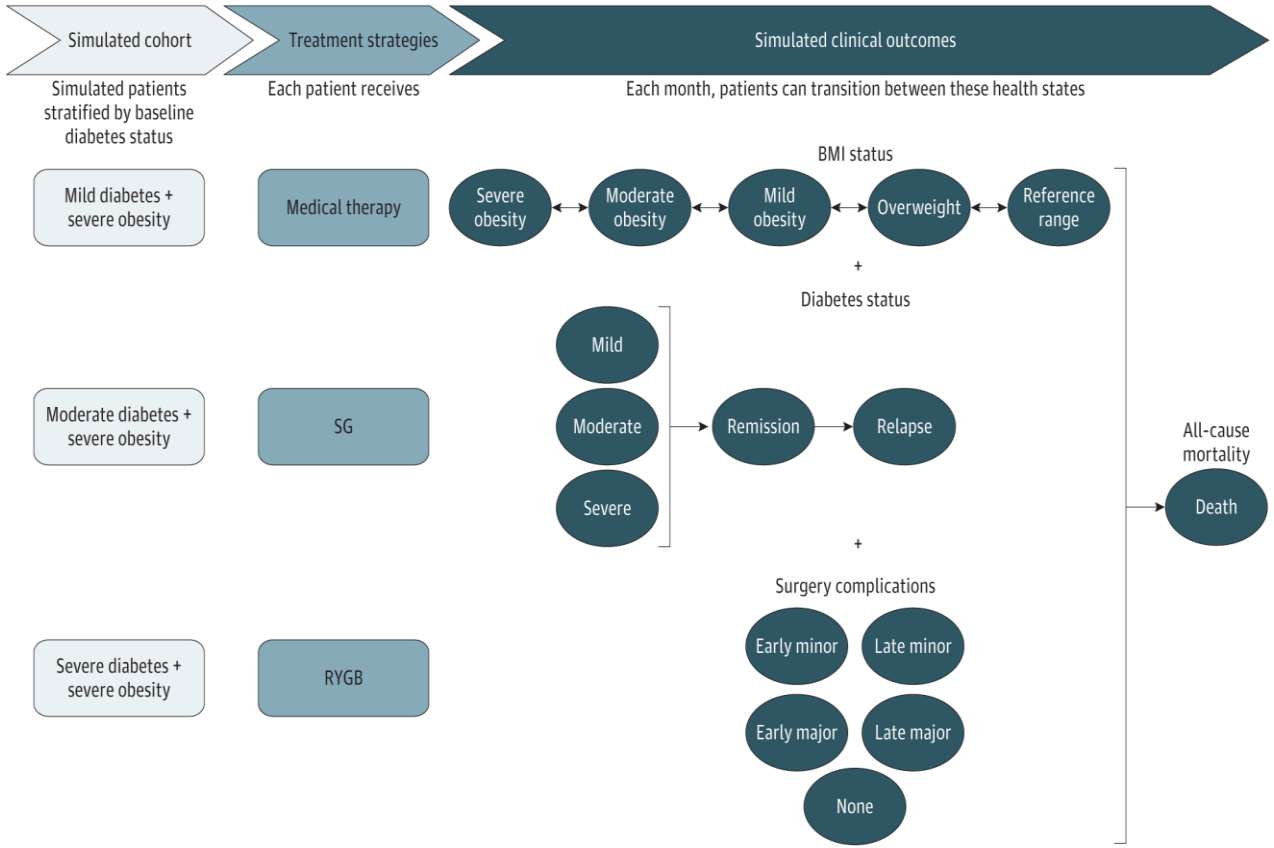
JAMA Network Open

Original Investigation | Surgery

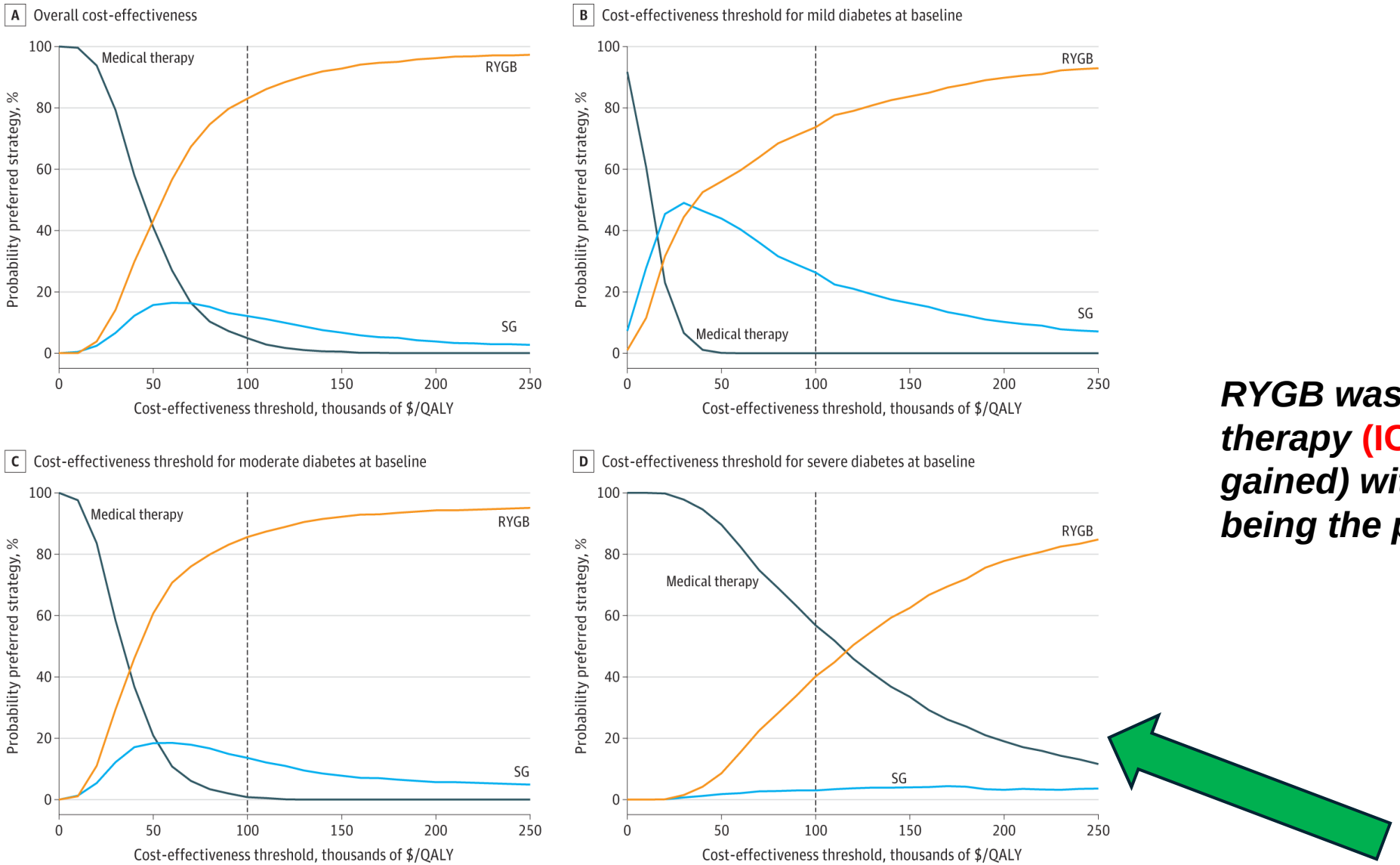
Estimated Cost-effectiveness of Medical Therapy, Sleeve Gastrectomy, and Gastric Bypass in Patients With Severe Obesity and Type 2 Diabetes

