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Review Article

GLP-1 medications versus surgery and balloon: evaluating cost-benefit in weight loss

Carlos Israel Verdugo Salazar*, Salvador Zadur Kaloyan Lopez, Casandra Rosas Rios, Luis Fernando Gálvez Coutiño

Unidad Medica De Alta Especialidad #25 del IMSS, Monterrey, Nuevo León, Mexico

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***Correspondence:**
Dr. Carlos Israel Verdugo Salazar,
E-mail: cv245997@gmail.com

ABSTRACT

This narrative review compares three prominent interventions-GLP-1 receptor agonists (e.g., semaglutide), laparoscopic sleeve gastrectomy (LSG), and intragastric balloon therapy-regarding their clinical efficacy and cost-effectiveness. Drawing on recent meta-analyses, professional guidelines, and economic modeling studies from 2023-2025, we synthesize key findings related to weight loss outcomes, comorbidity resolution, and long-term value. Bariatric surgery, particularly LSG, achieves the most substantial and durable weight loss (~20-30% of total body weight) and offers superior long-term benefits, including diabetes remission and reduced cardiovascular risk. Despite high initial costs, it is consistently found to be cost-effective or cost-saving over time, particularly in patients with diabetes. GLP-1 receptor agonists produce meaningful weight loss (~10-15%) and metabolic improvement but are associated with significant ongoing costs and potential weight regain after discontinuation, limiting long-term cost-effectiveness. Intragastric balloon therapy is less invasive and lower in immediate cost, with moderate efficacy (~10-15% weight loss), but typically results in temporary benefits and limited insurance coverage. As a standalone therapy, its cost-effectiveness is inferior to surgery, though modeling suggests economic value when used as a pre-surgical adjunct. Overall, LSG emerges as the most cost-effective intervention in severe obesity, while GLP-1 therapy's value depends heavily on duration and pricing. Intragastric balloons may be viable for specific subpopulations or preparatory contexts. Tailoring intervention selection based on both clinical and economic parameters is essential for sustainable obesity management. Further research is warranted to refine cost-benefit assessments as new therapies and pricing models evolve.

Keywords: Obesity, Weight loss, GLP-1 receptor agonists, Semaglutide, Sleeve gastrectomy, Metabolic surgery, Intragastric balloon, Cost-effectiveness, Health economics, Quality-adjusted life years

INTRODUCTION

Obesity has reached epidemic prevalence worldwide, contributing to a surge in weight-related comorbidities and healthcare expenditures. Recent estimates indicate that over 650 million adults globally (about 13% of the population) are obese, with trends projecting further increases in the coming decade.[1-6] In United States, adult obesity prevalence rose to 42.4% by 2018, reflecting a steady upward trend despite public health efforts. Excess body weight markedly elevates risk of type 2 diabetes, cardiovascular disease, certain cancers, and all-cause mortality.[3] Consequently, there is an urgent need for effective and cost-effective weight loss interventions to mitigate obesity's clinical and economic burden.

Current evidence supports three main modalities for achieving significant weight reduction in adults with obesity: pharmacological therapy, metabolic bariatric surgery, and endoscopic devices. Each approach has distinct mechanisms and cost implications. Pharmacotherapy for obesity has advanced rapidly with the introduction of GLP-1 receptor agonists such as liraglutide and semaglutide, and more recently dual agonists like tirzepatide. These medications, initially developed for diabetes, at higher doses induce substantial weight loss by suppressing appetite and reducing caloric intake. Clinical trials of weekly semaglutide 2.4 mg (approved for obesity) have demonstrated mean weight losses around 10-15% of body weight over 1 to 2 years in obese individuals, along with improvements in glycemic control and cardiovascular risk factors.[2] However, long-term data (≥5 years) on sustained efficacy of pharmacotherapy are limited, and weight regain is common if the medication is discontinued.[3] Moreover, the financial cost of GLP-1 drugs is high: for example, semaglutide 2.4 mg has an average U.S. retail cost on the order of $1,300-$1,600 per month, which must be incurred continuously to maintain results. These factors raise questions about the long-term cost-benefit profile of chronic anti-obesity medication use.[2]

