



Two Examples of Economic Analyses of Weight Loss Interventions

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Introduction to Economic Evaluation

Most public policies make some people better off and others worse off. With limited resources, decision makers must make trade-offs. Economic evaluation is one framework to aid in making these types of decisions. At least four types of economic evaluation exist—cost-minimization analysis (CMA), cost-benefit analysis (CBA), cost-effectiveness analysis (CEA), and cost-utility analysis (CUA).

Cost-minimization Analysis

CMA is used when treatments are statistically equivalent or with insufficient power to say that they are different. In this case, the most inexpensive treatment is chosen. However, this is not useful for decision making when outcomes differ.

Cost-benefit Analysis

CBA measures the costs and benefits of a treatment or intervention in monetary terms. To put it another way, CBA measures the net changes in resources expended (costs) and gained (benefits) by the interventions. The basic premise of CBA is that a project or policy will improve social welfare if the benefits associated with it exceed the costs.

Costs include direct and indirect costs and the opportunity cost of the intervention. In public projects, both the costs and benefits may not have a market to serve as a guide for monetary evaluation. A good example is building a dam, where the project may destroy animal habitat or attract water fowl. One difficulty with determining the CBA of a policy is valuing human life. Measuring the value of a human life may include direct methods, such as revealed preference, or indirect methods, such as stated preference of conjoint analysis. The advantage of CBA is that it allows the comparison of all public programs, regardless of focus. On the other hand, CBA is controversial because of the need to assign value to human life and other nonmonetary goals.

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Cost-effectiveness Analysis

CEA presents the ratio of a cost of an intervention to a relevant measure of its effect (eg, cost per case prevented or cost per kilogram of weight loss).

Cost-utility Analysis

CUA is a subset of CEA that presents effectiveness in terms of duration in various health states. One common measurement is quality-adjusted life-years (QALYs), the quantity and quality of life used in CUA. The central notion behind QALYs is that 1 year spent in good health is better than 1 year spent in poor health. Interventions are evaluated on the basis of their incremental costs per QALY. An incremental cost-effectiveness ratio (ICER) is calculated by dividing the difference between costs of two treatments by the difference in effectiveness of the treatments. Interventions that maximize the CEA ratio or enhance QALYs at the lowest costs often are given priority.

The following sections summarize two papers that used cost-evaluation techniques. The first is a cost-effectiveness study evaluating the effectiveness of a stepped-care weight-loss intervention. The second is a cost-minimization study of laparoscopic adjustable gastric band (LAGB) surgery.

Cost-effectiveness of a Stepped-Care, Weight Loss Intervention¹

Given the obesity epidemic, effective but resource-efficient, weight loss treatments are needed. One approach is a stepped-care weight loss intervention program (STEP), where the program starts with low-cost/low-intensity interventions and then ramps up for those who need something more intensive (and generally more expensive). The goal of the study by Jakicic et al¹ was to determine whether STEP compared with a standard behavioral weight loss intervention (SBWI) would result in greater weight loss. This project determined the effectiveness of the intervention, in terms of weight loss, and then compared the costs of the projects using incremental cost analysis.

This study, a randomized clinical trial of 363 overweight and obese adults, studied weight change during an 18-month period. The SBWI participants were placed on a low-calorie diet, prescribed increases in physical activity, and asked to attend group counseling sessions at fixed intervals throughout the duration of the study. For the STEP participants, the counseling frequency, type, and weight-loss strategies were modified every 3 months in response to observed weight loss. Failure to

lose specified amounts of weight resulted in more intensive interventions. Fig 1 describes the STEP program.

