Long-term all-cause and cause specific survival benefit after bariatric surgery

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Professor & Vice-Chair, Quality

Division Chief, Bariatric & Min Invasive Surgery

Yale School of Medicine

Past-President, American Society of Metabolic and Bariatric Surgery

Inaugural Chair, Committee on Metabolic and Bariatric Surgery, American College of Surgeons

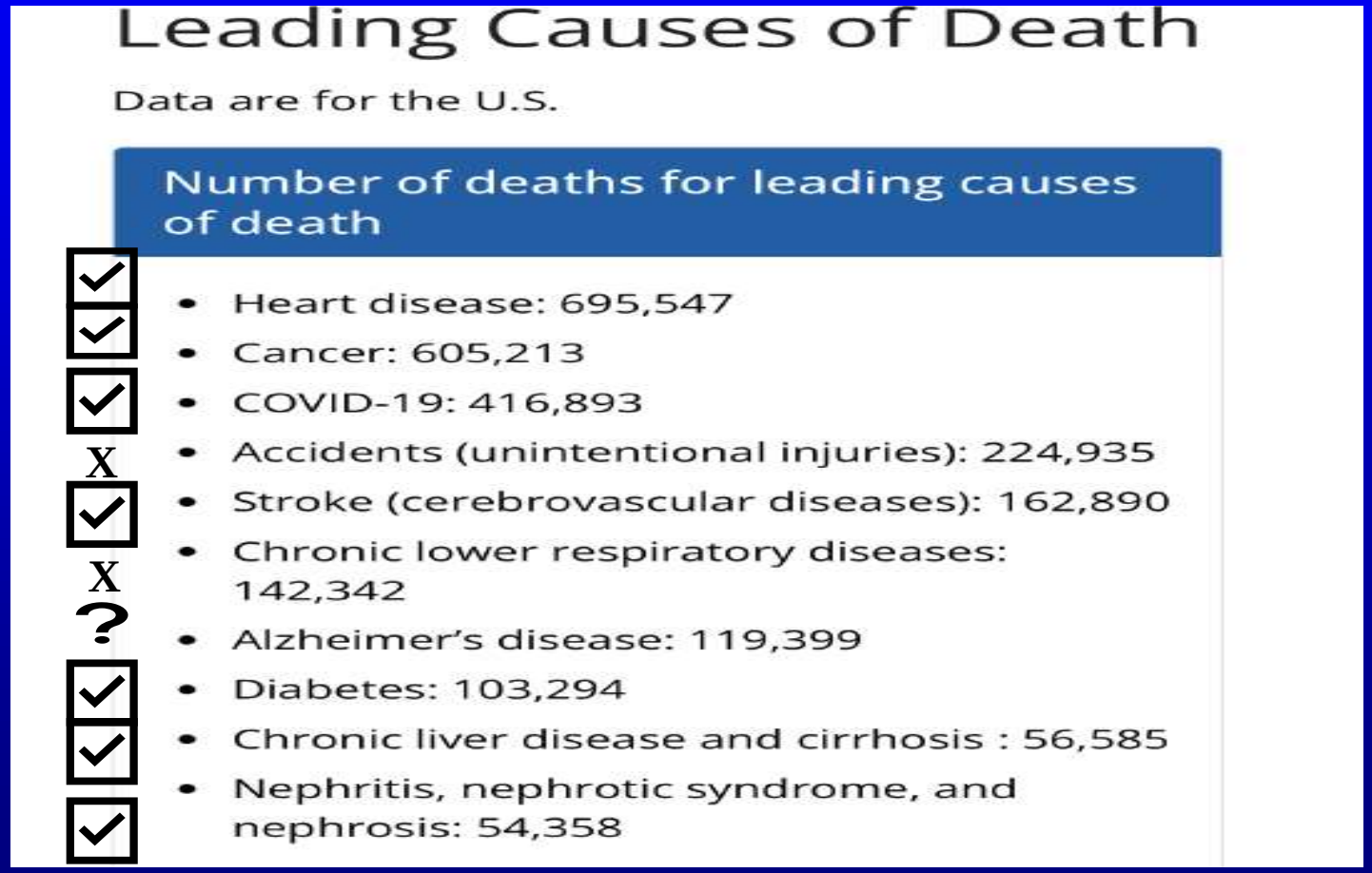
DISCLOSURES

- **Consultant- Allurion, Ethicon, Novo Nordisk, Olympus, Teleflex**

Survival Benefit of Metabolic and Bariatric Surgery

- Evidence Base for New ASMBS /IFSO Indications
- Magnitude of Benefit for Cause of Death
- Comparative Impact of MBS to other surgeries
- Degree of Benefit by Procedure & Procedural Factors

Leading Causes of Death- 7 of 10 Improved!



JAMA Surgery | Original Investigation

Association of Weight Loss Achieved Through Metabolic Surgery With Risk and Severity of COVID-19 Infection

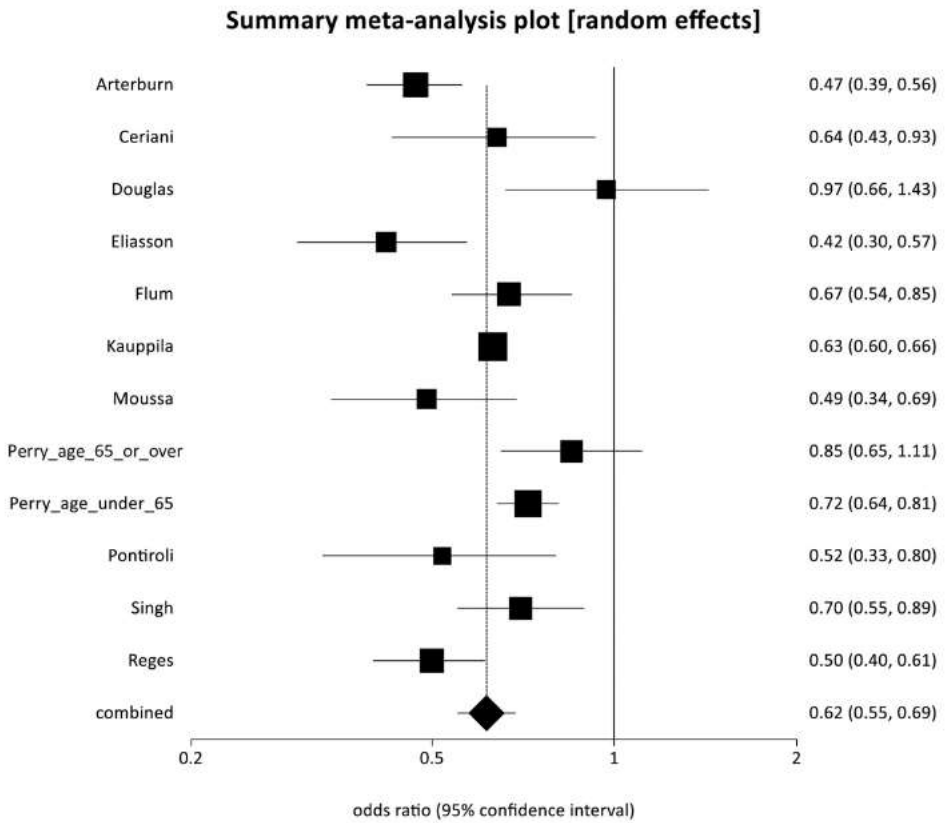
50% Reduction in Hospitalization following Bariatric Surgery

NCHS 2022

RESEARCH ARTICLE

Association of bariatric surgery with all-cause mortality and incidence of obesity-related disease at a population level: A systematic review and meta-analysis

Tom Wiggins[1,2], Nadia Guidozzi[1], Richard Welbourn[2], Ahmed R. Ahmed[1], Sheraz R. Markar[1,3]*

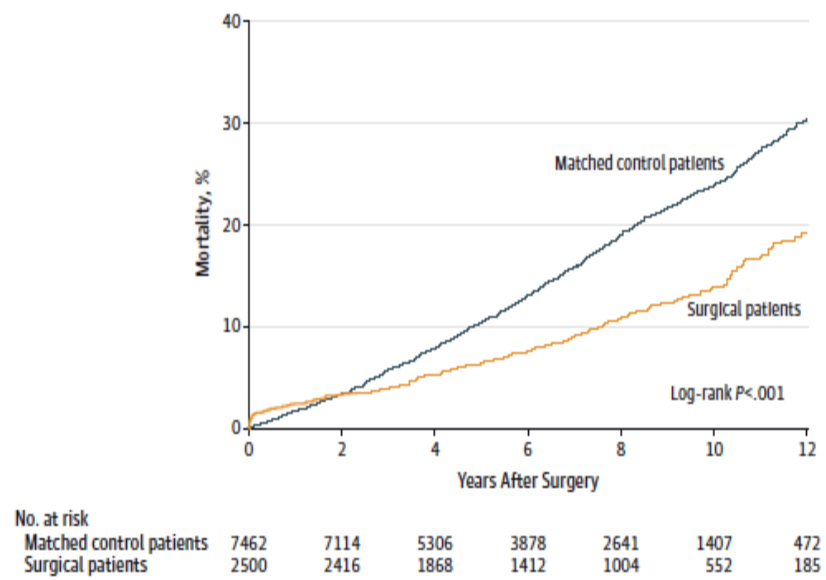


PLOS Medicine | https://doi.org/10.1371/journal.pmed.1003206 July 28, 2020

Association Between Bariatric Surgery and Long-term Survival

David E. Arterburn, MD, MPH; Maren K. Olsen, PhD; Valerie A. Smith, MS; Edward H. Livingston, MD, MS; Lynn Van Scoyoc; William S. Yancy Jr, MD, MHSc; George Eid, MD; Hollis Weidenbacher, PhD; Matthew L. Maciejewski, PhD