By contrast, metabolic (bariatric) surgery has a decades-long track record of inducing profound and durable weight loss. Procedures such as the LSG-in which ~80% of the stomach is removed to restrict intake-typically achieve 20-30% total body weight loss maintained over years.[2,3] Such weight reduction frequently leads to remission of type 2 diabetes and improvements in hypertension, dyslipidemia, and sleep apnea. A recent meta-analysis of randomized trials found that, over 5-10 years of follow-up, bariatric surgery resulted in significantly greater weight loss (by ~22 kg more, on average) than intensive medical therapy for obesity.[1] Surgery was also superior in producing favorable changes in cardiovascular and metabolic markers such as blood pressure, lipids, and glycemic control.[1] Long-term observational studies have associated bariatric surgery with lower incidence of major cardiovascular events, cancers, and mortality compared to non-surgical management, highlighting its durability and survival benefit.[3] These health benefits, however, come with high upfront costs and operative risks. A sleeve gastrectomy or gastric bypass procedure typically costs on the order of $10,000-$20,000 in the U. S., and while perioperative mortality is low (~0.1-0.5%), there is a 2-6% risk of major complications within 30 days and additional longer-term risks (e.g. micronutrient deficiencies, re-operations).[2,3] Therefore, an important consideration is whether the long-term savings from improved health and reduced medication usage after surgery can outweigh the initial surgical expense.

The third modality, intragastric balloon therapy, involves placing a balloon device in the stomach to induce satiety. Traditional balloons require endoscopic placement and removal after 6 months, whereas newer procedure-less balloons can be swallowed in a capsule and later pass naturally. Intragastric balloons are approved for patients with moderate obesity (BMI ~30-40) and produce modest weight loss (on average 10-15% of body weight while the balloon is in place, diminishing to ~6-8% at 1 year after balloon removal).[3] Their appeal lies in being less invasive and reversible compared to surgery. Nevertheless, the weight reduction from balloons is typically temporary, as patients often regain weight after the device is removed unless definitive therapy or lifestyle changes follow. Also, multiple balloon treatments can be repeated but incur additional cost. The safety profile of balloons is generally good (common side effects include nausea and abdominal pain, with rare serious complications such as gastric perforation).[3] The cost of intragastric balloon therapy varies but usually ranges in the several thousands of dollars per treatment, and importantly, insurance coverage is often lacking. American diabetes association (ADA) notes that devices like gastric balloons have high costs, limited insurance coverage, and limited efficacy data, which have led to uncertainty about their role and even withdrawal of some devices from the market.[2] Thus, intragastric balloons occupy a niche in obesity treatment-potentially useful for bridging or for those unwilling to undergo surgery-but their cost-effectiveness relative to other options remains uncertain in the long run.

In summary, clinicians and policymakers face a complex decision matrix: GLP-1 medications offer a pharmacological means to weight loss without surgery but require ongoing expense; metabolic surgery promises large and lasting weight loss with one-time cost and proven health outcome gains; and balloon therapy provides a less invasive, interim solution with intermediate cost and efficacy. Understanding the cost-benefit trade-offs among these options is critical for evidence-based obesity management. This article examines and compares the three approaches, focusing on both clinical outcomes and economic considerations. We integrate findings from recent studies and reviews to address how each intervention measures up in terms of value for money-i.e., the health benefits achieved relative to costs-in both short-term and long-term contexts.