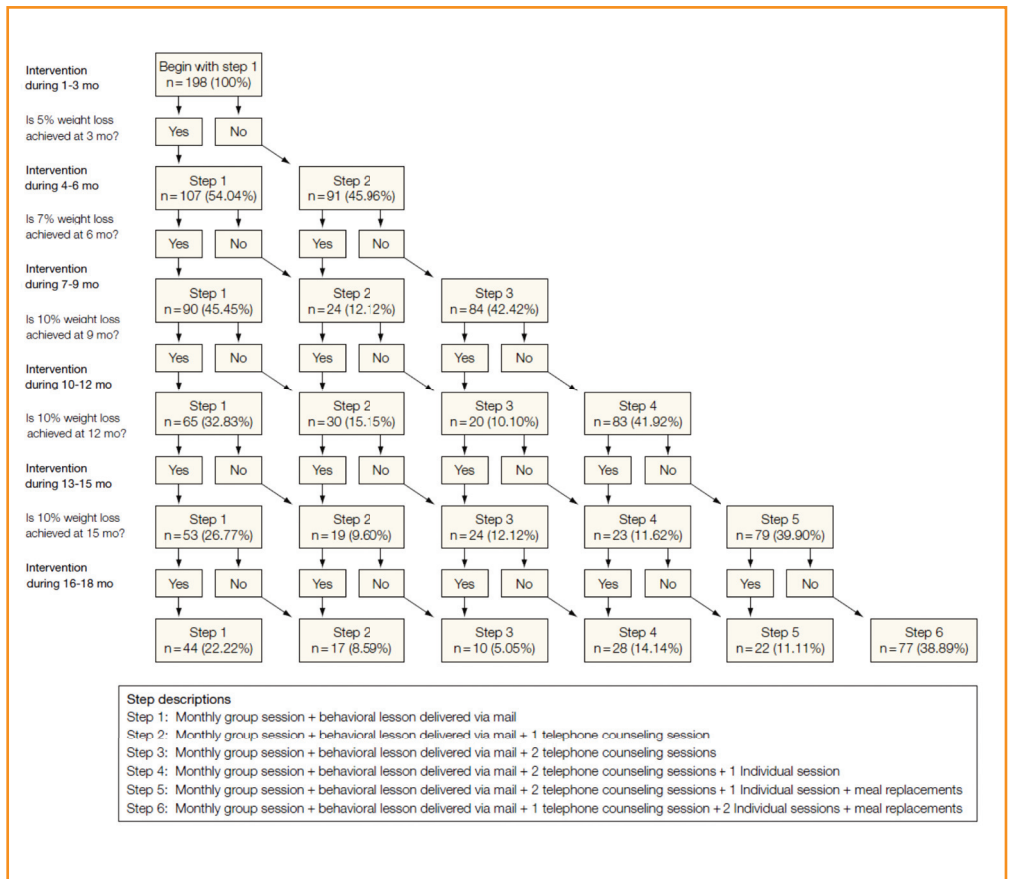


Fig 1. STEP weight loss program design and transitions.¹

Source: Jakicic JM, Tate DF, Lang W, et al. Effect of a stepped-care intervention approach on weight loss in adults: a randomized clinical trial. *JAMA*. 2012;307:2617-2626. Reprinted with permission of the American Medical Association.

When adjusted for baseline body mass index (BMI) and group by time interactions, the SBWI group had significantly greater weight loss at 18 months, 7.6 kg (6.5–8.7 kg) compared to 6.2 kg (5.2–7.3 kg) in the STEP group. Although the SBWI group had greater weight loss, the payer and participant costs were higher per participant because of more face-to-face meetings and the additional associated time and labor costs (Table).¹

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Table. Intervention Cost and Effectiveness of the STEP and SBWI Interventions¹

	Payer Costs	Participant Costs	Societal Costs	Incremental Costs	Incremental Benefit (kg)	Societal ICER per kg Lost
STEP vs No Intervention	\$358	\$427	\$785	\$785	6.2	\$127
SBWI vs STEP	\$494	\$863	\$1357	\$572	1.4	\$409

SBWI=standard behavioral weight loss intervention, STEP=stepped-care weight loss intervention program

Therefore, although SBWI resulted in greater weight loss compared to STEP, this additional weight loss came at a higher cost both to the payer and participants. For STEP, 22.2% of participants lost the goal weight at each measurement point, suggesting that some overweight and obese adults will respond to low-cost/low-intensity interventions. In addition, the costs and costs per kilogram weight loss for both programs compared favorably with pharmacologic and other behavioral weight loss interventions.

This paper is significant because it shows that a stepped-care approach to weight loss, one where participants start out with scalable low-cost interventions and then step up to more intensive interventions only if they do not meet their goals, is a viable option in clinical settings where resources are scarce. Future studies should attempt to extend these results to longer time periods and using QALYs as the outcome measure, so it is more comparable to other studies aimed at improving the health of the population.

Cost-Minimization Study of Laparoscopic Adjustable Gastric Band Surgery²

The objective of this study by Finkelstein et al was to estimate the break-even time and the 5-year net costs of LAGB, taking into account both the direct and indirect costs and cost savings. This is an important research question because many funders are hesitant to cover the costs of the procedure unless it can show that the procedure results in cost savings.