Figure. Kaplan-Meier Estimated Mortality Curves for Surgical Patients and Matched Control Patients



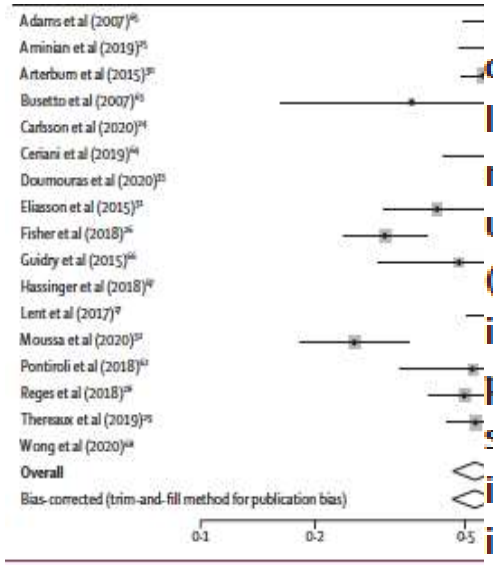
VA Population: Older, Sicker, Male

JAMA. 2015;313(1):62-70. doi:10.1001/jama.2014.16968

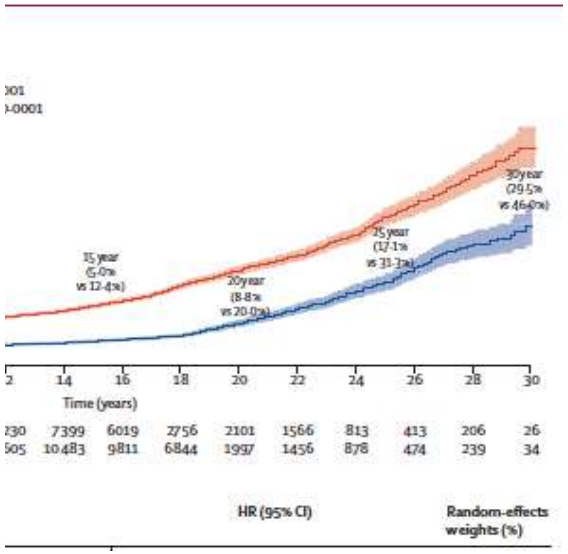
Association of metabolic–bariatric surgery with long-term survival in adults with and without diabetes: a one-stage meta-analysis of matched cohort and prospective controlled studies with 174 772 participants

Nicholas L Syn*, David E Cummings*, Louis Z Wang*, Daryl J Lin*, Joseph J Zhao, Marie Loh, Zong Jie Koh, Claire Alexandra Chew, Ying Ern Loo, Bee Choo Tai, Guowei Kim, Jimmy Bok-Yan So, Lee M Kaplan, John B Dixon, Asim Shabbir

Lancet 2021; 397: 1830–41



A future meta-analysis could investigate if the duration of obesity has an effect on life expectancy. In fact, Carlsson and colleagues[11] showed that the median life expectancy in individuals who have undergone metabolic–bariatric surgery was 3·0 years (95% CI 1·8–4·2) longer than in matched control individuals. However, compared with the general population, life expectancy was 5·5 years shorter, suggesting that obesity might leave a lifelong metabolic imprinting that increases mortality. The obvious implication is that prevention or early treatment of obesity is crucial to avoid organ damage.



p<0·0001). Median life expectancy was 9·3 years (95% CI 7·1–11·8) longer for patients with diabetes in the surgery group than the non-surgical group, whereas the life expectancy gain was 5·1 years (2·0–9·3) for patients without diabetes. The numbers needed to treat to prevent one additional death over a 10-year time frame were 8·4 (95% CI 7·8–9·1) for adults with diabetes and 29·8 (21·2–56·8) for those without diabetes. Treatment effects did not appear to differ between gastric bypass, banding, and sleeve gastrectomy (I^2 3·4%, p=0·36). By leveraging the results of this meta-analysis and other published data, we estimated that every 1·0% increase in metabolic–bariatric surgery utilisation rates among the global pool of metabolic–bariatric candidates with and without diabetes could yield 5·1 million and 6·6 million potential life-years, respectively.

Interpretation Among adults with obesity, metabolic–bariatric surgery is associated with substantially lower all-cause mortality rates and longer life expectancy than usual obesity management. Survival benefits are much more pronounced for people with pre-existing diabetes than those without.

Surgery Decreases Long-term Mortality, Morbidity, and Health Care Use in Morbidly Obese Patients

Nicolas V. Christou, MD, PhD, John S. Sampalis, PhD, Moishe Liberman, MD, Didier Look, MD, Stephane Auger, BSc, Alexander P.H. McLean, MD, and Lloyd D. MacLean MD, PhD

Annals of Surgery • Volume 240, Number 3, September 2004

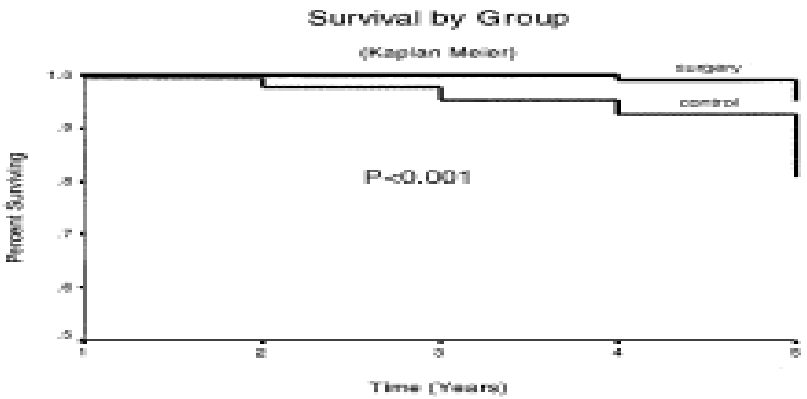


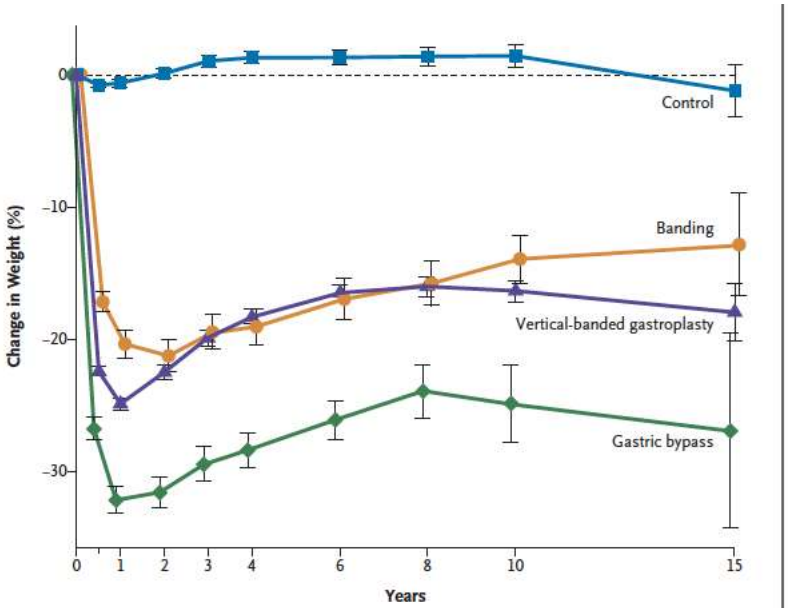
FIGURE 2. Survival by group (Kaplan Meier survival analysis).

Quebec, 2004

Effects of Bariatric Surgery on Mortality in Swedish Obese Subjects

Lars Sjöström, M.D., Ph.D., Kristina Narbro, Ph.D., C. David Sjöström, M.D., Ph.D., Kristjan Karason, M.D., Ph.D.,

N Engl J Med 2007;357:741-52.