THEORETICAL FRAMEWORK

Health decision-making for obesity interventions often employs a cost-effectiveness analysis (CEA) framework. In a CEA, the costs of an intervention (direct medical costs and sometimes indirect costs) are weighed against health outcomes, commonly quantified in quality-adjusted life years (QALYs) gained. The result is an incremental cost-effectiveness ratio (ICER), typically expressed as cost per QALY gained for one strategy versus an alternative. An intervention is usually deemed "cost-effective" if the ICER falls below a willingness-to-pay threshold, often around $50,000-$100,000 per QALY in U. S. health economics.[4] If an intervention leads to net cost savings while improving outcomes, it can be considered cost-saving.

Applying this framework to obesity treatments requires accounting for the unique nature of each approach.

Pharmacotherapy costs accrue over time (potentially for life), whereas bariatric surgery incurs a one-time cost (with possible additional costs for perioperative care or complications). Device therapies like balloons have time-limited effects and may be used in combination with other treatments. Therefore, time horizon is a critical factor: analyses with short horizons (e.g., 1-3 years) may favor less invasive or less costly short-term interventions, while longer horizons (10+ years or lifetime) are more likely to capture the full benefits of surgery's durability.[2,6] Indeed, as ADA's guidelines highlight, bariatric surgery's higher initial cost can be offset over time-it has been found cost-effective or even cost-saving for individuals with type 2 diabetes, but these conclusions depend heavily on assumptions about long-term effectiveness, the specific alternative therapy, and time frame considered.[2] Shorter-term analyses/those with pessimistic assumptions about sustained weight loss may undervalue surgery's benefits, whereas long-term models often show surgery paying off by reducing future healthcare utilization.[2,6]

Another important theoretical consideration is the perspective of the economic analysis. Most studies take a healthcare payer perspective, including only direct medical costs.[6] This captures expenses like surgery fees, medication costs, and treatment of complications. A broader societal perspective would also include indirect costs such as lost productivity from obesity-related illness or the patient's time and travel costs for treatment.[6] A societal view might favor interventions that quickly restore productivity (e.g., surgery leading to remission of diabetes could yield societal gains beyond medical cost savings). However, few obesity economic evaluations to date have adopted a full societal perspective.[6] In this review, when comparing cost-benefit, primarily consider healthcare system viewpoint given available data.

Clinical outcomes-particularly magnitude of weight loss and resolution of comorbid conditions-form the benefit side of the cost-benefit equation. Here, it is important to recognize that weight loss per se has health value: even a 5-10% weight reduction can significantly improve glycemic control and blood pressure, while losses >20% (as often seen with surgery) can induce disease remission and reduce long-term mortality risk.[2,3] Thus, interventions achieving greater and more durable weight loss will confer larger QALY gains. For instance, metabolic surgery's ~25% average weight loss often leads to improvement or remission of diabetes in a high proportion of patients, which translates to fewer complications and medications and improved survival.[2,3] These benefits accumulate over a lifetime. On the other hand, GLP-1 agonists' ~10-15% weight loss can also improve health (indeed, semaglutide 2.4 mg has been shown to reduce the incidence of cardiovascular events in overweight patients, but if the drug is stopped and weight is regained, the long-term health benefit may diminish. Therefore, maintenance of weight loss is a key factor in sustained cost-effectiveness.[2] Intragastric balloon's 10-15% short-term weight loss may improve quality of life (QoL) and metabolic parameters for duration of therapy, but without follow-up treatment the benefit may largely vanish after the balloon is removed.[3] In cost-effectiveness terms, a balloon would need to either be a bridge to something else (like enabling safer surgery or motivating behavior change) or be repeated periodically to maintain benefit-both scenarios involving additional cost.

