

# COMPARATIVE EFFECTIVENESS OF WEIGHT LOSS TREATMENTS: DIET, PHARMACOLOGIC AGENTS, AND BARIATRIC SURGERY

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## BACKGROUND

- Comparative effectiveness research (CER) evaluates the benefits and harms of different interventions and strategies to prevent, diagnose, treat, and monitor health conditions.<sup>1</sup>
- In contrast to research on novel interventions, CER helps determine which existing interventions are most effective, safest, or least costly when multiple options are available.<sup>2</sup>
- A recent systematic literature review examined recently published studies in top-tier journals that evaluated medications and found that only one-third qualified as CER, defined as studies that compared existing medications with active comparators, and that only 10% compared pharmacological with non-pharmacological treatments.<sup>3</sup>
- The Institute of Medicine (IOM) has declared that using CER to compare different treatment options (surgical and nonsurgical) for obesity is a national priority.<sup>1</sup>
- Although systematic literature reviews and meta-analyses have evaluated the efficacy and cost-effectiveness of various weight loss interventions, these have typically focused on a single treatment modality, and it is often unclear how the information produced by these analyses can be used by payers to help determine coverage and reimbursement for weight loss treatments.
- The methods used to evaluate the efficacy of weight loss treatments in clinical trials have varied widely, hindering CER based on existing clinical evidence.<sup>4</sup>
- To better inform coverage and reimbursement decision making, new methods must be developed to compare existing and emerging weight loss treatments.

## OBJECTIVE

- To compare the efficacy of various modalities of weight loss treatments at one year.