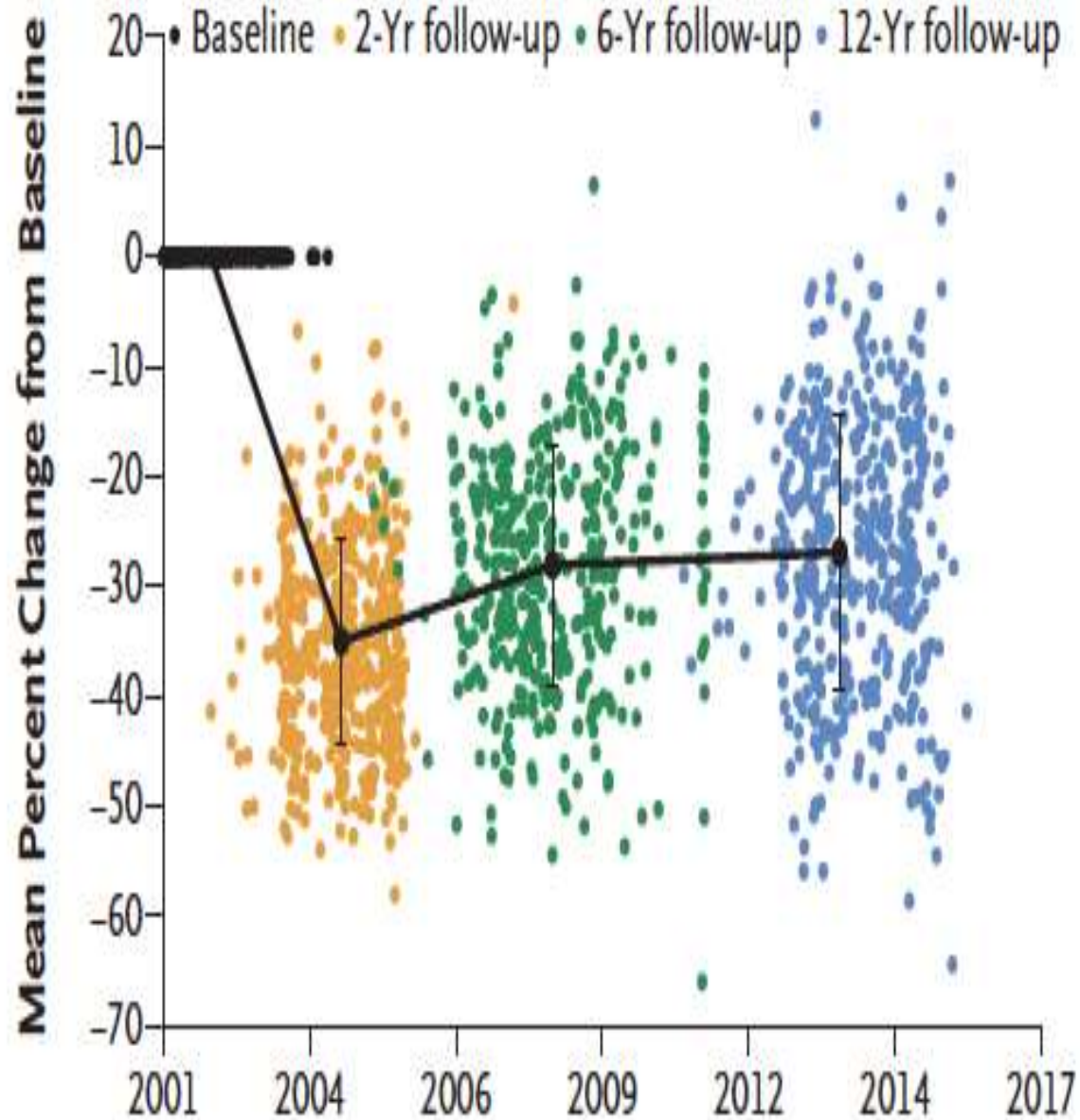
No. Examined									
Control	2037	1768	1660	1553	1490	1281	982	886	190
Banding	376	363	357	328	333	298	267	237	52
Vertical-banded gastroplasty	1369	1298	1244	1121	1086	1004	899	746	108
Gastric bypass	265	245	245	211	209	166	92	58	10

Figure 1. **Mean Percent Weight Change during a 15-Year Period in the Control Group and the Surgery Group, According to the Method of Bariatric Surgery.**

I bars denote 95% confidence intervals.

SOS, 2007

A Mean Percent Change in Body Weight from Baseline to Years 2, 6, and 12 in the Surgery Group



Systematic Review

Reduction of Major Adverse Cardiovascular Events (MACE) after Bariatric Surgery in Patients with Obesity and Cardiovascular Diseases: A Systematic Review and Meta-Analysis

Andryanto Sutanto [1,2], Citrawati Dyah Kencono Wungu [3,4,*], Hendri Susilo [5] and Henry Sutanto [6,*]

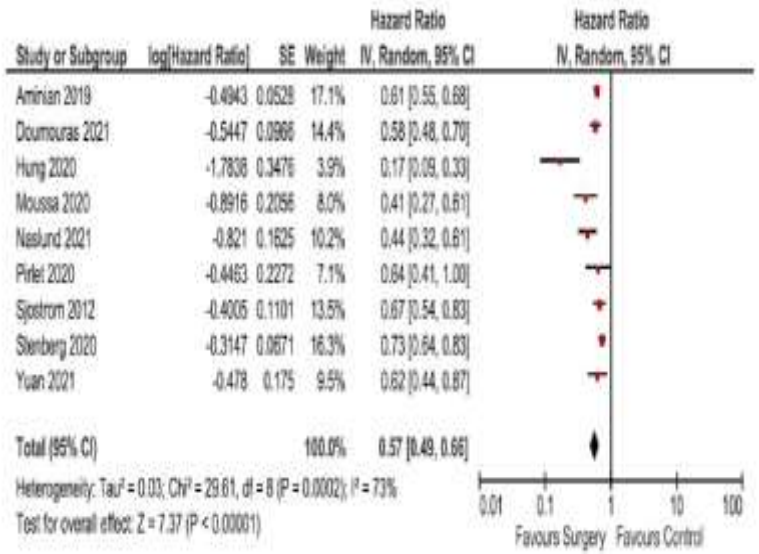
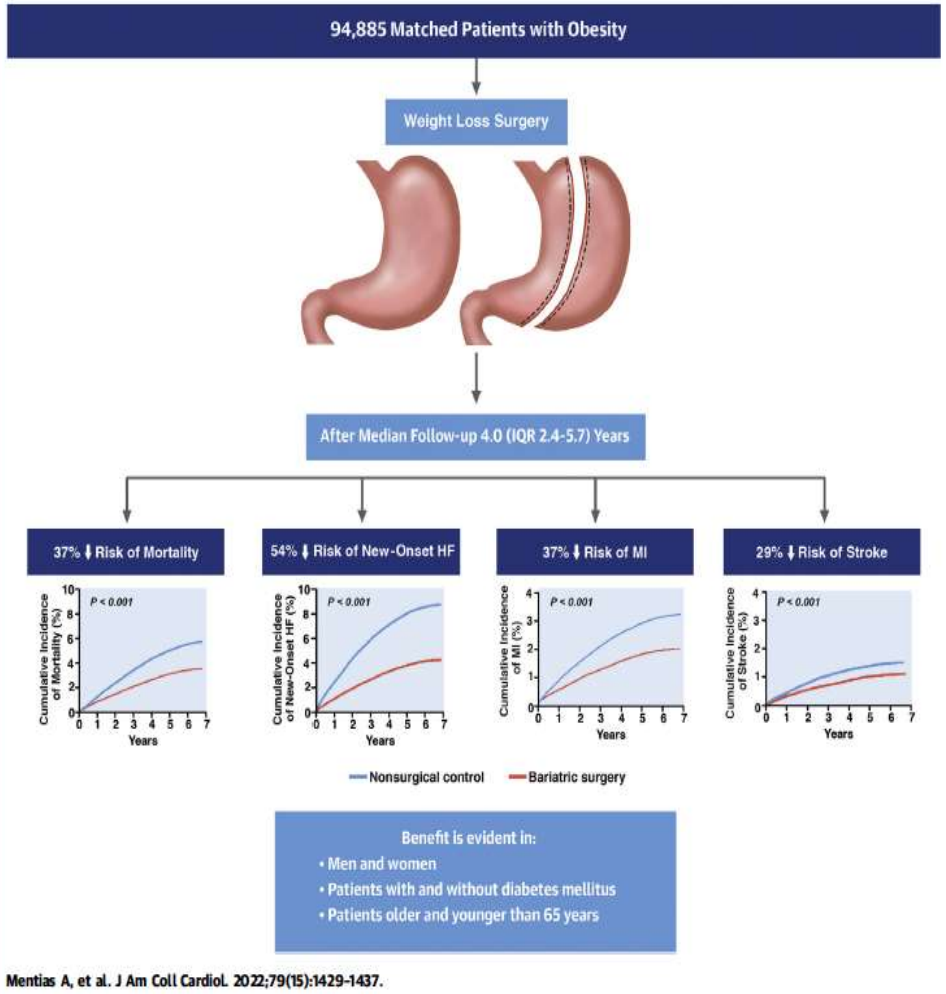


Figure 7. Adjusted forest plot of the MACE incidence comparing bariatric surgery with no surgery.

Nutrients **2021**, *13*, 3568. https://doi.org/10.3390/nu13103568

Long-Term Cardiovascular Outcomes After Bariatric Surgery in the Medicare Population

Amgad Mentias, MD, MS,[a] Ali Aminian, MD,[b] Dalia Youssef, MD,[c] Ambarish Pandey, MD,[d] Venu Menon, MD,[a] Leslie Cho, MD,[a] Steven E. Nissen, MD,[a] Milind Y. Desai, MD, MBA[a]