Brianna N. Lauren, BS; Francesca Lim, MS; Abraham Krikhely, MD; Elsie M. Taveras, MD, MPH; Jennifer A. Woo Baidal, MD, MPH; Brandon K. Bellows, PharmD, MS; Chin Hur, MD, MPH

2022



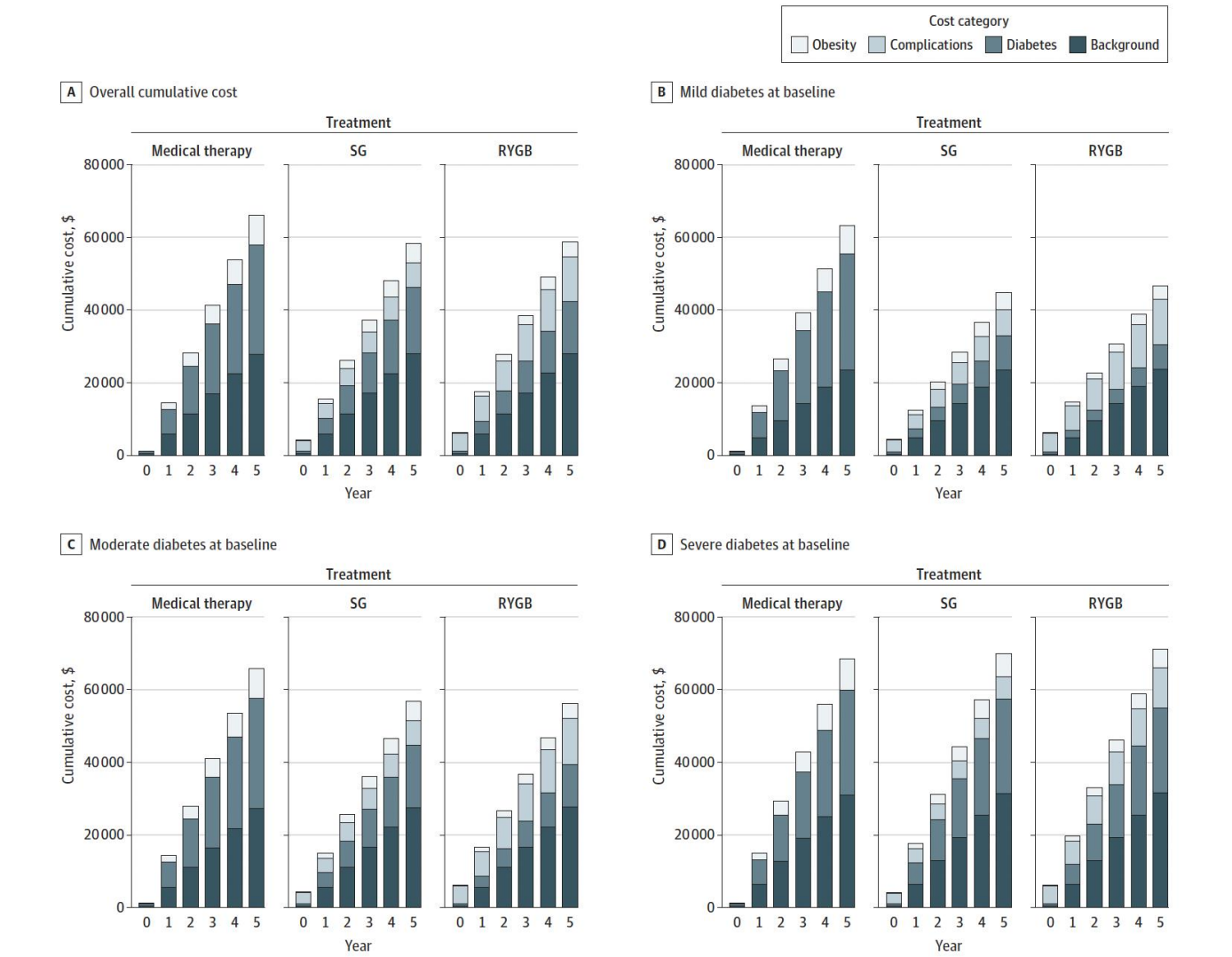
Projected WL and T2D outcomes based on the SOS, RCTs, cross sectional big data studies