It is also useful to consider a simpler "break-even" analysis in economic terms. This approach asks: at what point does the cumulative cost of a given intervention equal that of an alternative? One recent analysis explicitly compared the cost trajectories of GLP-1 RA therapy versus bariatric surgery: using 2023 U. S. prices for medications and inflation-adjusted surgical costs, researchers calculated how many months of medication would equate to the cost of one surgery.[5] Such break-even points provide an intuitive benchmark for short-term vs. long-term cost trade-offs, though they do not directly incorporate health outcomes. Additionally, beyond monetary costs, each modality carries different risk-benefit profiles (for example, surgical complications versus medication side effects) that are part of the overall value assessment but can be difficult to monetize. In practice, the "best" intervention for weight loss depends not only on cost-effectiveness ratios but also on individual patient factors (BMI, comorbidities, preferences) and healthcare system constraints (such as insurance coverage and accessibility).

Table 1: Comparison of weight loss interventions.

Intervention	Average weight loss (%)	Duration of effect	Approximate cost (USD)	Adverse event risk	Gastroesophageal reflux	Ideal candidates	Cost-benefit ratio
GLP-1 RAs (e.g., semaglutide)	10-15%	Depends on continuous use	1,300-1,600/ month	Nausea, vomiting, pancreatitis risk	Low	Patients not eligible for surgery or preferring medical option	Moderate, depends on duration and price
Sleeve gastrectomy (Surgery)	20-30%	Long-term durability	10,000-20,000 one-time	Surgical complications (2-6%)	Controlled if fundoplication is added	Severe obesity, T2DM, motivated surgical candidates	High, single cost with durable benefits
Intragastric balloon	10-15% (temporary)	Limited (~6–12 months)	3,000-8,000	Pain, nausea, rare complications	Variable	Moderate BMI or as a bridge to surgery	Limited as standalone, useful as adjunct

In the following sections, we discuss and compare GLP-1 pharmacotherapy, sleeve gastrectomy, and intragastric balloon treatment, drawing on empirical evidence to evaluate their cost-benefit outcomes. We consider both short-term outcomes (within 1-2 years) and long-term outcomes (5-10 years or more), as these can lead to different conclusions about value. The theoretical principles outlined above-time horizon, perspective, and the relationship between weight loss and health gains-will underpin our analysis of the literature.

DISCUSSION

Comparative weight loss efficacy and health outcomes

The magnitude of weight loss achieved is central to both clinical success and cost-benefit calculus. Metabolic surgery (LSG) produces the greatest mean weight reduction. Pipek et al report that across multiple RCTs with extended follow-up, patients undergoing bariatric surgery lost on average 22 kg more body weight than those receiving intensive medical therapy after several years.[1] This superior weight loss translates into markedly better metabolic outcomes: for example, long-term surgery patients showed greater improvements in blood glucose (HbA1c lowered ~0.97% more) and lipids, as well as a significantly reduced calculated cardiovascular risk relative to non-surgical patients.[1] Correspondingly, observational data compiled in the BMJ state that surgery is associated with lower incidence of cardiovascular events, diabetes, and death compared to non-surgical management over 10-15 years.[3] In contrast, GLP-1 agonist medications yield moderate weight loss. Trials like STEP-2 and others cited in ADA standards 2025 have shown semaglutide 2.4 mg can induce ~10% or more body weight loss in diabetics over 68 weeks.[2] This is a significant benefit, often improving glycemic control to the point of reducing the need for other diabetes medications.[2] Furthermore, GLP-1 RAs carry extra-metabolic benefits; notably, recent evidence (the SELECT trial) indicates that semaglutide 2.4 mg in people with overweight/obesity lowers cardiovascular event rates versus placebo.[2] Still, head-to-head comparisons suggest that surgery's weight loss far exceeds what current medications achieve, especially in the long term. Indeed, remission of type 2 diabetes-an outcome closely tied to weight loss magnitude-is much more frequent after bariatric surgery than after medical management alone.[2,3] Intragastric balloons produce the least weight loss of the three modalities. As a point of reference, a meta-analysis of randomized trials found that at 6 months (time of removal), balloon-treated patients had lost about 7% more body weight than lifestyle controls, and at 12 months (6 months after removal) they maintained about a 6-8% total body weight loss relative to baseline.[3] This degree of weight loss can improve some metabolic parameters, but it usually will not match the dramatic comorbidity remissions seen with surgery. Thus, from a pure efficacy standpoint, the rank order is: surgery > GLP-1 therapy >balloon.