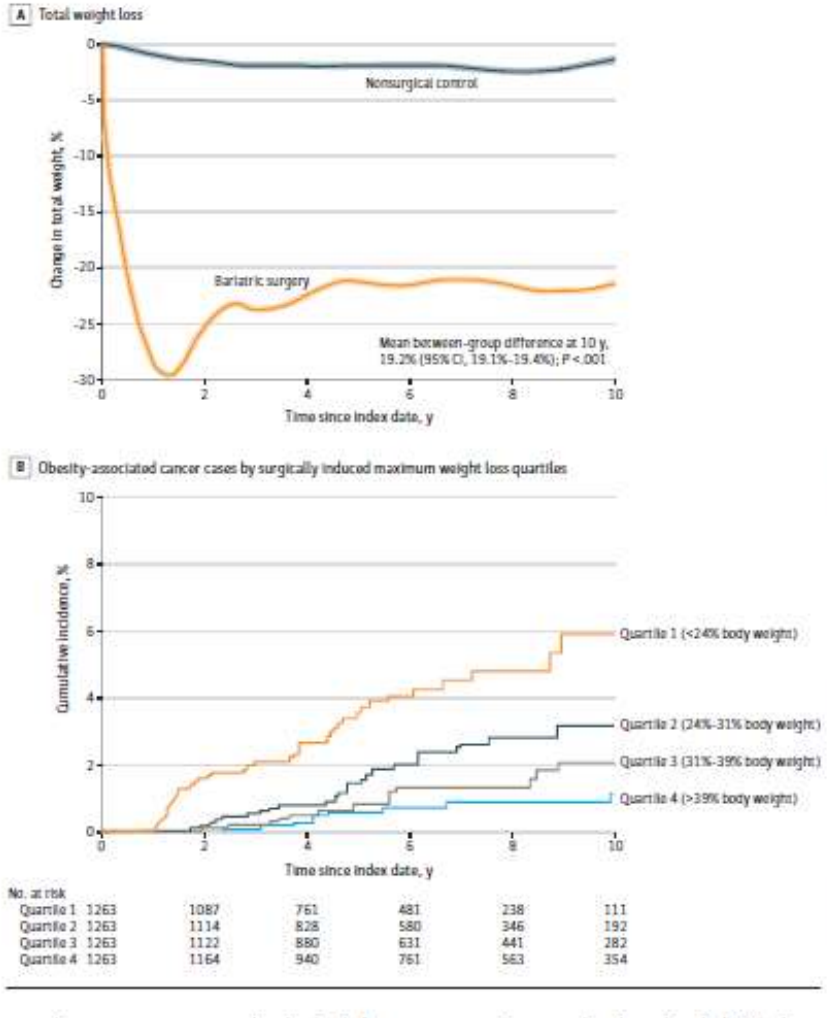
Mentias A, et al. J Am Coll Cardiol. 2022;79(15):1429-1437.

Older, Sicker Population

- **37% Reduction in Mortality**
- **54% Reduction in New HF**
- **37% Reduction in MI**
- **29% Reduction in CVA**

- **Intriguing Results for HF**

Figure 4. Weight Loss and Cumulative Incidence of Primary End Point Stratified by Maximum Weight Loss Quartile



A, The data were smoothed and are mean trends for the percentage change in body weight from baseline in patients in the bariatric surgery group and the nonsurgical control group during follow-up. The shaded areas indicate 95% CIs. The mean between-group difference at 10 years from baseline was estimated from a flexible regression model with a 4-knot restricted cubic spline for the time × treatment interaction. The median observation time was 5.9 years (IQR, 3.4-9.0 years) for patients in the bariatric surgery group and was 6.3 years (IQR, 4.0-9.2 years) for patients in the nonsurgical control group. B, The data are Kaplan-Meier estimates for incidence of obesity-associated cancer types by the quartile of maximum (the largest) weight loss in the bariatric surgery group ($P < .001$ from log-rank test). The findings suggest that weight loss in the bariatric surgery group was associated with lower risk of incident cancer cases in a dose-dependent response.

JAMA | Original Investigation

Association of Bariatric Surgery With Cancer Risk and Mortality in Adults With Obesity

Ali Aminian, MD; Rickesha Wilson, MD; Abbas Al-Kurd, MD; Chao Tu, MS; Alex Milinovich, BA; Matthew Kroh, MD; Raul J. Rosenthal, MD; Stacy A. Brethauer, MD; Philip R. Schauer, MD; Michael W. Kattan, PhD; Justin C. Brown, PhD; Nathan A. Berger, MD; Jame Abraham, MD; Steven E. Nissen, MD

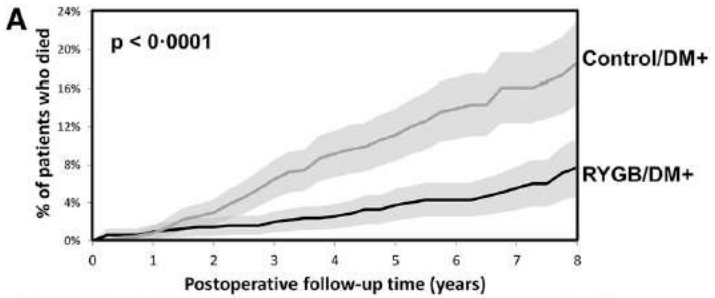
Threshold is 25% TBW

Survival Benefit of MBS for patients with diabetes and obesity

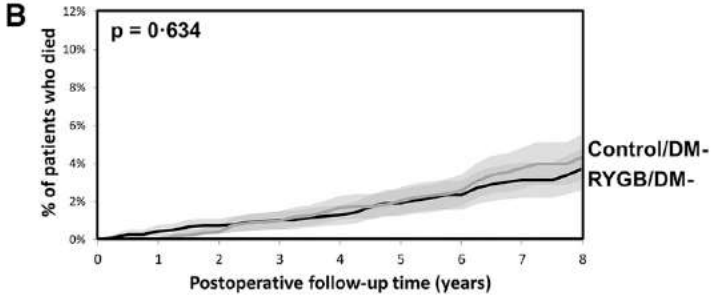
All-Cause and Specific-Cause Mortality Risk After Roux-en-Y Gastric Bypass in Patients With and Without Diabetes

Diabetes Care 2017;40:1379–1385 | https://doi.org/10.2337/dc17-0519

Diabetes Care Volume 40, October 2017



	Number at risk in follow-up							
Year of follow-up	1	2	3	4	5	6	7	8
Control	622	575	504	424	343	261	183	126
RYGB	619	582	525	452	372	292	208	148



All-Cause Mortality of Patients With and Without Diabetes Following Bariatric Surgery: Comparison to Non-surgical Matched Patients

Dror Dicker[1,2] · Philip Greenland[3,4] · Morton Leibowitz[5,6] · Moshe Hoshen[5,7] · Adi Berliner Senderey[5] · Laura J. Rasmussen-Torvik[3,8] · Ran D. Balicer[5,9] · Orna Reges[3,5]

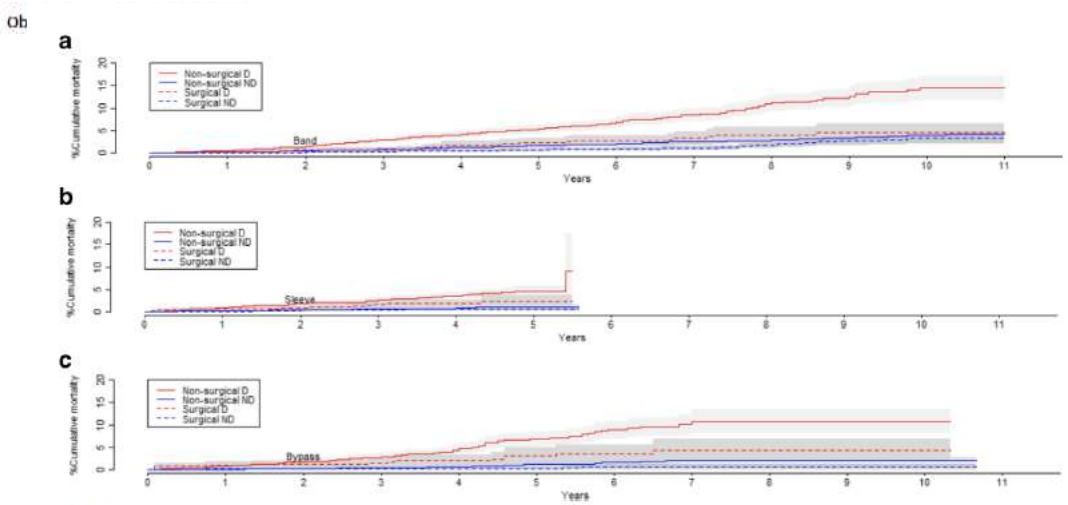
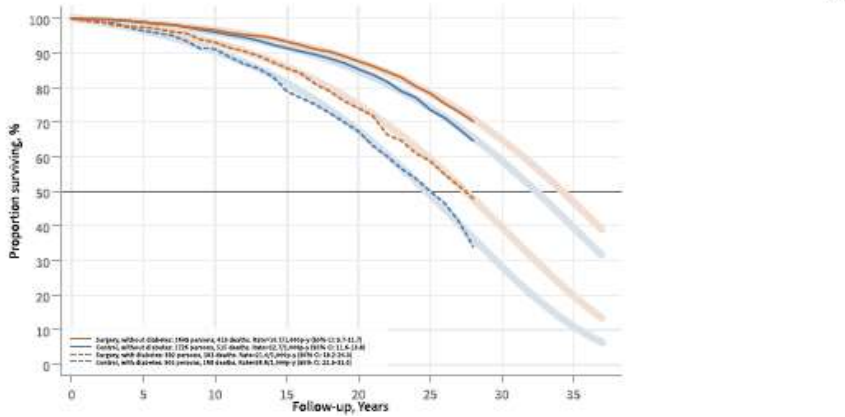


Fig. 1 Kaplan-Meier estimated mortality curves for 3 types of surgical patients and matched nonsurgical obese patients with and without diabetes: 1-A laparoscopic banding, 1-B: laparoscopic sleeve gastrectomy, 1-C: Roux-en-Y gastric bypass

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

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]✉



CONCLUSIONS: Bariatric surgery is associated with similar reduction of overall and cardiovasular mortality and increased life expectancy regardless of baseline diabetes status.