To address this question, the Thompson Reuters MarketScan[®] Commercial Claims and Encounters Database (2003–first quarter of 2008) was used.³ This database included all patient-level data—inpatient, outpatient, and pharmaceutical and benefit design, from thousands of commercially insured patients representing hundreds of employers. At the visit level, records included diagnosis and procedure codes, charges, and payments, as well as the date of service. A separate file included basic demographics of participants, such as age, gender, and periods of eligibility.

Procedure-related payments, comprising the actual procedure costs plus related ancillary costs, amounted to \$20,080 on average. Costs were extrapolated from the presurgery period and into the postsurgery period (Fig 2). The difference between the extrapolated presurgery payments—an estimate of what would have happened in the absence of surgery—and observed costs postsurgery was calculated.

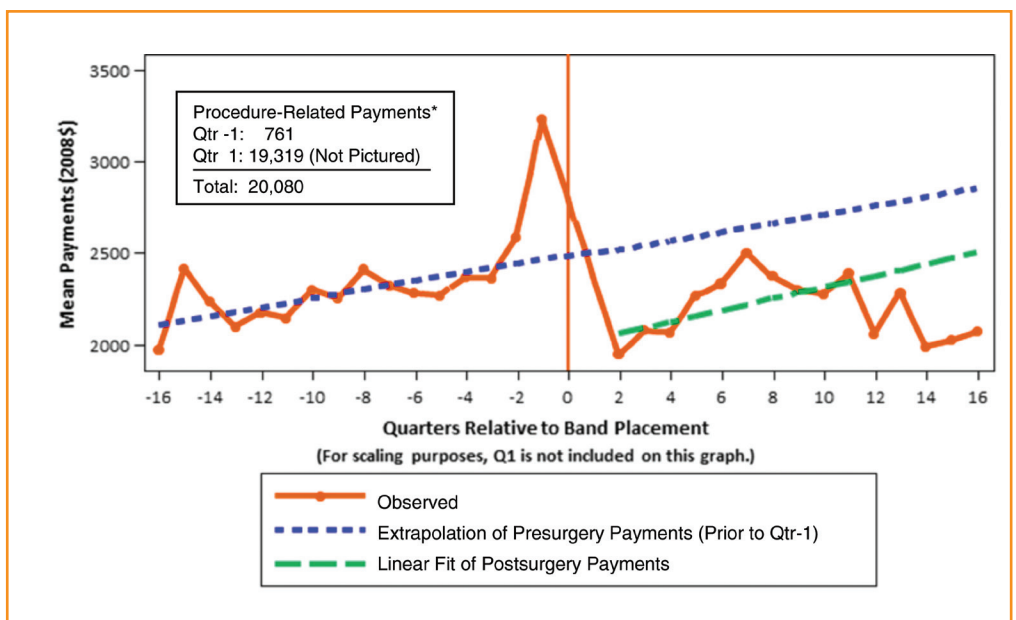


Fig 2. Total quarterly payments (excluding surgical quarter) for LAGB sample.³

*The procedure-related costs of surgery are estimated by subtracting observed costs minus projected costs.

LAGB=laparoscopic adjustable gastric band

Source: Thompson Reuters MarketScan Commercial Claims and Encounters data.

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Based on this pre/post analysis and not including indirect costs, the median break-even time was 50 quarters. However, from a business case perspective, the key question is not a pre/post comparison, but the counterfactual: What would have happened in the absence of surgery? To answer this question, a comparison sample was required.

Propensity score matching was used to match each LAGB patient to a comparable individual. Match variables included demographics, comorbidities, and medical expenditure 2–5 months presurgery. A regression was run comparing the costs postprocedure for the LAGB and matched control sample to generate net costs. Fig 3 shows that the matched controls have similar payments in the preperiod and that the LAGB sample has reduced payments postperiod, representing savings.