The health outcome differences influence cost-benefit: greater weight loss and comorbidity resolution mean larger quality-of-life gains and potentially lower downstream medical costs. Bariatric surgery's durability is a crucial advantage. While weight regain after surgery can occur, it is often partial; one meta-analysis found about 49% of patients experience some weight regain (e.g. >10% of lost weight) several years post-surgery, yet few return to their pre-surgery weight.[5] Even with some regain, many patients retain substantial net weight loss and health benefits long-term. In contrast, if a patient stops GLP-1 therapy, most of the lost weight tends to be regained within 1-2 years off medication. For instance, one study found patients regained ~67% of the weight they had lost within a year after discontinuing weekly semaglutide.[5] This phenomenon undermines the long-term efficacy of pharmacotherapy unless the drug is continued indefinitely. Intragastric balloon therapy by design is time-limited (typically 6 months of device placement), and weight regain after balloon removal is expected unless another intervention follows. Therefore, to maintain balloon-induced weight loss, patients might require either repeated balloon placements or transition to pharmacotherapy or surgery-incurring additional costs each time.

Cost considerations-short term vs long term

From an economic perspective, GLP-1 medications are expensive on an ongoing basis, whereas surgery is an upfront investment. Docimo et al performed a cost comparison and found a striking result: due to high drug prices, the cost of GLP-1 therapy can surpasses the cost of bariatric surgery in well under two years.[5] Specifically, using average 2023 U. S. retail prices, they calculated that for the injectable GLP-1 agents indicated for obesity, the "break-even" time with surgery was on the order of only 9-16 months. For example, semaglutide (Wegovy) and liraglutide (Saxenda) each accrued costs equal to a sleeve gastrectomy within about 9 months, and equaled a gastric bypass cost in roughly 10-11 months.[5] Even the less expensive GLP-1 drugs (like exenatide [Byetta] or dulaglutide [Trulicity]) would outspend the cost of a sleeve gastrectomy after about 13-15 months of therapy, reaching gastric bypass equivalence by ~1.5 years.[5] These break-even figures illustrate that if a patient requires more than a year or two of GLP-1 treatment, surgery could be financially more sensible strictly from a cost standpoint. It's important to note that this analysis did not factor in effectiveness; it simply compared costs. However, given that surgery also produces greater weight loss (hence likely greater health benefit) than a year of medication, the implication is that surgery offers more "bang for the buck" after the first year. The ADA 2025 guidelines echo this consideration, stating that while surgery has higher initial costs, many studies suggest it becomes cost-effective or cost-saving over time in patients with diabetes (through reduced medication needs and complication rates).[2] Indeed, after bariatric surgery, patients often see a sharp decline in expenditures on medications for diabetes, hypertension, and hyperlipidemia. One study noted that by 6 months post-op, gastric bypass patients were spending 68% less on prescription drugs for chronic conditions compared to before surgery.[5] Over a few years, these savings accumulate. For instance, in patients with type 2 diabetes, the cost of a gastric bypass was fully recouped in about 2.5 years through reductions in diabetes-related healthcare costs and medication usage.[5]