International Journal of Obesity, https://doi.org/10.1038/s41366-023-01332-2

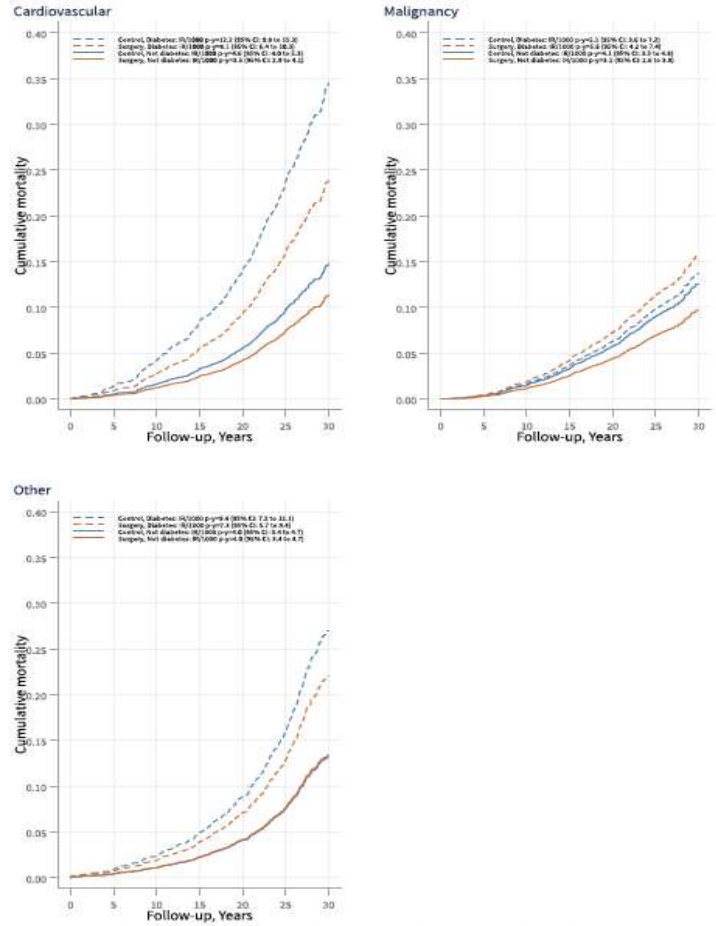


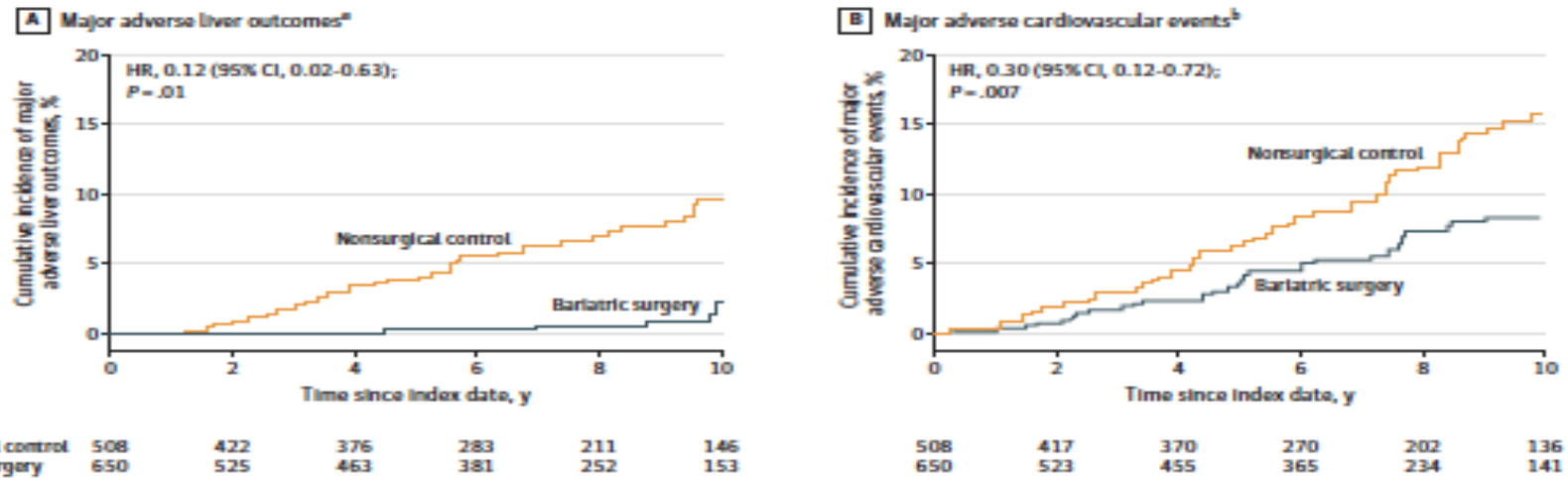
Fig. 3 Cause-specific mortality in the surgery and control groups stratified by baseline diabetes status. Shown are subgroups with (dashed lines) and without (solid lines) baseline type 2 diabetes. IR incidence rate, p-y person-years.

JAMA | Original Investigation

Association of Bariatric Surgery With Major Adverse Liver and Cardiovascular Outcomes in Patients With Biopsy-Proven Nonalcoholic Steatohepatitis

Ali Aminian, MD; Abbas Al-Kurd, MD; Rickesha Wilson, MD; James Bena, MS; Hana Fayazzadeh, MD; Tavankit Singh, MD; Vance L. Albaugh, MD, PhD; Faiz U. Shariff, MD; Noe A. Rodriguez, MD; Jian Jin, MS; Stacy A. Brethauer, MD, MBA; Srinivasan Dasarathy, MD; Naim Alkhouri, MD; Philip R. Schauer, MD; Arthur J. McCullough, MD; Steven E. Nissen, MD

Figure 2. Cumulative Incidence Estimates (Kaplan-Meier) for 2 Composite End Points in the Overlap-Weighted Analysis



No. at risk						
Nonsurgical control	508	422	376	283	211	146
Bariatric surgery	650	525	463	381	252	153

508	417	370	270	202	136
650	523	455	365	234	141

JAMA. 2021;326(20):2031-2042. doi:10.1001/jama.2021.19569
Published online November 11, 2021.

Pyrrhic victory? Long-term results of biliopancreatic diversion on patients with type 2 diabetes and severe obesity

Francesco Papadia, M.D.[a], Flavia Carlini, M.D.[a], Gaia Longo, M.D.[a], Alice Rubartelli, M.D.[a], Micaela Battistini, M.D.[a,b], Beatrice Drago, M.D.[a], Gian Franco Adami, M.D.[a,b,*], Giuseppe Marinari, M.D.[c], Giovanni Camerini, M.D.[a]

Surgery for Obesity and Related Diseases ■ (2023) 1–8

Results: T2D resolved within the first postoperative phases in most patients, and in the long and very long term, the fasting blood glucose level remained above the normal range in only 8% of patients. Likewise, a stable improvement of blood lipid pattern was observed (follow-up rate 63%). In contrast, in nonsurgical patients in the long term, the glucose and lipid metabolic parameters remained in the pathologic range in all cases. In the BPD group, a very high number of severe BPD-related complications was recorded, and 27% of the BPD patients died, whereas in the control group, 87% of patients were still alive at the end of the follow-up period ($P < .02$).

15 year results
BPD 73% Alive
No Surgery 87% Alive

COUNTY OF LOS ANGELES — DEPARTMENT OF MEDICAL EXAMINER-CORONER

12

AUTOPSY REPORT

No. 2023-00513

I performed an autopsy on the body of → PRESLEY, LISA MARIE BEAULIEU

at the DEPARTMENT OF MEDICAL EXAMINER-CORONER

Los Angeles, California on JANUARY 14, 2023 (Date) 0918 HOURS (Time)

From the anatomic findings and pertinent history I ascribe the death to:

(A) SEQUELAE OF SMALL BOWEL OBSTRUCTION

I. Ischemic bowel.

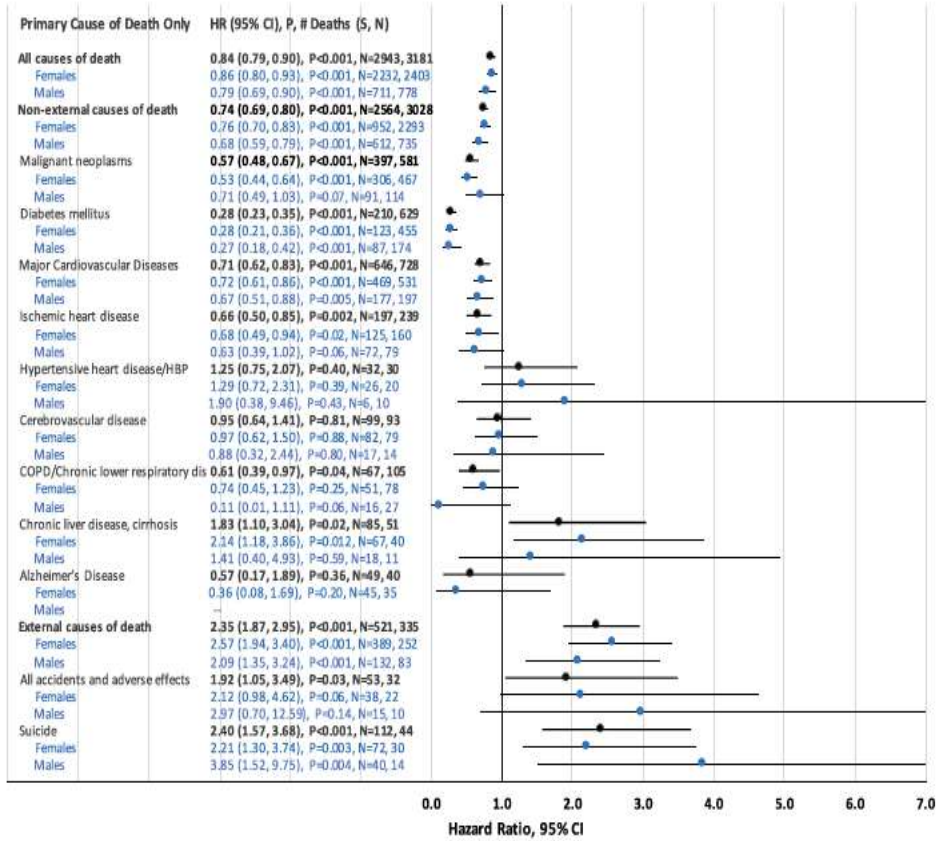
A. Incarceration of distal small bowel.
B. Adhesion of small bowel to peritoneum posterior right lower quadrant of abdomen.
C. 915 cm of ischemic small bowel.
D. Remote bariatric surgery.
E. Severe metabolic acidosis, clinical.

