Gastric Sleeve Weight Loss; Early Results of a Self-Case Study

By: Kelsey Woods

woodskd24 (Kelsey Woods) (github.com)

Project Proposal

- Targeted problem
  - **Those who get bariatric surgery do not have information on weight trends to understand what they will likely experience post-surgery. Research like this has not been done well on a day to day level.**
- Research question
  - **Goal is to perform a time series analysis to investigate if we can forecast weight loss trends post gastric sleeve surgery, as well as look at correlative features.**
- Dataset
  - Self-collected data from date of surgery to current date. Includes features such as weight, bmi, protein intake, and measurements. Currently 69 KB.
- Motivation
  - I didn’t fully understand the magnitude of the weight loss post

Gastric Sleeve Journey

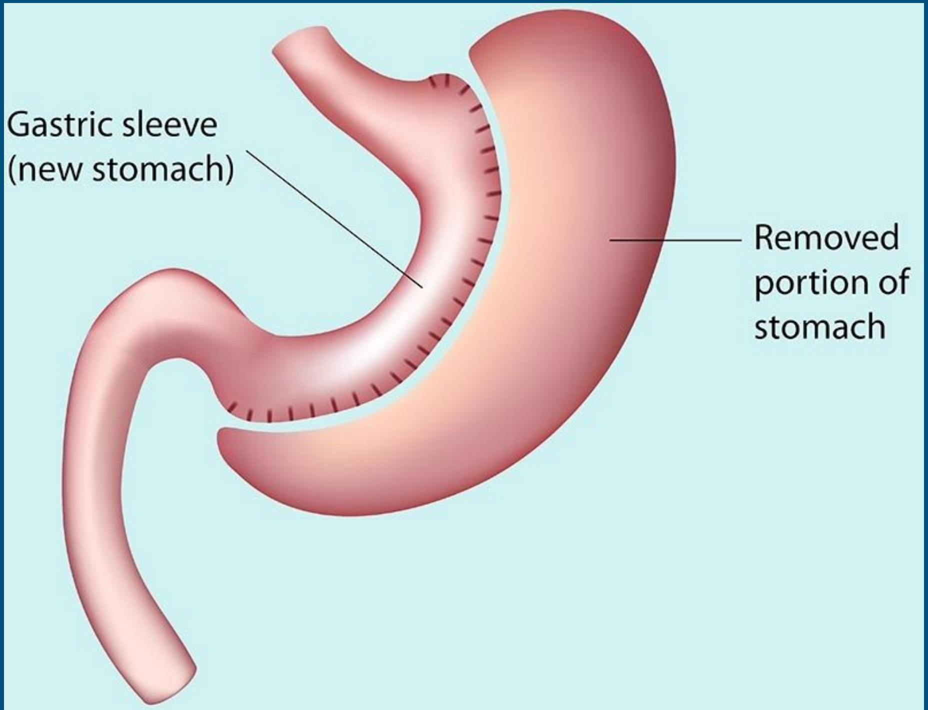
By: Kelsey Woods

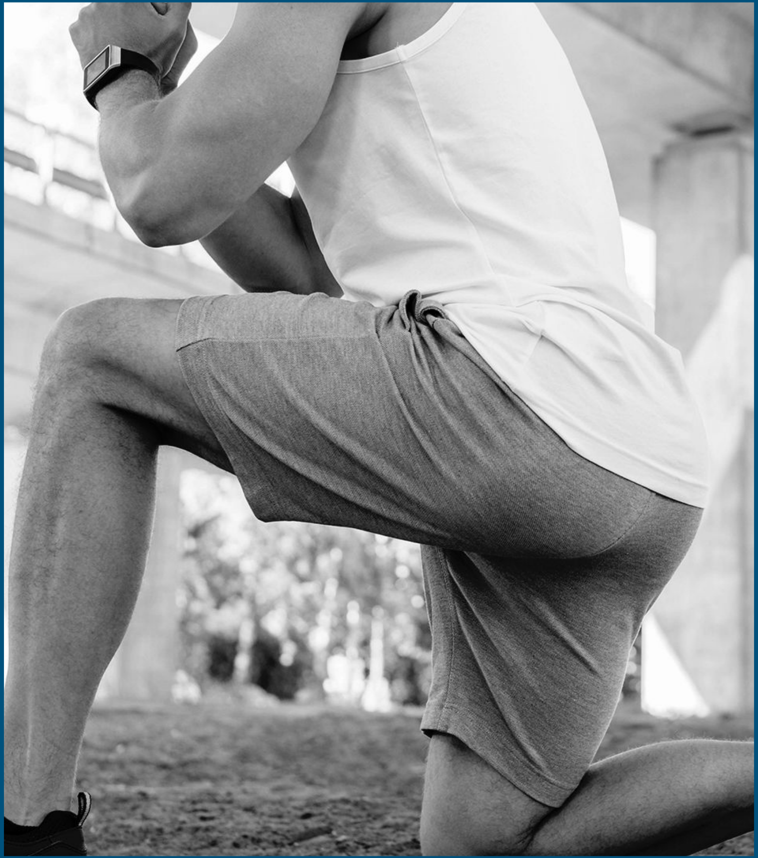
https://github.com/woodskd24/MS_DS_Capstone