GLP-1 therapy, conversely, remains a continuous expense. If maintained, say, over 5 years, even at a discounted price, it can easily total well above the cost of a single surgery. Furthermore, a recent cost-effectiveness evaluation (cited by Docimo et al) determined that at current list prices, newer anti-obesity medications do not meet conventional cost-effectiveness thresholds for non-diabetic patients.[5] For example, semaglutide or liraglutide for obesity was found not cost-effective under a $100,000/QALY threshold in certain analyses, whereas an older combination (phentermine/topiramate) was cost-effective.[5] The researchers estimated that semaglutide's price would need to drop by roughly 44-57% (to about $7,500-$9,800 per year) to be cost-effective given its benefits.[5] This underscores a key point: the cost-benefit of GLP-1 drugs is highly sensitive to drug price. In health systems where medication cost is lower (or subsidized), pharmacotherapy could become more cost-effective. Likewise, if payers negotiate rebates or if cheaper GLP-1 alternatives (such as generic forms in the future) become available, the equation may change. As of 2025, however, the high cost of branded GLP-1 RAs is a limiting factor in their economic appeal.[6]

Intragastric balloons have a different cost structure. A single procedure-less balloon (e.g., the Allurion swallowable balloon) plus the necessary clinical follow-up might cost several thousand dollars.[4,7] Mital and Nguyen modeled the cost-effectiveness of such balloons in various scenarios. They found that using a balloon as a "bridge" to bariatric surgery (i.e., patients get a balloon, lose some weight, then undergo surgery) can be an efficient strategy.[4] In their simulation, "balloon+sleeve gastrectomy" was the most cost-effective approach among those tested, with an ICER of only ~$3,781 per QALY gained versus no intervention.[4,8] This very low ICER suggests that the addition of the balloon (which helped patients achieve a lower BMI before surgery) actually saved enough costs or added enough QALYs to make the combination more cost-effective than doing immediate surgery. The balloon-before-surgery approach was even cost-saving compared to surgery alone in some iterations, presumably by reducing surgical risk or long-term complications due to starting at a lower weight.[4] On the other hand, balloon therapy alone did not outperform surgery. The model indicated that for eligible patients, going straight to sleeve gastrectomy was more cost-effective than balloon alone (which makes sense given balloon's lesser efficacy).[4] However, for patients who absolutely will not undergo surgery, balloon treatment provided an option that was cost-effective compared to doing nothing, with an ICER around $21,700 per QALY vs. no treatment.[4,9-11] This figure is well below common willingness-to-pay thresholds, meaning a balloon is a worthwhile investment for health if surgery is off the table. These findings highlight that the role of balloon therapy in cost-benefit terms may be supplementary-either to safely shrink the patient's BMI pre-surgery (thus potentially reducing perioperative costs or complications) or to offer some benefit where surgery can't be done. Notably, there was no existing systematic review of balloon economic evaluations as of 2024 so evidence is relatively sparse and based on modeling assumptions.[6] Given balloons' limited long-term impact, their cost-effectiveness will usually hinge on short-term benefits or strategic use in a treatment sequence.

Risk and additional costs

Each modality's risks can incur costs that affect cost-benefit. Bariatric surgery, despite low mortality, can have complications such as bleeding, leaks, or strictures that require intervention. These complications, although infrequent (in 5-15% of patients combined for major/minor long-term issues), can increase the total cost of care. One analysis showed that if a patient experiences a serious complication, it can raise the effective cost of the surgery by up to 50% of the base operation cost due to additional treatments.[5] For example, an anastomotic leak after gastric bypass might require prolonged hospitalization or reoperation, substantially adding expense. Thus, in cost-effectiveness studies, averages are used that account for complication probabilities. GLP-1 medications have side effects as well-most commonly gastrointestinal (nausea, vomiting)-and there are rare but serious adverse events (like pancreatitis or a theoretical thyroid cancer risk).[5] The financial impact of GLP-1 side effects is not well quantified; severe events could lead to ER visits or hospitalizations, but these are uncommon.[12-15] There is also a hidden cost if patients cannot tolerate the medication's side effects, leading to discontinuation and thus less weight loss benefit (which makes the therapy less cost-effective). Intragastric balloons can cause short-term side effects (often requiring medications for nausea), and in rare cases complications like gastric perforation or obstruction may necessitate urgent endoscopic or surgical management-events which would add considerable cost. However, such severe events are rare (<1%).[3]