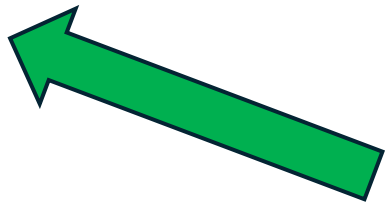


RYGB was cost-effective vs medical therapy (ICER of $46 877 per QALY gained) with an 83.0%probability of being the preferred strategy

Surgery is not cost-effective in severe T2D

insulin use, diabetes medication use, and poor glycemic control





ELSEVIER

Surgery for Obesity and Related Diseases ▮ (2017) 00–00

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

What is the impact on the healthcare system if access to bariatric surgery is delayed?

Ricardo V. Cohen, M.D.[a,*], Alexandre Luque, Ph.D.[b], Silvio Junqueira, M.D.[b], Rodrigo Antonini Ribeiro, Ph.D.[c], Carel W. Le Roux, M.D.[d]

[a]*Center for Obesity and Diabetes, Oswaldo Cruz German Hospital, São Paulo, Brazil*
[b]*Health Economic Department of Johnson & Johnson Medical Devices, São Paulo, Brazil*
[c]*HTAnalyze consulting; Faculdade Meridional–IMED, Porto Alegre, Brazil*
[d]*Diabetes Complication Research Centre, UCD Conway Institute, School of Medicine and Medical Science, University College, Dublin, Dublin, Ireland*

Received January 18, 2017; revised March 6, 2017; accepted March 22, 2017

Markov Microssimulation Model to evaluate the impact of surgical delay in the perspective of public health care system