Research Questions

Can post gastric sleeve weight loss be predicted at a monthly and daily interval

What are the greatest factors when it comes to post-GS surgery weight loss





8/25/2023	258.6	67	0	0	11.4	40.49806193	Severe Obesity	48.0	51.0	48.0	60	Walk	Liquids
8/26/2023	258.0	67	0.6	0.6	12.0	40.40409891	Severe Obesity	48.0	50.8	47.8	60	Walk	Liquids
8/27/2023	256.8	67	1.2	1.8	13.2	40.21617287	Severe Obesity	47.7	50.5	47.5	60	Walk	Liquids
8/28/2023	255.0	67	1.8	3.6	15.0	39.9342838	Class 2 Obesity	47.4	50.3	47.1	60	Walk	Liquids
8/29/2023	254.3	67	0.7	4.3	15.7	39.82466028	Class 2 Obesity	47.3	50.3	47.0	60	Walk	Liquids
8/30/2023	251.7	67	2.6	6.9	18.3	39.41748719	Class 2 Obesity	46.9	50.0	46.7	60	Walk	Liquids
8/31/2023	247.7	67	4.0	10.9	22.3	38.79106705	Class 2 Obesity	46.6	49.8	46.3	60	Walk	Liquids

Methodology & Next Steps

CONCLUSIONS

- Data science has been slowly breaking into clinical research, but has yet to touch this area of bariatric surgery
-
- I would like to see what can be expected for this surgery to help not only myself but others
-

References

Benaiges D, Más-Lorenzo A, Goday A, Ramon JM, Chillarón JJ, Pedro-Botet J, Flores-Le Roux JA. Laparoscopic sleeve gastrectomy: More than a restrictive bariatric surgery procedure? World J Gastroenterol. 2015 Nov 7;21(41):11804-14. doi: 10.3748/wjg.v21.i41.11804. PMID: 26557004; PMCID: PMC4631978.

Carvalho Silveira F, Maranga G, Mitchell F, Nowak BA, Ren-Fielding CJ, Fielding GA. First-year weight loss following gastric band surgery predicts long-term outcomes. ANZ J Surg. 2021 Nov;91(11):2443-2446. doi: 10.1111/ans.17233. Epub 2021 Sep 28. PMID: 34582100.

Kassir R, Debs T, Blanc P, Gugenheim J, Ben Amor I, Boutet C, Tiffet O. Complications of bariatric surgery: Presentation and emergency management. Int J Surg. 2016 Mar;27:77-81. doi: 10.1016/j.ijsu.2016.01.067. Epub 2016 Jan 22. PMID: 26808323.

Karpińska IA, Kulawik J, Pisarska-Adamczyk M, Wysocki M, Pędziwiatr M, Major P. Is It Possible to Predict Weight Loss After Bariatric Surgery?-External Validation of Predictive Models. Obes Surg. 2021 Jul;31(7):2994-3004. doi: 10.1007/s11695-021-05341-w. Epub 2021 Mar 13. PMID: 33712937; PMCID: PMC8175311.

O'Brien PE, Hindle A, Brennan L, Skinner S, Burton P, Smith A, Crosthwaite G, Brown W. Long-Term Outcomes After Bariatric Surgery: a Systematic Review and Meta-analysis of Weight Loss at 10 or More Years for All Bariatric Procedures and a Single-Centre Review of 20-Year Outcomes After Adjustable Gastric Banding. Obes Surg. 2019 Jan;29(1):3-14. doi: 10.1007/s11695-018-3525-0. PMID: 30293134; PMCID: PMC6320354

Pekkarinen T, Mustonen H, Sane T, Jaser N, Juuti A, Leivonen M. Long-Term Effect of Gastric Bypass and Sleeve Gastrectomy on Severe Obesity: Do Preoperative Weight Loss and Binge Eating Behavior Predict the Outcome of Bariatric Surgery? Obes Surg. 2016 Sep;26(9):2161-2167. doi: 10.1007/s11695-016-2090-7. PMID: 26843084

Schrader G, Stefanovic S, Gibbs A, Elmslie R, Higgins B, Slavotinek A. Do psychosocial factors predict weight loss following gastric surgery for obesity? Aust N Z J Psychiatry. 1990 Dec;24(4):496-9. doi: 10.3109/00048679009062905. PMID: 2073225.