QoL and patient preference

Beyond numerical cost and weight metrics, QoL improvements are part of the "benefit" in cost-benefit. All three interventions, if successful, tend to improve obesity-related QoL. Some differences exist: surgery patients must adapt to permanent anatomical changes and need lifelong vitamin supplementation, but many report improved physical function and psychosocial well-being after massive weight loss.[3] GLP-1 patients avoid surgery and may feel more in control by using medication, but they must deal with injections and side effects; their QoL improves as weight drops, but if weight rebounds after stopping, QoL gains might diminish.[16-18] Balloon patients experience a temporary foreign-body sensation and some discomfort, but typically have improved satiety and weight-related QoL during treatment; once the balloon is out, maintaining those QoL gains depends on keeping the weight off. Patient preference plays a role in cost-benefit in practice, since an intervention only works if the patient adheres to it. Some individuals will never consider surgery due to fear or contraindications, making pharmacotherapy or balloons the only viable options-for these patients, the "optimal" cost-benefit choice within their acceptable treatments might be different from a theoretical population optimum. Likewise, a patient with severe diabetes complications might prioritize the chance of remission via surgery despite higher upfront risk/cost, whereas another patient might prioritize avoiding surgery. These nuances mean that the best value intervention can vary on a case-by-case basis, but population-level analyses still favor the interventions that on average deliver bigger health gains per dollar.

Integration and long-term outlook

When considering short-term (1-2 years) outcomes, pharmacological and device approaches hold some appeal. In that time frame, many benefits of surgery (like mortality reduction or complication avoidance) may not yet be fully realized, while the costs of surgery are all incurred at once. For instance, within the first year, a patient on semaglutide might lose ~10% of weight at a cost of ~$15,000 in drugs, whereas a sleeve patient might lose 25% at a cost of ~$15,000 for surgery-in purely year-1 terms, the drug might seem comparable or slightly less effective per dollar. Additionally, in the very short run, balloons or medications have the advantage of lower immediate risk; there is no surgical recovery period, which for some patients (e. g., those at borderline surgical risk) is a meaningful benefit. However, once we extend to long-term (5+ years), the picture shifts markedly. The enduring nature of surgical weight loss (with potential weight regain but rarely full reversal) leads to sustained health improvements that accumulate. By 5 years post-intervention, a surgery patient has likely maintained significant weight loss, often remains off certain medications (blood pressure, diabetes meds), and has lower healthcare utilization for obesity-related issues. The pharmacotherapy patient, to maintain comparable benefits, must have persisted with the medication for all 5 years (incurring continuous costs and possibly dealing with side effects). If they stopped at any point, some or all benefits may be lost, negating the earlier investment. Thus, over long horizons, surgery tends to yield greater total QALYs gained and often at a lower cumulative cost than ongoing pharmacotherapy. The umbrella review by Sharif et al confirms that in the majority of economic evaluations, bariatric surgery is identified as a cost-effective strategy for obesity.[6] In contrast, the cost-effectiveness of anti-obesity medications has been more contested and variable in the literature.[6] Some analyses find certain drugs cost-effective in specific scenarios, while others do not, reflecting the sensitivity to assumptions about drug efficacy duration and cost.[6] Interestingly, the umbrella review noted that no comprehensive economic review existed for gastric balloons, and it cautioned that while balloons are safe, their limited weight loss and durability mean their costs must be weighed carefully against cheaper alternatives like lifestyle therapy.[6] This aligns with our discussion that balloon therapy alone is generally not a cost-optimal solution unless used purposefully (e.g. as a bridge).