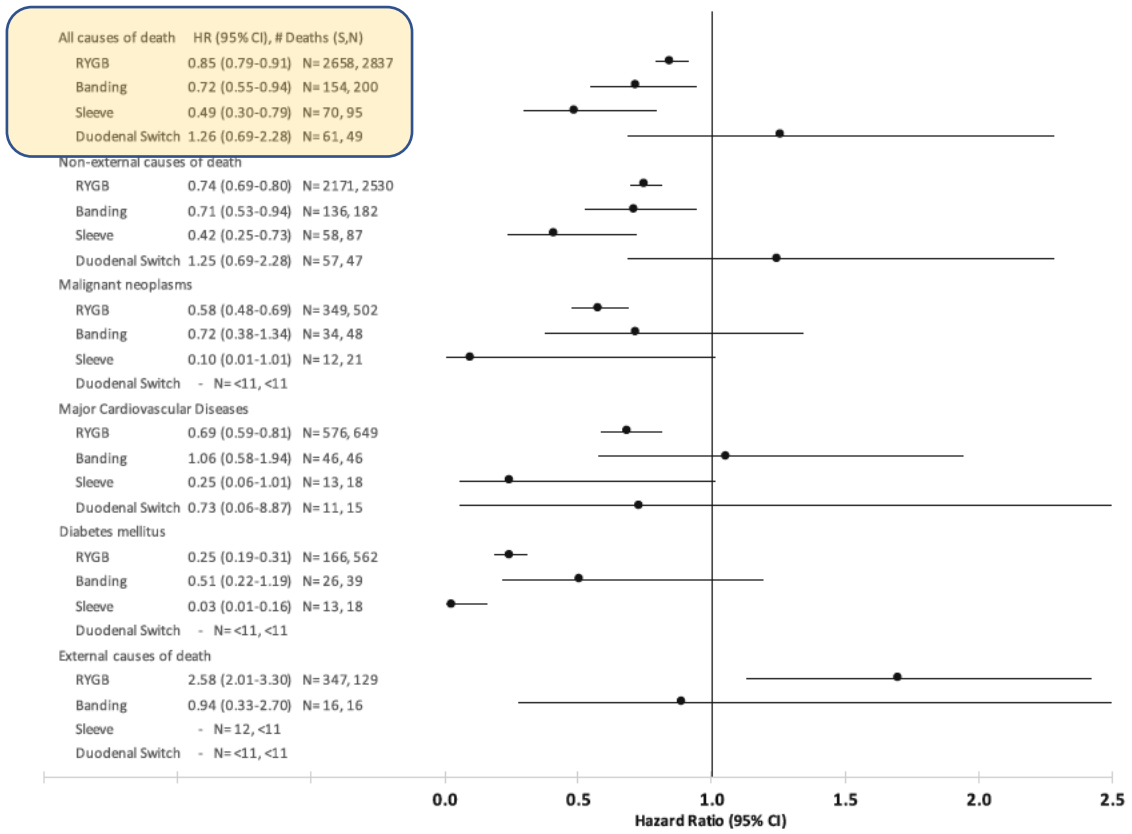
The esophagus is intact throughout. The stomach appears tubular i shape with surgical staples noted to the left lateral aspect of th stomach. The distal portion of the stomach is surgically attached to the small bowel located 731.5 cm distal to the duodenojejunal junction. The mucosa of the stomach shows superficial mucosal hemorrhages. No tablets or capsules are identified in the stomach. The small and large bowel are distended, 915 cm of the small bowel, from the duodenojejunal junction to the ileocecal region are ischemic showing a dusky brown color of the small bowel wall with certain areas appearing gray to black. A segment of the small

Long-term all-cause and cause-specific mortality for four bariatric surgery procedures

Obesity (Silver Spring). 2023;31:574–585.

Ted D. Adams[1,2,3] | Huong Meeks[4] | Alison Fraser[4] | Lance E. Davidson[2,5] | John Holmen[6] | Michael Newman[7] | Anna R. Ibele[8] | Nathan Richards[1] | Steven C. Hunt[2,9] | Jaewhan Kim[10]





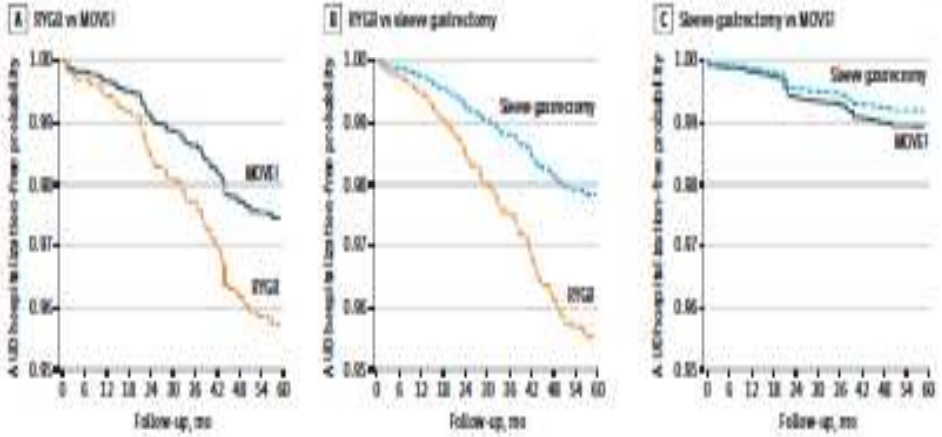
JAMA Surgery | Original Investigation

Association Between Bariatric Surgery and Alcohol Use–Related Hospitalization and All-Cause Mortality in a Veterans Affairs Cohort

Nadim Mahmud, MD, MS, MPH, MSCE; Sanjukumar Panchal, MD, PharmD; Samir Abu-Gazala, MD; Marina Serper, MD, MS; James D. Lewis, MD, MSCE; David E. Kaplan, MD, MSc

JAMA Surg. 2023;158(2):163-171. doi:10.1001/jamasurg.2022.6410
Published online December 14, 2022.

Figure 1. Association Between Weight Management Approach and Alcohol Use Disorder (AUD)–Related Hospitalization



CONCLUSIONS AND RELEVANCE This cohort study found that RYGB was associated with an increased risk of AUD-related hospitalizations vs both sleeve gastrectomy and the MOVE! program. The mortality benefit associated with RYGB was diminished by increased alcohol use, highlighting the importance of careful patient selection and alcohol-related counseling for patients undergoing this procedure.

Impaired Alcohol Metabolism after Gastric Bypass Surgery: A Case-Crossover Trial

Gavitt A Woodard, BS, John Downey, MD, Tina Hernandez-Boussard, PhD, MPH, John M Morton, MD, MPH, FACS

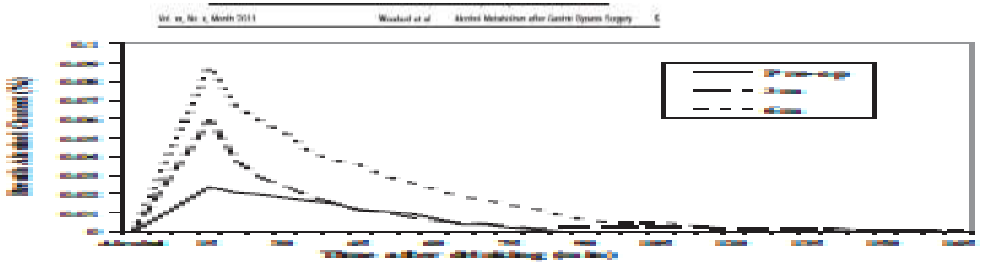
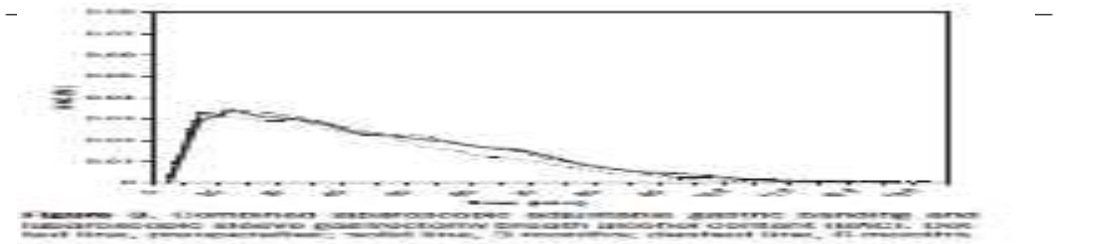


Figure 1. Breath alcohol content after gastric bypass, weight-corrected.