Vitiello A, Abu-Abeid A, Dayan D, Berardi G, Musella M. Long-Term Results of Laparoscopic Sleeve Gastrectomy: a Review of Studies Reporting 10+ Years Outcomes. Obes Surg. 2023 Sep 25. doi: 10.1007/s11695-023-06824-8. Epub ahead of print. PMID: 37743393

Literature Review

By: Kelsey Woods

First-year weight loss following gastric band surgery predicts long-term outcomes

Citation: Carvalho Silveira F, Maranga G, Mitchell F, Nowak BA, Ren-Fielding CJ, Fielding GA. First-year weight loss following gastric band surgery predicts long-term outcomes. ANZ J Surg. 2021 Nov;91(11):2443-2446. doi: 10.1111/ans.17233. Epub 2021 Sep 28. PMID: 34582100.

Goal: “To investigate the prognostic utility of using early weight loss following LAGB to predict long-term weight outcomes”

Methodology: Clinical data from patients undergoing LAGB between 2001 and 2007 at a single institution were retrospectively collected and analysed

Results: Weight loss of less than 10% in 1 year was a negative predictor of weight loss >20% in 8-12 years (OR = 0.449; $p = 0.002$; 95% CI = 0.272-0.742). Moreover, weight loss >20% in 1 year was a strong predictor of weight loss >20% in 8-12 years (OR = 5.33; $p < 0.001$; 95% CI = 3.17-8.97).

Link: https://pubmed.ncbi.nlm.nih.gov/34582100/

Is It Possible to Predict Weight Loss After Bariatric Surgery?-External Validation of Predictive Models

Citation: Karpińska IA, Kulawik J, Pisarska-Adamczyk M, Wysocki M, Pędziwiatr M, Major P. Is It Possible to Predict Weight Loss After Bariatric Surgery?-External Validation of Predictive Models. Obes Surg. 2021 Jul;31(7):2994-3004. doi: 10.1007/s11695-021-05341-w. Epub 2021 Mar 13. PMID: 33712937; PMCID: PMC8175311.

Goal: Is it possible to predict weight loss after bariatric surgery

Methodology: Retrospective analysis included patients after Roux-en-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) who completed 1-year follow-up. Postoperative body mass index (BMI) predicted by 12 models was calculated for each patient. The correlation between predicted and observed BMI was assessed using linear regression. Accuracy was evaluated by squared Pearson's correlation coefficient (R2). Goodness-of-fit was assessed by standard error of estimate (SE) and paired sample t test between estimated and observed BMI.

Results: Of patients, 65.92% underwent SG and 34.08% had RYGB. Median BMI decreased from 45.19 to 32.53kg/m2 after 1 year.

Link: https://pubmed.ncbi.nlm.nih.gov/33712937/

Do psychosocial factors predict weight loss following gastric surgery for obesity?

Citation: Schrader G, Stefanovic S, Gibbs A, Elmslie R, Higgins B, Slavotinek A. Do psychosocial factors predict weight loss following gastric surgery for obesity? Aust N Z J Psychiatry. 1990 Dec;24(4):496-9. doi: 10.3109/00048679009062905. PMID: 2073225.

Goal: Determine whether psychosocial factors determined during a pre-operative semi-structured psychiatric interview were associated either with the amount of weight loss following obesity surgery or with dropping out from follow-up after surgery

Methodology: Multiple regression and discriminant function analysis of weight loss at six, twelve, twenty four and thirty six months

Results: no correlation between psychosocial variables and the amount of weight lost or with dropping out from follow-up.

Link: https://pubmed.ncbi.nlm.nih.gov/2073225/

Long-Term Effect of Gastric Bypass and Sleeve Gastrectomy on Severe Obesity: Do Preoperative Weight Loss and Binge Eating Behavior Predict the Outcome of Bariatric Surgery?

Citation: Pekkarinen T, Mustonen H, Sane T, Jaser N, Juuti A, Leivonen M. Long-Term Effect of Gastric Bypass and Sleeve Gastrectomy on Severe Obesity: Do Preoperative Weight Loss and Binge Eating Behavior Predict the Outcome of Bariatric Surgery? Obes Surg. 2016 Sep;26(9):2161-2167. doi: 10.1007/s11695-016-2090-7. PMID: 26843084

Goal: to determine long-term outcome after SG and gastric bypass (GBP) and learn whether preoperative weight loss and binge eating behavior can be used to predict outcome

Methodology: 257 patients (64 % women) were operated, 163 by GBP and 94 by SG. Binge eating was assessed by binge eating scale (BES) and preoperative weight loss was advised to all, including very low-calorie diet for 5 weeks

Results: Total weight loss at year one was 24.1 % in GBP and 23.7 % in SG (P = 0.40), at year two 24.4 and 23.4 % (P = 0.26), and at long-term control 23.0 and 20.2 % (P = 0.006), respectively. Weight was analyzed in 93, 88, and 89 % of those alive, respectively. BES did not predict weight outcome, but larger preoperative weight loss predicted less postoperative weight loss at 2 years.