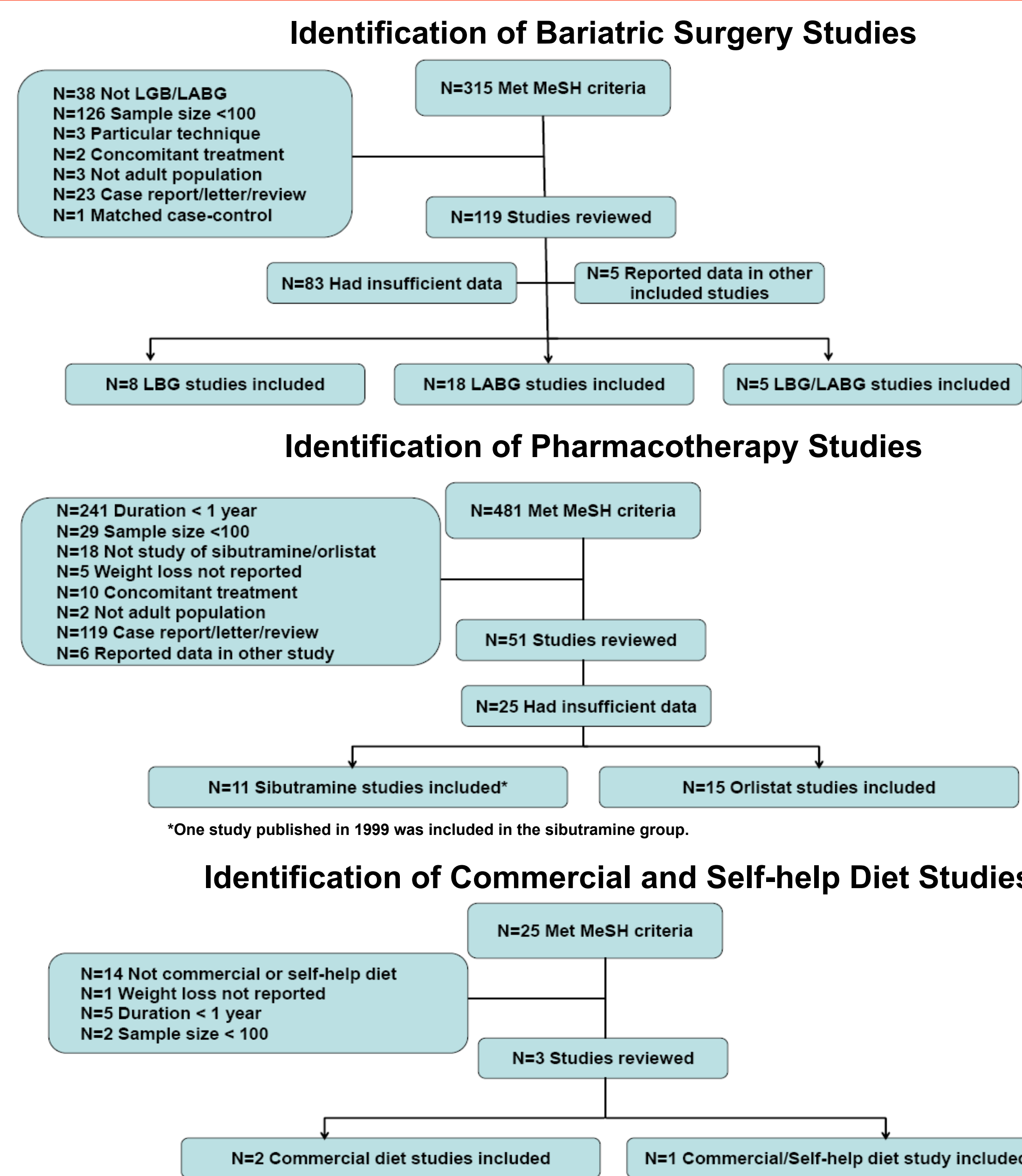
## METHODS

- We conducted a systematic literature review of published clinical trials to compare mean percent weight loss from baseline to one year for the following weight loss treatments:
  - Bariatric surgery
    - Laparoscopic Roux-en-Y gastric bypass (LGB)
    - Laparoscopic Adjustable Gastric Banding (LAGB)
  - FDA-approved weight loss medications
    - Orlistat 120 mg three times a day
    - Sibutramine 10-15 mg/day
  - Self-help diets
  - Commercial diet programs
- Inclusion criteria were consecutive patient series or randomized clinical trials; English language; adults only (>18 years old); reported the mean percent weight loss at one year, or baseline weight and either percentage excess weight loss or absolute weight loss at one year; enrollment sample size of ≥100.
- Exclusion criteria included nonhuman studies; concomitant weight loss treatments except for hypocaloric diet for patients receiving pharmacotherapy; surgeries other than LGB/LAGB, strictly revisional surgeries, or surgeries focusing on a particular technique; follow-up before one year.
  - We combined various commercial diet programs as research indicates that the effectiveness of diets does not differ based on their macronutrient content.
- A MEDLINE search of studies published from 2000 to 2009 using the MeSH terms "bariatric surgery," "laparoscopy," and "weight loss" identified LGB/LAGB studies; the terms "sibutramine," "orlistat," and "weight loss" identified pharmacotherapy studies; and the terms "obesity/diet therapy" [Mesh], "weight loss" [Mesh], and "commercial," "popular," and "self-help" identified commercial and self-help diet studies.
- Electronic papers were reviewed based on inclusion/exclusion criteria, and selected papers were abstracted and entered into an Excel database.

## METHODS: CALCULATION OF MEAN % WEIGHT LOSS AT ONE YEAR

- Studies of bariatric surgery often report weight loss in terms of percent excess weight loss (%EWL), defined as:
  - $[(\text{Preoperative Weight} - \text{Postoperative Weight}) / (\text{Preoperative Weight} - \text{Ideal Weight})] * 100$
  - Ideal weight was derived from the 1983 Metropolitan insurance height and weight tables,<sup>5</sup> which represent the weight for each height at which mortality was lowest and longevity was highest.
    - We assumed an "ideal" weight of 70 kg for males (69" tall, 154 lb) and 59.5 kg for females (64" tall, 131 lb), which corresponds to the midpoint of the large frame for the Metropolitan tables.
- To calculate the mean percentage weight loss at one year based on the %EWL at one year:
  - The **ideal average baseline weight** for each group was calculated as:
    - $[(\text{Number of Males} * 70 \text{ kg}) + (\text{Number of Females} * 59.5 \text{ kg})] / \text{Total Number of Male and Female Subjects}$
  - The **average weight loss** achieved was calculated as:
    - $[(\text{Mean Baseline Weight} - \text{Ideal Baseline Weight}) * (\% \text{ Excess Weight Loss at One Year})]$

## RESULTS: STUDY IDENTIFICATION



## RESULTS: MEAN PERCENT WEIGHT LOSS AT ONE YEAR

Treatment	Number of Studies	N	Mean (Range) Baseline Weight (kg)	Mean (Range) Weight Loss at One Year (kg)	Mean (Range) % Weight Loss at One Year
LGB	13 <sup>6-18</sup>	5,392	130.3 (129.5-162.0)	53.6 (38.4-62.6)	38.2 (29.2-45.0)
LAGB	23 <sup>8,9,12,15,17,19-36</sup>	11,059	124.7 (117.0-145.0)	25.7 (16.6-53.2)	20.6 (14.1-37.2)
Sibutramine	11 <sup>37-47</sup>	1,505	99.8 (96.7-108.2)	7.7 (4.4-9.6)	7.8 (4.5-9.9)
Orlistat	15 <sup>48-62</sup>	4,662	100.2 (95.3-110.4)	8.0 (3.9-9.9)	7.7 (3.8-10.0)
Commercial diet	3 <sup>63-65</sup>	682	93.1 (85.0-100.0)	4.3 (4.0-5.0)	4.7 (4.6-5.0)
Self-help diet	1 <sup>65</sup>	212	93.0	1.3	1.4

LGB=laparoscopic gastric bypass; LAGB=laparoscopic adjustable gastric banding

## CONCLUSIONS

- To our knowledge, this is the first systematic literature review to compare the effectiveness of bariatric surgery, pharmacotherapy, and dietary therapy using the same weight loss parameters as outcomes.
- This study demonstrates just one example of how CER of existing weight loss treatments might be conducted. Other comparisons would be facilitated by uniform reporting of weight loss outcomes across weight loss studies.
- This study had some limitations:
  - Although outcomes were reported at one-year follow-up (which excludes many shorter-term pharmacotherapy and diet studies), and weight loss at one year is typically lower than weight loss before one year, follow-up after one year is likely to show an attenuation of weight loss.
  - Whereas studies of weight loss pharmacotherapy and diets were randomized clinical trials (RCTs), all bariatric surgery studies meeting inclusion criteria were consecutive patient series.
    - Consecutive series may overestimate weight loss because posttreatment data for patients lost to follow-up (often a substantial number) are not included in the analyses whereas RCTs that report the intent-to-treat outcomes offer more conservative estimates of weight loss.
  - Outcomes were limited to weight loss and did not include other important information needed to assess the value of weight loss treatments, such as other measures of efficacy (e.g., % achieving weight loss thresholds, reduction in weight-related comorbidities or cardiometabolic risks), safety and tolerability, and costs.
- Nonetheless, the information gleaned from this study can be useful in exploring future development of healthcare coverage and reimbursement policies for current and emerging weight loss treatments.

## REFERENCES

A list of references is provided in the handout.

## FOR FURTHER INFORMATION

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## DISCLOSURES

Cheryl Hankin and Amy Bronstone are consultants to VIVUS, Inc. Research supported by VIVUS, Inc.