Normal Alcohol Metabolism after Gastric Banding and Sleeve Gastrectomy: A Case-Cross-Over Trial

Eric M Changchien, MD, Gavitt A Woodard, MD, Tina Hernandez-Boussard, PhD, John M Morton, MD, MPH, FACS



ORIGINAL ARTICLE

Trends in Gastrectomy and ADH1B and ALDH2 Genotypes in Japanese Alcoholic Men and Their Gene–gastrectomy, Gene–gene and Gene–age Interactions for Risk of Alcoholism

DOI: 10.1111/acer.15099
COMMENTARY
ALCOHOL

Commentary on: Fat-free mass accounts for most of the variance in alcohol elimination rate in women

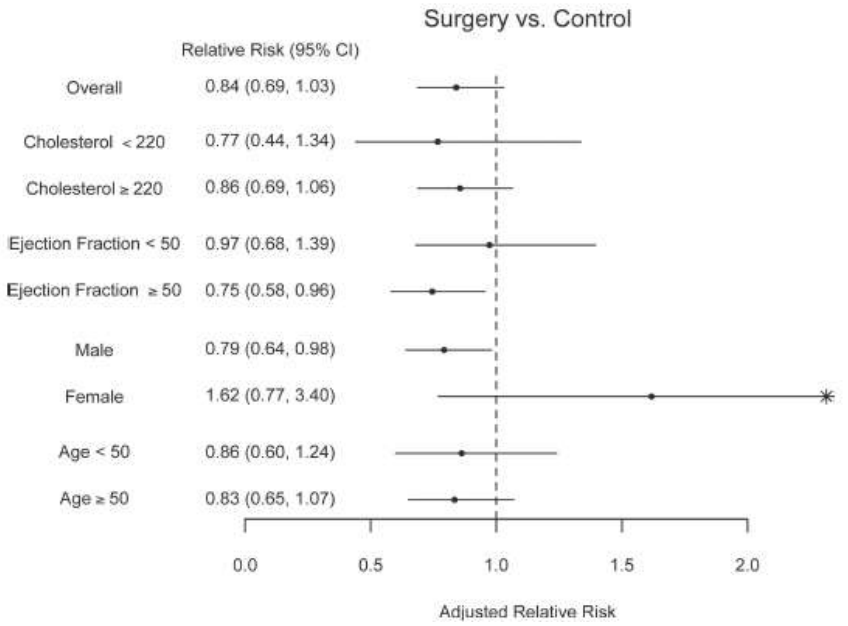
John M. Morton

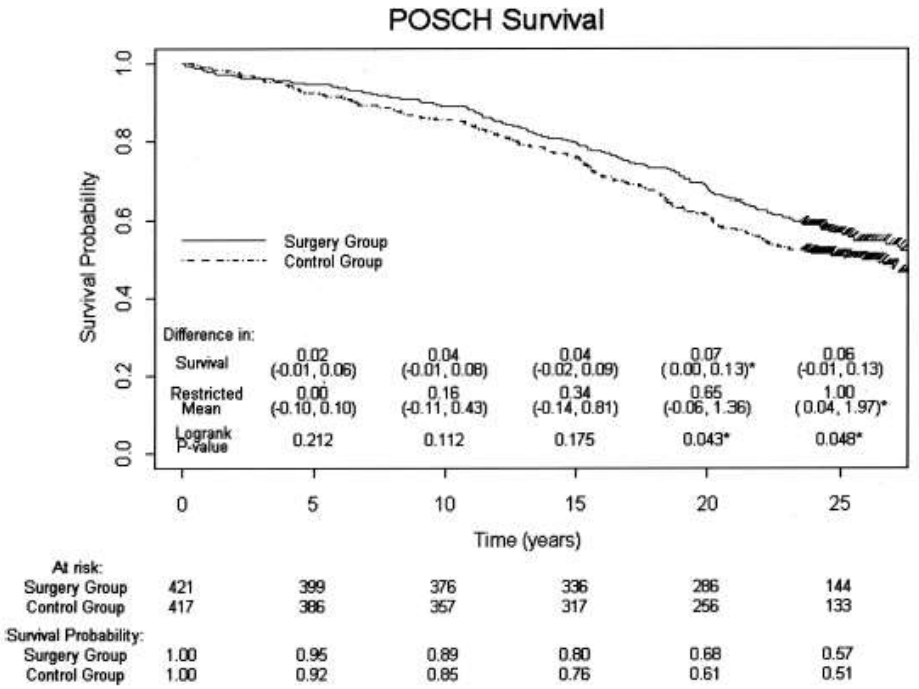
Physiology not Psychology

Overall Mortality, Incremental Life Expectancy, and Cause of Death at 25 Years in the Program on the Surgical Control of the Hyperlipidemias

Henry Buchwald, MD, PhD, Kyle D. Rudser, PhD,† Stanley E. Williams, PhD,* Van N. Michalek, BA,* James Vagasky,‡ and John E. Connett, PhD†*

Annals of Surgery • Volume 251, Number 6, June 2010





RCT demonstrating survival advantage at 25 years!

Is Survival Benefit Seen in Other Surgeries?

Do Patients Live Longer After THA and Is the Relative Survival Diagnosis-specific?

Clin Orthop Relat Res (2018) 476:1166-1175

after surgery, the survival in patients undergoing THA was 1% better than the expected survival (r = 1.01; 95% confidence interval [CI], 1.01-1.02; p < 0.001); at 5 years, this increased to 3% (r = 1.03; 95% CI, 1.03-1.03; p < 0.001); at 10 years, the difference was 2% (r = 1.02; 95% CI, 1.02-1.03; p < 0.001); and by 12 years, there was no difference between patients undergoing THA and the general population (r = 1.01; 95% CI, 0.99-1.02; p = 0.13). Using the

TJR: 3% Improvement 5 Years
Gone after 12

N Engl J Med. 2011 April 28; 364(17): 1607–1616. doi:10.1056/NEJMoa1100356.

Coronary-Artery Bypass Surgery in Patients with Left Ventricular Dysfunction

Eric J. Velazquez, M.D.
Division of Cardiovascular Medicine, Duke University Medical Center, Durham, NC

CONCLUSIONS—In this randomized trial, there was no significant difference between medical therapy alone and medical therapy plus CABG with respect to the primary end point of death from any cause. Patients assigned to CABG, as compared with those assigned to medical therapy alone, had lower rates of death from cardiovascular causes and of death from any cause or hospitalization for cardiovascular causes. (Funded by the National Heart, Lung, and Blood Institute and Abbott Laboratories; STICH ClinicalTrials.gov number, NCT00023595.)

No Survival Advantage

Procedural Characteristics Improving Mortality
Preoperative Weight Loss

Original article

Preoperative weight loss is linked to improved mortality and leaks following elective bariatric surgery: an analysis of 548,597 patients from 2015–2018

Valentin Mocanu, M.D.*, Gabriel Marcil, M.D., Jerry T. Dang, M.D., Daniel W. Birch, M.D., M.Sc., Noah J. Switzer, M.D., M.P.H., Shahzeer Karmali, M.D., M.P.H.

Table 4
Effect of PWL on leaks, bleeds, serious complications, and mortality as evaluated by multivariable logistic regression

	Leak			Bleed			Serious complications			Mortality		
	OR	95% CI	*P* value	OR	95% CI	*P* value	OR	95% CI	*P* value	OR	95% CI	*P* value
Percent weight loss												
0–5% versus 0%	.87	.77–.98	.02	.94	.87–1.02	.2	.97	.93–1.02	.2	.78	.61–.99	.04
5–10% versus 0%	.72	.63–.83	<.0001	.96	.88–1.05	.4	.95	.91–1.00	.04	.81	.62–1.06	.1
>10% versus 0%	.68	.56–.84	<.0001	1.08	.96–1.22	.2	1	.93–1.06	.9	.6	.39–.92	.02
Absolute weight loss												
0–5 kg versus 0 kg	.87	.77–.99	.03	.95	.88–1.04	.3	.98	.94–1.03	.4	.79	.62–1.02	.08
5–10 kg versus 0 kg	.78	.68–.89	<.0001	.95	.87–1.04	.3	.95	.91–1.00	.053	.8	.61–1.04	.1
>10 kg versus 0 kg	.7	.60–.81	<.0001	1	.91–1.10	1	.96	.91–1.01	.1	.71	.53–.95	.02
Percent weight loss (per 5% loss)	.85	.80–.91	<.0001	1.04	1.00–1.07	.06	.99	.97–1.01	.4	.9	.79–1.02	.09
Weight loss (per 5-kg loss)	.9	.86–.94	<.0001	1.02	.99–1.04	.1	.99	.98–1.00	.1	.94	.87–1.01	.09