It is worth noting that combination or sequential therapies are emerging as pragmatic approaches and may represent the future of cost-effective obesity care. For example, using GLP-1 therapy after surgery in patients who have weight regain can help lose additional weight; this combination could harness the strengths of both modalities-surgery's initial large loss and medication's tweak for recurrence-potentially improving overall cost-benefit.[1,2] The ADA now explicitly recommends considering adjunct pharmacotherapy for post-bariatric patients who regain weight.[2] Likewise, balloon followed by surgery (as studied by Mital and Nguyen) is an example of a sequential approach that might maximize benefit relative to cost.[4] These strategies complicate economic evaluation but are important in practice for tailoring treatment. Payers and providers may increasingly look at integrated care pathways where, for instance, a patient starts with medication and if they respond well and tolerate it, they continue, but if not, they move to surgery-optimizing resources by avoiding ineffective spending. Economically, this kind of adaptive approach could improve overall cost-effectiveness by individualizing therapy.

Finally, insurance coverage policies strongly influence real-world cost-benefit. Currently, coverage for bariatric surgery is fairly common (especially for patients meeting NIH criteria), whereas coverage for obesity medications is inconsistent and often lacking.[5] Many U. S. insurance plans historically did not cover weight-loss drugs at all, or impose strict criteria.[5] As noted in one analysis, only about 11% of marketplace insurance plans in 2019 covered any anti-obesity medication.[5,19,20] This lack of coverage means the cost burden falls on patients, reducing the utilization of potentially beneficial medications and skewing the cost-benefit equation (since an intervention that isn't accessible has limited population health impact). Bariatric surgery and lifestyle counseling, on the other hand, are covered under the affordable care act's essential health benefits for severe obesity, making them more accessible.[5] If policy changes in the future to broaden drug coverage or lower drug prices, the landscape of cost-benefit might shift more favorably toward pharmacotherapy for a larger segment of patients. Conversely, if novel oral or generic weight-loss drugs enter the market at lower price points, the cost-effectiveness of pharmacotherapy could improve dramatically, providing a viable cost-beneficial alternative or complement to surgery. Ongoing economic research and long-term outcome studies for GLP-1 agents (beyond 5 years) will be critical to update these comparisons in the future.[3,6]

In summary, the comparative discussion indicates that metabolic surgery currently offers the greatest health benefit per unit cost for appropriate patients, especially over a long-term horizon. GLP-1 medications, while effective, are challenged by high costs and the need for sustained use, which presently result in less favorable cost-effectiveness unless prices decline.[5,6] Intragastric balloons have a role in specific short-term or combination scenarios but are not standalone cost leaders. The evidence base consistently leans toward surgery as a high-value intervention for obesity with comorbidities.[6] Nonetheless, real-world decision-making must also consider patient-centered factors and incremental approaches. The ideal strategy might involve leveraging all tools-for instance, using medications to optimize a patient pre- or post-surgery-to achieve maximal health outcomes in a cost-conscious way.[1,2,4] Future studies adopting longer timeframes and a societal perspective (capturing work productivity gains, etc.) are encouraged to fully elucidate the broad cost-benefit impacts of these treatments.[6]

CONCLUSION

This review advances current understanding by providing a comprehensive comparative analysis of the clinical and economic performance of three leading obesity interventions. It reinforces that LSG offers the most favorable long-term cost-benefit profile due to its robust and durable weight loss outcomes and associated reductions in comorbidity-related healthcare costs. While GLP-1 receptor agonists mark a significant advancement in non-surgical obesity management, their long-term economic value is limited by high ongoing costs and the need for sustained use, which may exceed cost-effectiveness thresholds without pricing adjustments or definitive long-term outcome data. Intragastric balloons serve a more limited, complementary role, being economically justifiable in select scenarios such as preoperative bridging or short-term interventions. By synthesizing clinical efficacy with economic impact, this analysis supports a more nuanced, individualized approach to obesity treatment-highlighting the need for policy frameworks that align patient eligibility, therapeutic goals, and resource allocation. It underscores the importance of expanding access to cost-effective interventions while encouraging future research that incorporates broader societal perspectives and long-term economic modeling to optimize obesity care strategies globally.

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