RESULTS

Incremental Cost-effectiveness ratio

RESULTS

T2D

IMMEDIATE SURGERY WAS A COST-SAVING STRATEGY COMPARED TO ANY OTHER STRATEGY INVESTIGATED

NO SURGERY IS THE WORST SCENARIO
DELAY TREATAMENT INCREASES:
DEATH; CV EVENTS
PREVALENCE OF TYPE 2 DIABETES

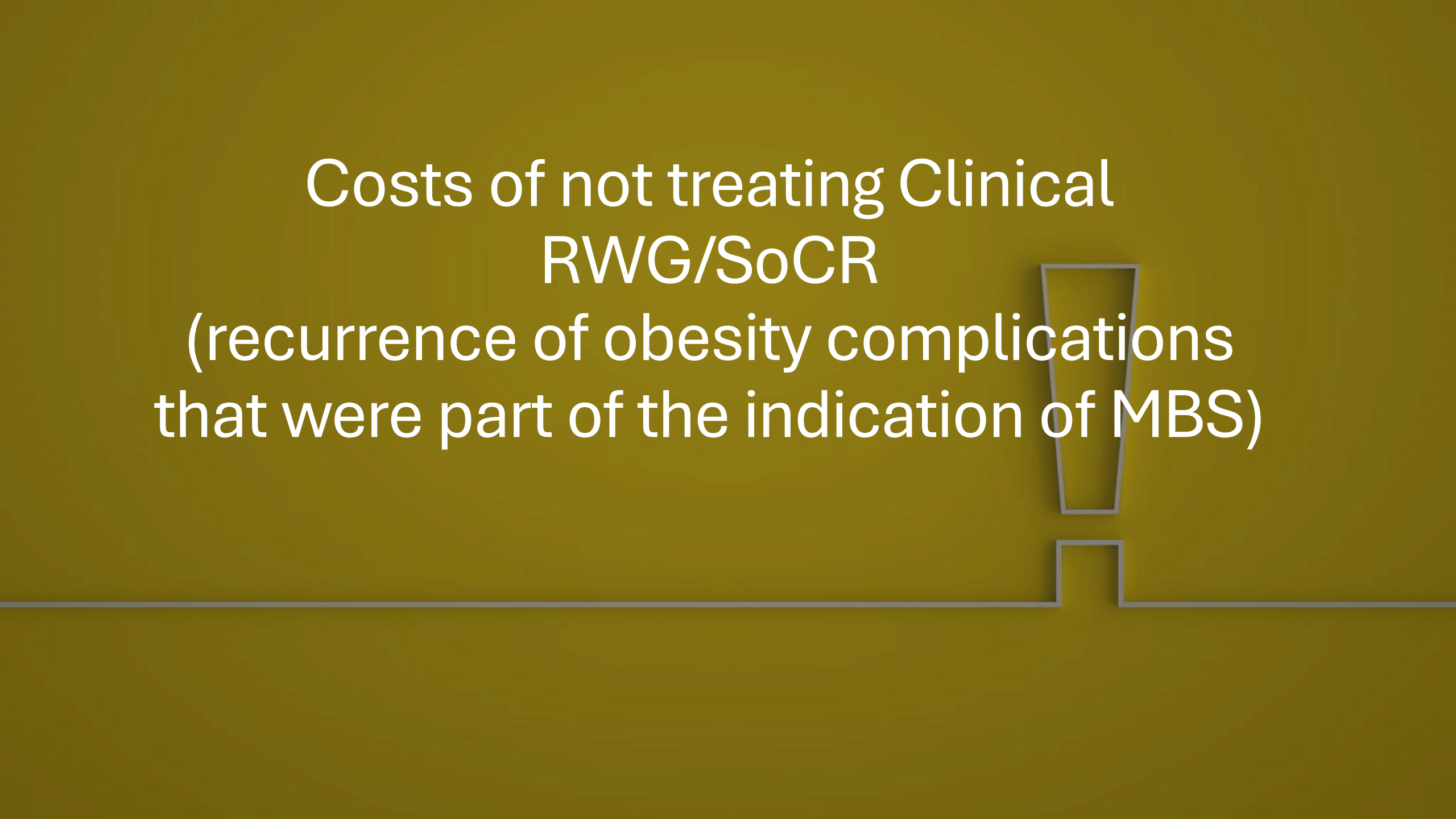
Strategy	Cost (R$)	Effectiveness (QALY)	ICER (R$/QALY)	% CV events	RR CV Events	LY	% Type II DM	% Deaths
No Surgery	Int$ 26.704,63	9,054	**Dominated***	16,51%	1,32	17,725	86,54%	27,68%
Immediate Surgery	Int$ 24.586,69	10,925	-	12,52%	-	18,693	62,85%	15,39%
2 y Delay	Int$ 24.968,27	10,678	**Dominated****	12,72%	1,02	18,570	63,28%	16,51%
4 y Delay	Int$ 25.665,07	10,411	**Dominated****	12,95%	1,03	18,455	64,23%	17,11%
7 y Delay	Int$ 26.507,88	10,049	**Dominated****	13,25%	1,06	18,266	66,06%	18,24%

*All data were derived from the analyses of a 20-year time horizon; CV events proportion, patients currently with DM, life years and total number of deaths represented values in the end of this timespan. Costs, QALYs and LYG are discounted at a 5% per year rate. I undiscounted life years. ICER: incremental cost-effectiveness ratio; LYG: life years gained, QALY: quality adjusted life years. *Immediate surgery vs. no surgery or vs. surgery delay scenarios; when the result is labeled as "dominated", it means that the strategy with delay is dominated by immediate surgery. The first order Monte Carlo simulation was run with 1 million trials.*

Cohen, 2017

Combined strategies, pre and/or postop will add health benefits or only increase costs ?

Costs of not treating Clinical RWG/SoCR (recurrence of obesity complications that were part of the indication of MBS)