Link: https://pubmed.ncbi.nlm.nih.gov/26843084/

Long-Term Outcomes After Bariatric Surgery: a Systematic Review and Meta-analysis of Weight Loss at 10 or More Years for All Bariatric Procedures and a Single-Centre Review of 20-Year Outcomes After Adjustable Gastric Banding

Citation: O'Brien PE, Hindle A, Brennan L, Skinner S, Burton P, Smith A, Crosthwaite G, Brown W. Long-Term Outcomes After Bariatric Surgery: a Systematic Review and Meta-analysis of Weight Loss at 10 or More Years for All Bariatric Procedures and a Single-Centre Review of 20-Year Outcomes After Adjustable Gastric Banding. Obes Surg. 2019 Jan;29(1):3-14. doi: 10.1007/s11695-018-3525-0. PMID: 30293134; PMCID: PMC6320354.

Goal: a systematic review and meta-analysis of all reports providing data at 10 or more years and a single-centre study of laparoscopic adjustable gastric banding (LAGB) with 20 years of follow-up.

Methodology: a prospective cohort study of LAGB patients measuring weight loss and reoperation at up to 20 years is presented

Results: All current procedures are associated with substantial and durable weight loss. More long-term data are needed for one-anastomosis gastric bypass and sleeve gastrectomy. Reoperation is likely to remain common across all procedures.

Link: https://pubmed.ncbi.nlm.nih.gov/30293134/

Long-Term Results of Laparoscopic Sleeve Gastrectomy: a Review of Studies Reporting 10+ Years Outcomes

Citation: Vitiello A, Abu-Abeid A, Dayan D, Berardi G, Musella M. Long-Term Results of Laparoscopic Sleeve Gastrectomy: a Review of Studies Reporting 10+ Years Outcomes. Obes Surg. 2023 Sep 25. doi: 10.1007/s11695-023-06824-8. Epub ahead of print. PMID: 37743393

Goal: Systematic search of Pubmed, Cochrane, and Embase was performed in order to find all the articles reporting 10+ years of LSG results

Methodology: a meta analysis of the procedures overall

Results: Eleven studies including 1020 patients met the inclusion criteria. Overall weighted mean %TWL was 24.4% (17-36.9%), and remission rates from TD2M to HTN were 45.6% (0-94.7%) and 41.4% (0-78.4%), respectively. De novo GERD had an overall prevalence of 32.3% (21.4-58.4%), and five cases (0.5%) of Barrett's disease were reported. Revisional surgery was required for 19.2% (1-49.5%) of patients, Roux-en-Y gastric bypass being the most common secondary procedure.

Link: https://pubmed.ncbi.nlm.nih.gov/37743393/

Laparoscopic sleeve gastrectomy: More than a restrictive bariatric surgery procedure?

Citation: Benaiges D, Más-Lorenzo A, Goday A, Ramon JM, Chillarón JJ, Pedro-Botet J, Flores-Le Roux JA. Laparoscopic sleeve gastrectomy: More than a restrictive bariatric surgery procedure? World J Gastroenterol. 2015 Nov 7;21(41):11804-14. doi: 10.3748/wjg.v21.i41.11804. PMID: 26557004; PMCID: PMC4631978.

Goal: The aim of this review was to highlight the salient aspects of SG regarding its historical evolution, pathophysiologic mechanisms, main results, clinical applications and perioperative complications.

Methodology: Perform a meta analysis of SG studies

Results: SG achieves clearly better results than other restrictive techniques and is comparable in some aspects to the Roux-en-Y gastric bypass, the current gold standard in bariatric surgery.

Link: https://pubmed.ncbi.nlm.nih.gov/26557004/

Complications of bariatric surgery: Presentation and emergency management

Citation: Kassir R, Debs T, Blanc P, Gugenheim J, Ben Amor I, Boutet C, Tiffet O. Complications of bariatric surgery: Presentation and emergency management. Int J Surg. 2016 Mar;27:77-81. doi: 10.1016/j.ijsu.2016.01.067. Epub 2016 Jan 22. PMID: 26808323.

Goal: Determine the main complications after surgery

Methodology: A meta analysis of different surgery complications

Results: The most common complication after surgery is peritonitis due to anastomotic fistula formation

Link: https://pubmed.ncbi.nlm.nih.gov/26808323/