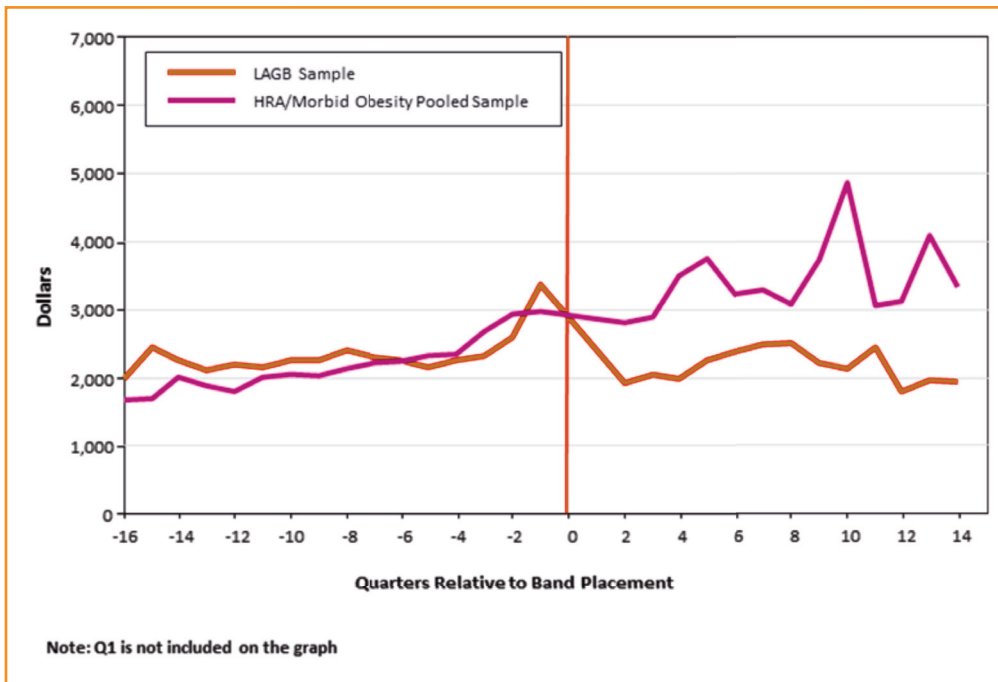


Fig 3. Total payments after propensity score matching.²

HRA=health risk assessment, LAGB=laparoscopic adjustable gastric band

Source: Finkelstein EA, Allaire BT, Burgess SM, Hale BC. Financial implications of coverage for laparoscopic adjustable gastric banding. *Surg Obes Relat Dis.* 2011;7:295-303. Reprinted with permission of Elsevier.



Using the propensity-matching approach, gastric banding shows a return on investment of 16 quarters for the full sample and even faster return for those with diabetes. However, this includes only the direct medical costs of obesity. In addition to the financial impact, obesity is associated with reduced productivity, including absenteeism and presenteeism (reduced productivity while working). From an employer's perspective, these indirect costs are potentially an important factor in determining whether to provide coverage for LAGB.

To address this additional question, the relationship between changes in medical expenditures and changes in absenteeism and presenteeism was estimated. Using these multipliers, it was shown that the break-even time was reduced by 6 months, from 16 to 14 quarters. After 5 years, net savings in medical expenditures from a gastric-banding procedure were estimated at \$4970 (\pm \$3090), and including absenteeism, increased savings were estimated at \$6180 (\pm \$3550). Thus, savings were increased to \$10,960 (\pm \$5864) when both absenteeism and presenteeism estimates were included.

This study was unique because it described a new approach for including absenteeism and presenteeism estimates in CMAs related to weight loss. Application of the approach to gastric banding among surgery-eligible obese employees revealed that the inclusion of indirect costs and cost savings improves the business case for the procedure.

Summary

In summary, from a practical perspective, the analysis chosen must meet the needs of the decision maker. For those who focus on net costs and time to break even, cost-minimization studies are most relevant. Those who also want to consider health improvements of the target population should choose the cost-effectiveness analysis method. Ultimately, the goal of these analyses is to help inform decision makers about how best to allocate scarce resources.

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References

1. Jakicic JM, Tate DF, Lang W, et al. Effect of a stepped-care intervention approach on weight loss in adults: a randomized clinical trial. *JAMA*. 2012;307:2617-2626.
2. Finkelstein EA, Allaire BT, Burgess SM, Hale BC. Financial implications of coverage for laparoscopic adjustable gastric banding. *Surg Obes Relat Dis*. 2011;7:295-303.
3. Thomas Reuters (Healthcare) Inc. MarketScan®. Available at: http://thomsonreuters.com/products_services/healthcare/healthcare_products/research. Accessed November 15, 2012.