International Journal of Obesity www.nature.com/ijo

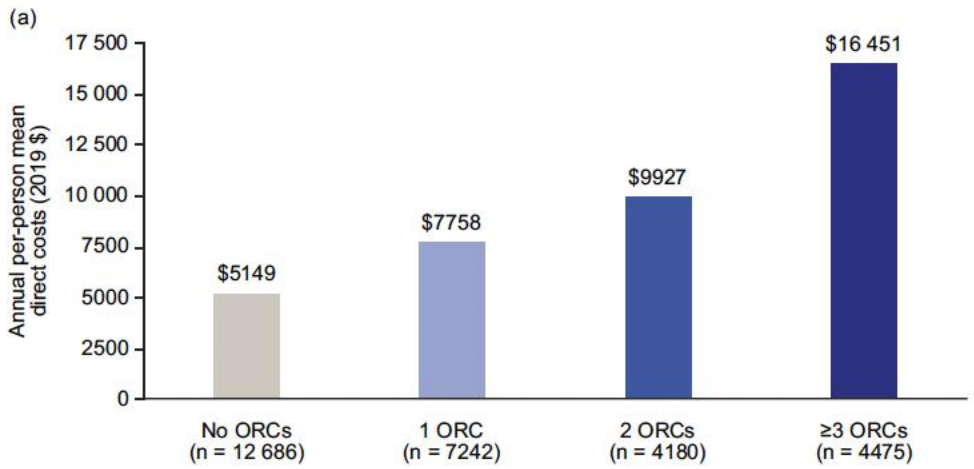
ARTICLE OPEN

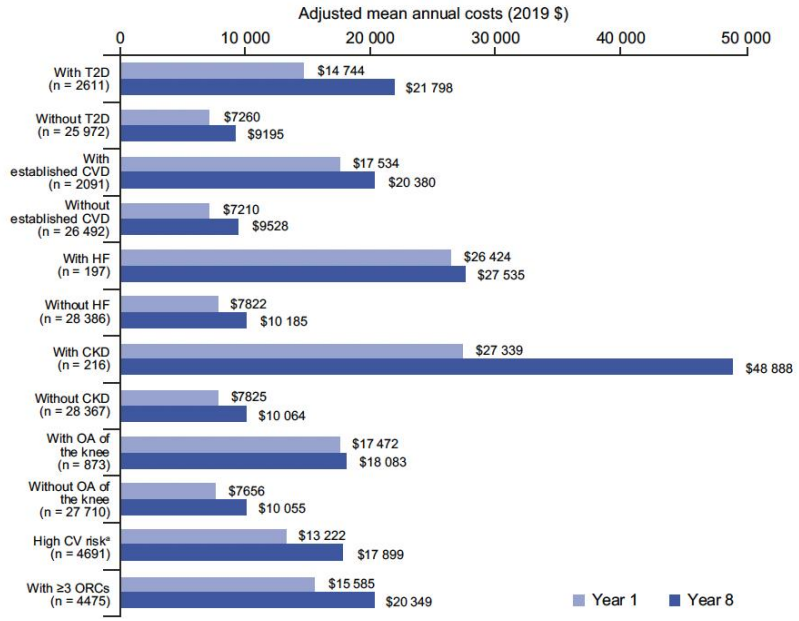
Check for updates

Epidemiology and Population Health

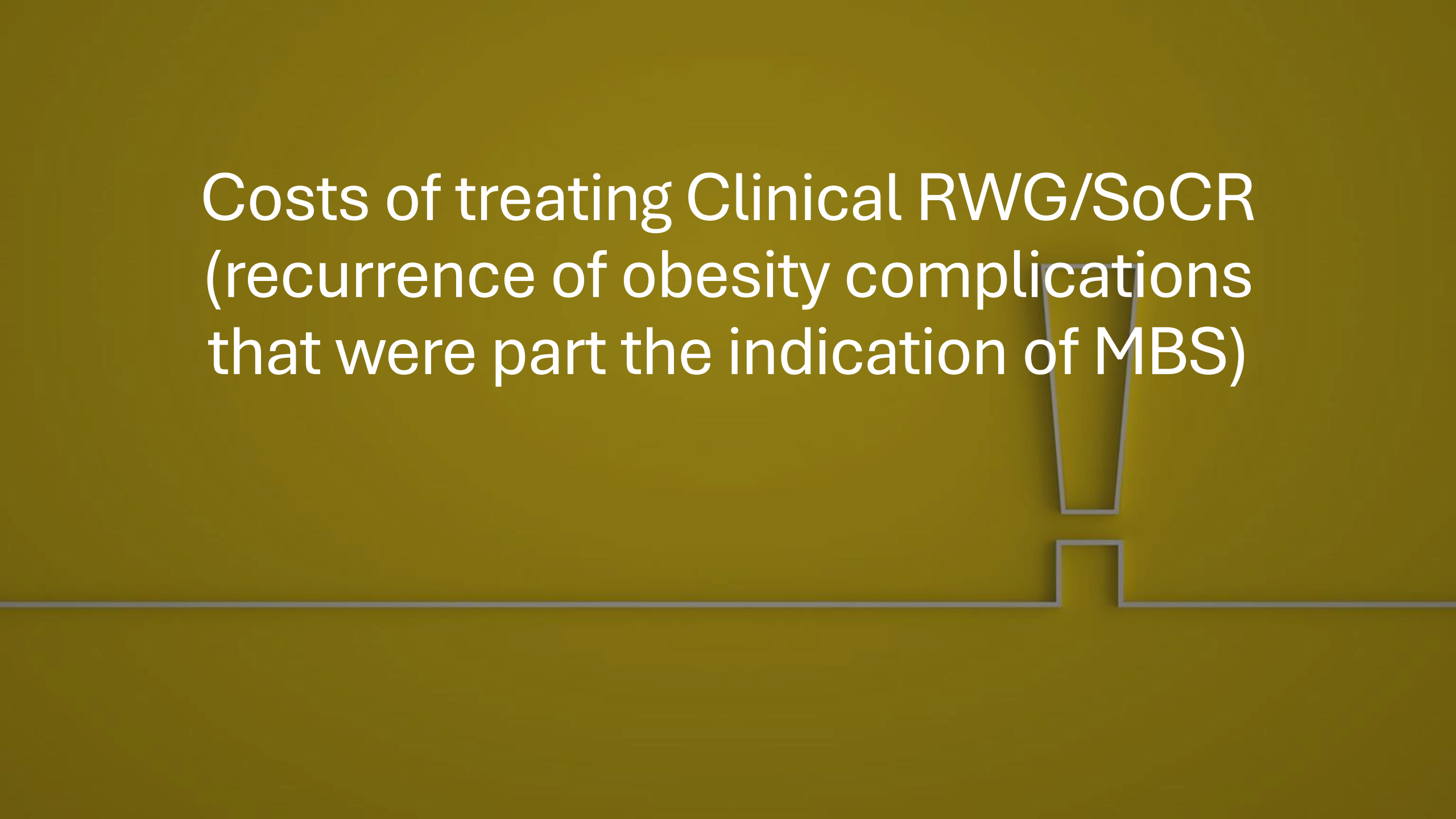
Real-world costs of obesity-related complications over eight years: a US retrospective cohort study in 28,500 individuals