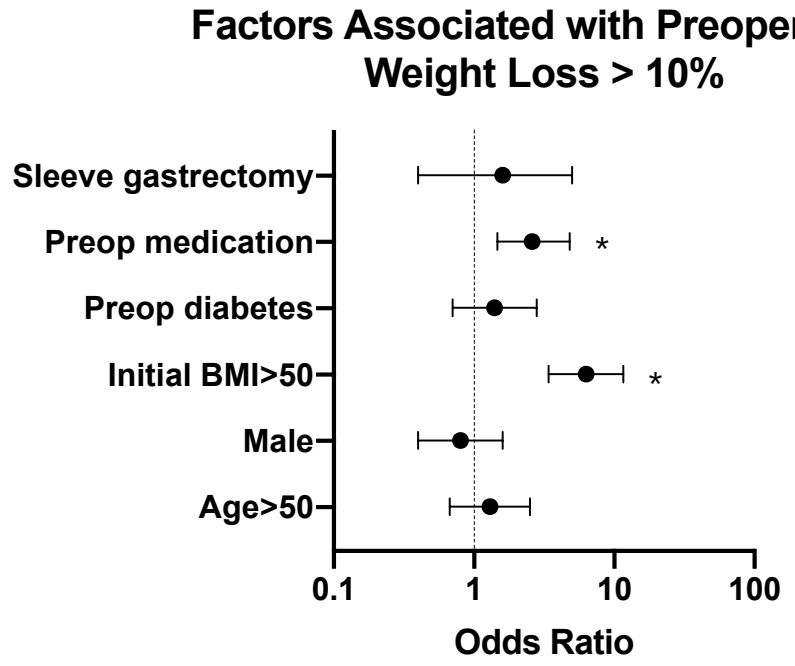
With Preop 10% Total Body Weight Loss…

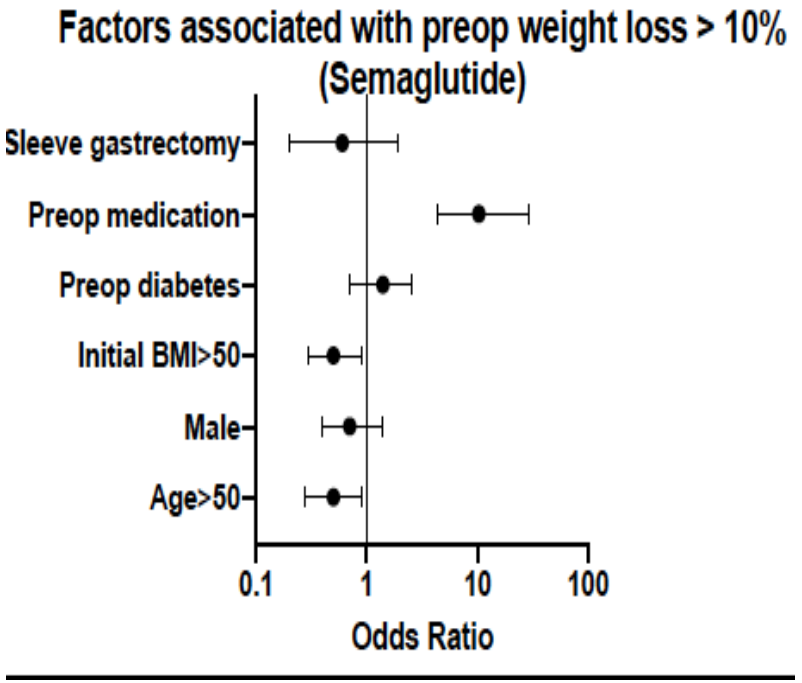
40% Reduction in Mortality and 32% Reduction in Leaks

Surgery for Obesity and Related Diseases 17 (2021) 1846–1853

Utilizing Neoadjuvant Anti-Obesity Medications for Patients Undergoing Bariatric Surgery Improves Outcomes- Morton et al

	Preop %TWL>10%	1 month %TWL>15%	6 month %TWL > 30%	12 month %TWL > 30%
Independent variables	*Odds ratio [95% Confidence interval]*			
Age>50	0.5 [0.3 - 0.9]	0.9 [0.4 - 2.1]	1.2 [0.6 - 2.8]	2.3 [1.0 - 5.5]
Male	1.4 [0.7 - 2.6]	1.6 [0.7 - 3.5]	0.9 [0.4 - 2.2]	0.4 [0.2 - 1.1]
Initial BMI>50	**2.1 [1.1 - 4.2]**	**3.9 [1.9 - 8.4]**	2.2 [0.9 - 4.9]	1.4 [0.6 - 3.2]
Preop diabetes	1.4 [0.8 - 2.6]	0.6 [0.2 - 1.3]	1.0 [0.4 - 2.3]	0.9 [0.4 - 2.0]
Preop medication	**10.0 [4.2 - 28.0]**	**3.8 [1.7-8.5]**	1.1 [0.4 - 2.7]	1.4 [0.5 - 3.8]
Sleeve gastrectomy	1.6 [0.5 - 5.3]	1.3 [0.2 - 4.8]	2.3 [0.6. - 8.2]	2.8 [0.8 - 11.9]





Procedural Characteristics Improving Mortality Hospital Volume

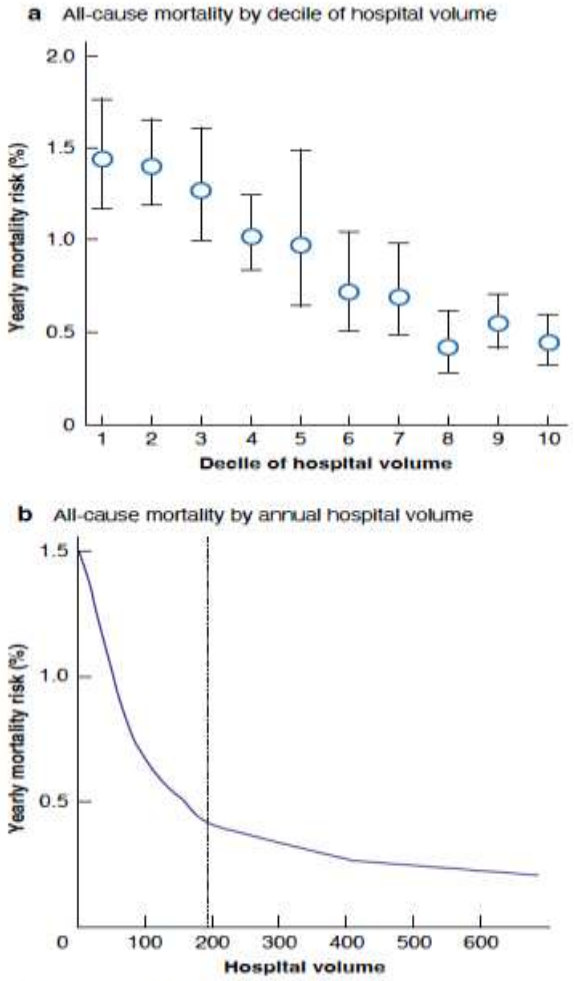


Fig. 3 All-cause mortality in relation to annual hospital volume of bariatric surgery

Bariatric surgery volume by hospital and long-term survival: population-based NordOSCo data

Sheraz R. Markar[1,2,3,*], Giola Santoni[1], Dag Holmberg[1], Joonas H. Kauppila[1,4] and Jesper Lagergren[1,5]

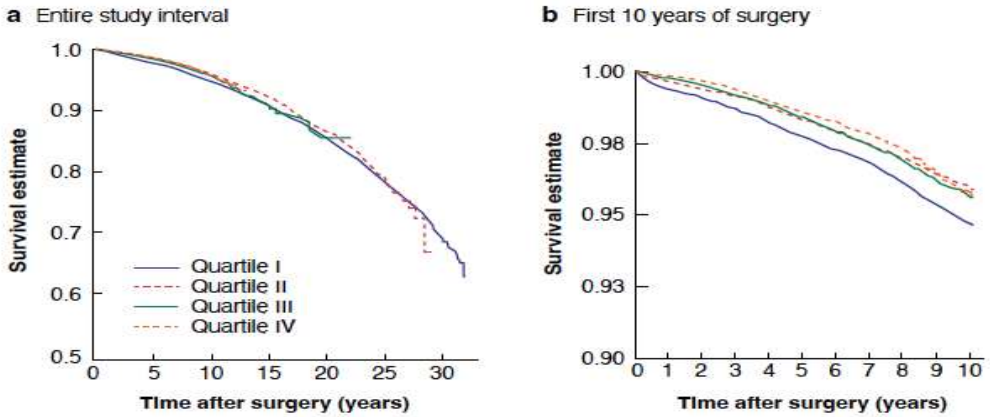


Fig. 2 Kaplan–Meier curves for overall survival by annual hospital volume of bariatric surgery

a Entire study interval and **b** first 10 years after surgery. Quartile I, 55.5 or fewer; quartile II, 55.75–111.25; quartile III, 111.5–221.5; and quartile IV, more than 221.5 bariatric procedures annually. Circle is point estimate and error bars are confidence interval.

Table 2 Main analyses: HRs for all-cause mortality by annual hospital volume of bariatric surgery

Hospital volume	Mortality rate per 100 000 people	HR	
		Unadjusted model	Adjusted model*
Continuous		0.99 (0.99, 0.99)	0.99 (0.99, 1.00)
Quartile			
I	815.1 (781.7, 849.9)	1.00 (reference)	1.00 (reference)
II	545.0 (512.0, 580.1)	0.88 (0.82, 0.96)	0.88 (0.81, 0.96)
III	428.8 (395.5, 465.0)	0.89 (0.80, 0.98)	0.87 (0.78, 0.97)
IV	356.0 (324.1, 391.1)	0.78 (0.70, 0.87)	0.82 (0.73, 0.93)

Summary And Conclusions

- MBS Increases Life Expectancy
  - Add Life to Years and Years to Life
- Large Benefit for Diabetics But Not Exclusive
- Reduction in 3 Cs: Cancer, Cardiac and Cirrhotic Deaths Plus Covid?
- Caution with Younger Patients and AUD
- Procedures appear equivalent with caveat for DS
- Procedural Characteristics that reduce mortality
  - Preop weight loss
  - Surgical Volume

Thank You

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