Jonathan Pearson-Stuttard[1,2]✉, Tania Banerji[3], Silvia Capucci[4], Elisabeth de Laguiche[4], Mads D. Faurby[4], Christiane Lundegaard Haase[4], Kasper Sommer Matthiessen[4], Aimee M. Near[3], Jenny Tse[3], Xiaohui Zhao[3] and Marc Evans[5]





Costs of treating Clinical RWG/SoCR (recurrence of obesity complications that were part the indication of MBS)



Medications are as effective in operated x non operated patients, ⬆ WL, but still, no studies on an cost perspective

Adjunctive liraglutide treatment in patients with persistent or recurrent type 2 diabetes after metabolic surgery (GRAVITAS): a randomised, double-blind, placebo-controlled trial

Alexander Dimitri Miras, Belén Pérez-Pevida*, Madhawi Aldhwayan, Anna Kamocka, Emma Rose McGlone, Werd Al-Najim, Harvinder Chahal, Rachel L Batterham, Barbara McGowan, Omar Khan, Veronica Greener, Ahmed R Ahmed, Aviva Petrie, Samantha Scholtz, Stephen R Bloom, Tricia M Tan*

Research

JAMA Surgery | Original Investigation

Safety and Efficacy of Liraglutide, 3.0 mg, Once Daily vs Placebo in Patients With Poor Weight Loss Following Metabolic Surgery
The BARI-OPTIMISE Randomized Clinical Trial

Jessica Mok, BMBS, MPhil; Mariam O. Adeleke, PhD; Adrian Brown, PhD; Cormac G. Magee, MBBChir, MA; Chloe Firman, MRes; Christwishes Makahamadze, MRes; Friedrich C. Jassil, PhD; Parastou Marvasti, PhD; Alisia Carnemolla, PhD; Kalpana Devalia, MBBS, MS; Naim Fakih, MD; Mohamed Elkalaawy, MRCSEd, MS, MD; Andrea Pucci, MD, PhD; Andrew Jenkinson, MBBS, MS; Marco Adamo, MD; Rumana Z. Omar, PhD; Rachel L. Batterham, MBBS, PhD; Janine Makaronidis, MBChB, PhD

Received: 31 October 2022 | Revised: 4 January 2023 | Accepted: 6 January 2023
DOI: 10.1002/oby.23736

ORIGINAL ARTICLE
Clinical Trials and Investigations

Obesity THE OBESITY SOCIETY WILEY

Effectiveness of semaglutide versus liraglutide for treating post-metabolic and bariatric surgery weight recurrence

Natia Murvelashvili[1] | Luyu Xie[2,3] | Jeffrey N. Schellinger[1] | M. Sunil Mathew[2,3] | Elisa Morales Marroquin[2,3] | Ildiko Lingvay[1,4] | Sarah E. Messiah[2,3,5] | Jaime P. Almandoz[1]

Obesity Surgery (2024) 34:1917–1928
https://doi.org/10.1007/s11695-024-07206-4

REVIEW

Medium and Long-Term Weight Loss After Revisional Bariatric Surgery: A Systematic Review and Meta-Analysis

Eduardo L. S. Bastos[1] · Wilson Salgado Jr.[2] · Anna C. B. Dantas[3] · Tiago R. Onzi[4] · Lyz B. Silva[5] · Álvaro Albano[6] · Luca S. Tristão[7] · Clara L. dos Santos[7] · Antonio Silvinato[8] · Wanderley M. Bernardo[9] · For the Scientific Committee of the Brazilian Society of Bariatric and Metabolic Surgery (SBCBM)

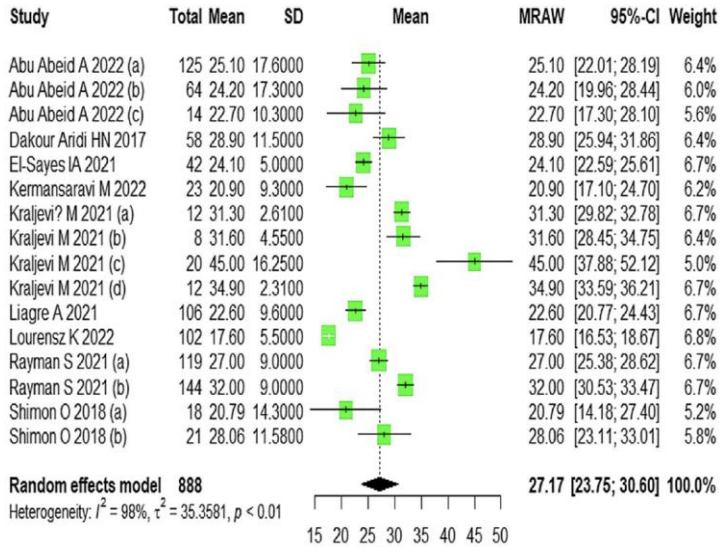


Fig. 5 %TWL. Forest plot. Random effect: – 27.17% (95%CI = 23.75 to 30.6; I^2 = 97.5% (95%CI 96.8%; 98.1%); Q test—p < 0.0001; certainty of evidence: very low)

Table 2 Analysis of the quality of evidence (GRADE) in relation to the overall rate of occurrence of the assessed outcomes

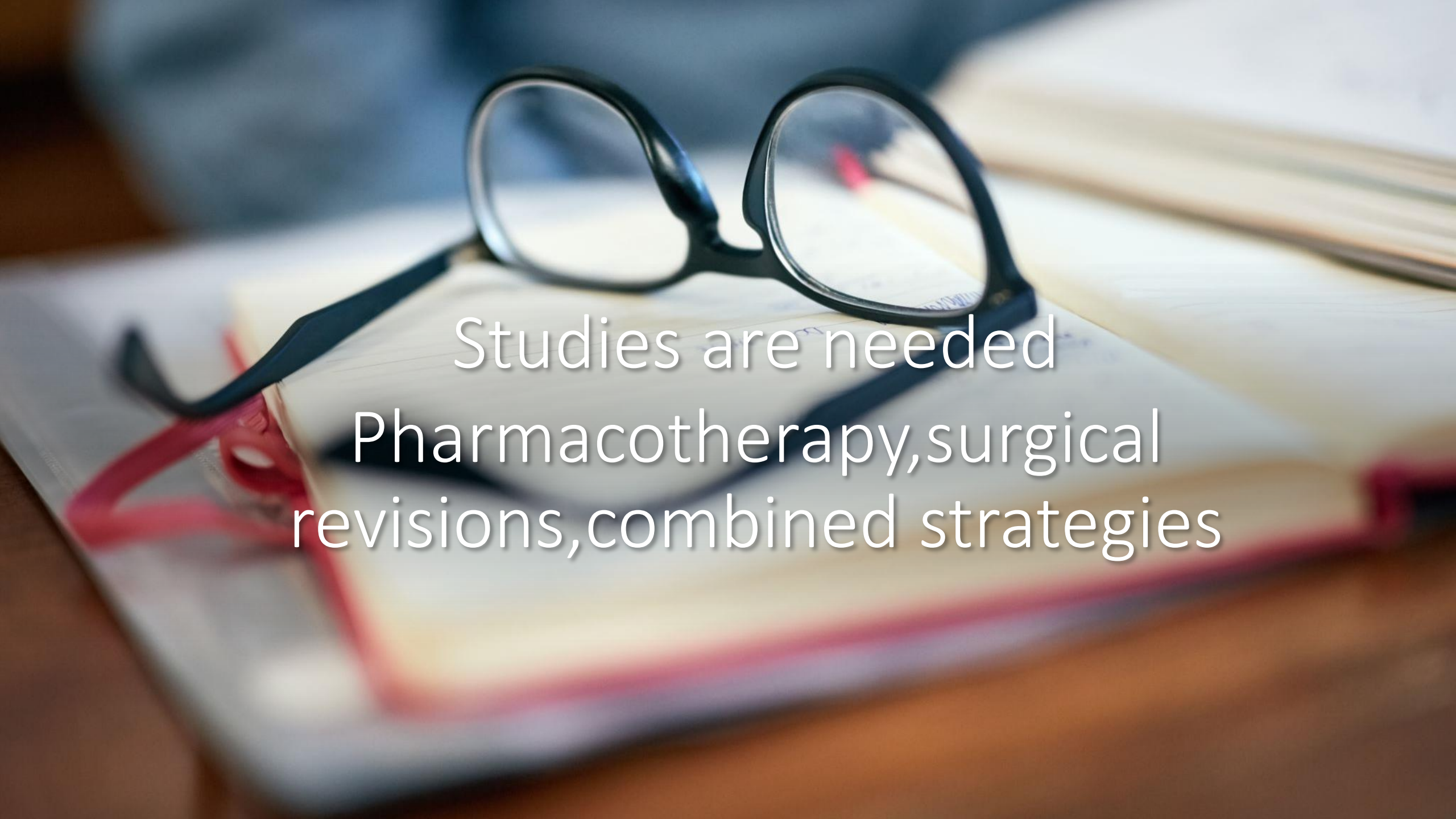
Certainty assessment								Patients (n)	Certainty of evidence
Outcome	Studies (n)	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Others considerations		
BMI	23	Observational	NS	VS (I^2 > 75)	NS	NS	None	1,602	⨁◯◯◯ Very low
%EWL	18	Observational	NS	VS (I^2 > 75)	NS	NS	Publication Bias Strongly Suspected	1,031	⨁◯◯◯ Very low
%EBMIL	7	Observational	NS	VS (I^2 > 75)	NS	NS	None	350	⨁◯◯◯ Very low
%TWL	16	Observational	NS	VS (I^2 > 75)	NS	NS	None	888	⨁◯◯◯ Very low

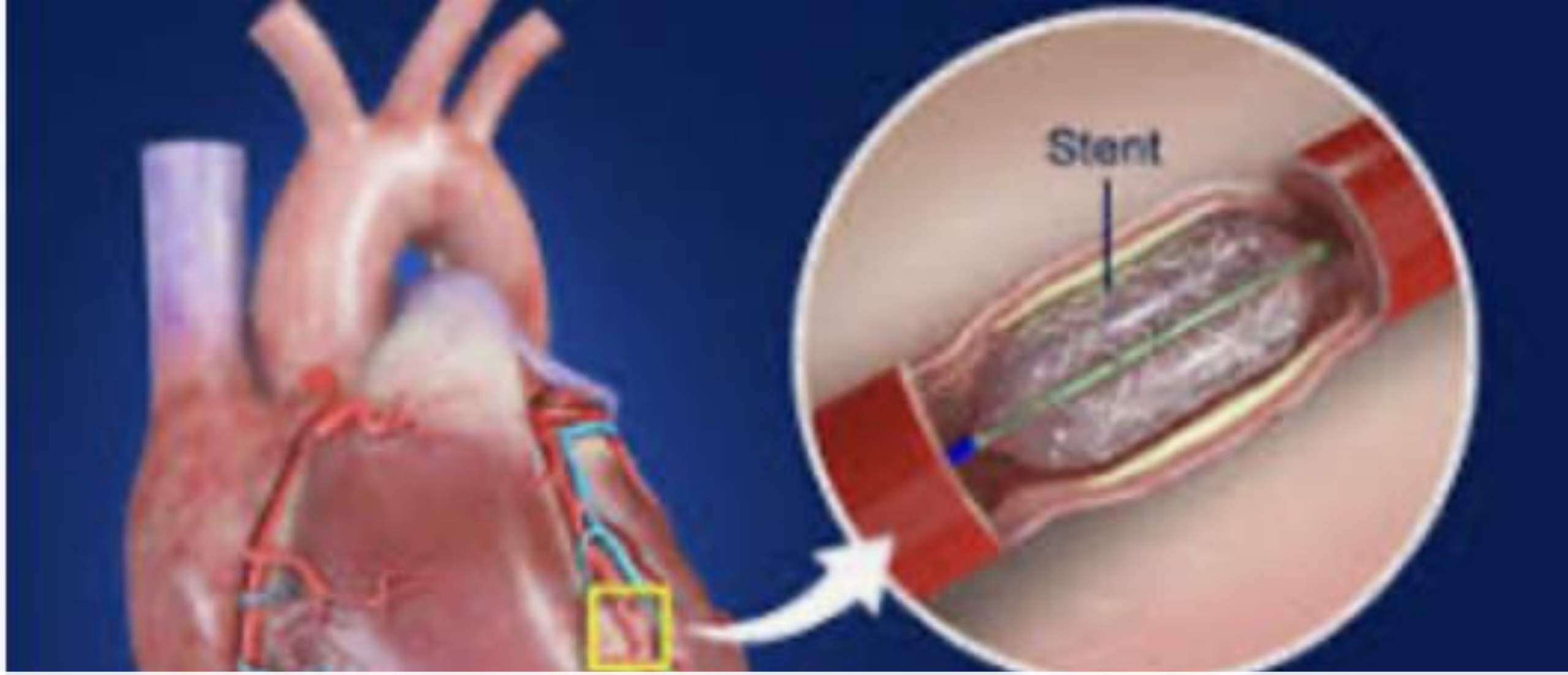
High operative complication rates, most are conversions into malabsorptive operations, no long-term safety or efficacy data

NO cost-effectiveness studies

Still, maybe some individuals may have indications for revisional surgery

Customized evaluation, including risk assessment and economic analysis


Studies are needed
Pharmacotherapy,surgical
revisions,combined strategies

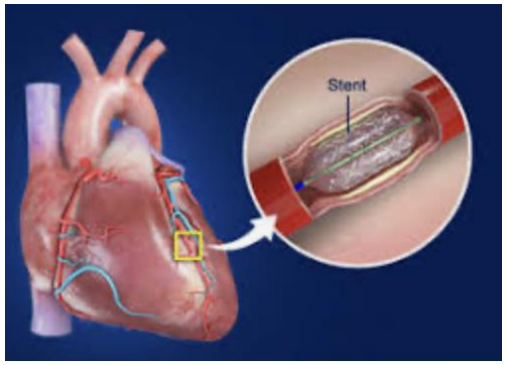


A paralel to RWG in Cardiology

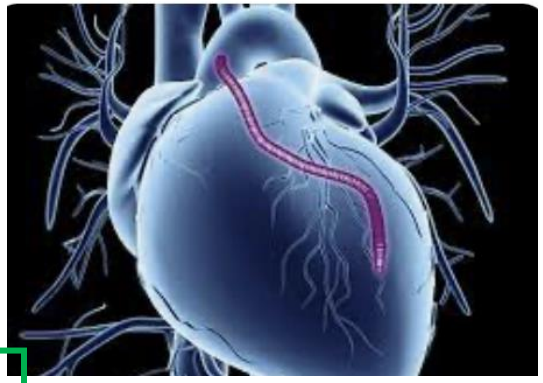
Cost effectiveness of coronary revascularisation

Özcan Birim*, MD, PhD; Ad J.J.C. Bogers, MD, PhD; A. Pieter Kappetein, MD, PhD

Department of Cardio-Thoracic Surgery, Erasmus MC Rotterdam, The Netherlands



Late in-stent thrombosis is responsible for an important increase in death (30%) and myocardial infarction (> 60%)



RE-STENTING with a “different fancier stent”

Cost per QALY $250,935

(SIRIUS) trial. Circulation 2004;110:508-514.

Cost per QALY $257,591

TAXUS-IV Trial. J Am Coll Cardiol 2006;48:253-261.

Without considering the adjunctive use and cost of extended dual-antiplatelet therapy (aspirin and clopidogrel)

ricardo.cohen@haoc.com.br

@rvcohen(twitter)

OSWALDO CRUZ
CENTRO ESPECIALIZADO EM **OBESIDADE E DIABETES**