

# Operational cost of obesity surgery in Turkey

Güvenç Koçkaya,<sup>1</sup> Fatma Betül Yenilmez,<sup>2</sup> Gülperembe Ergin,<sup>3</sup> Kağan Atikeler,<sup>3</sup> Mehtap Tatar,<sup>4</sup> M. Mahir Özmen,<sup>5</sup> Mehmet Görgün,<sup>6</sup> Halil Coşkun,<sup>7</sup> Halil Alış,<sup>8</sup> Mustafa Şahin,<sup>9</sup> Ali Yağız Üresin,<sup>10</sup> Bilgehan Karadayı,<sup>11</sup> Adem Ünal,<sup>11</sup> Olgun Şener,<sup>11</sup> Mustafa Taşkın<sup>12</sup>

<sup>1</sup>HEPA, Healthcare Economics and Policy Association, Ankara, Turkey

<sup>2</sup>Department of Health Economics, Hacettepe University, Ankara, Turkey

<sup>3</sup>Polar, Healthcare Economics, Ankara, Turkey

<sup>4</sup>Department of Health Economics and Administration, Hacettepe University, Ankara, Turkey

<sup>5</sup>Department of General Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

<sup>6</sup>Department of General Surgery, Tepecik Training and Research Hospital, Izmir, Turkey

<sup>7</sup>Department of General Surgery, Bezmialem Vakif University Faculty of Medicine, Istanbul, Turkey

<sup>8</sup>Department of General Surgery, Sisli Training and Research Hospital, Istanbul, Turkey

<sup>9</sup>Department of General Surgery, Selcuk University Faculty of Medicine, Konya, Turkey

<sup>10</sup>Department of Pharmacology, Istanbul University Istanbul Faculty of Medicine, Istanbul, Turkey

<sup>11</sup>Department of Health Technologies Assessments, Directory of Health Research, Ankara, Turkey

<sup>12</sup>Department of General Surgery, Istanbul University Cerrahpasa Faculty of Medicine, Istanbul, Turkey

## ABSTRACT

**Introduction:** Obesity and its comorbidities are among the primary challenges faced by health systems globally. Obesity is rapidly becoming a problem in Turkey, as well. Real cost of obesity surgery differs from country to country, largely due to differences in costs of health care services, medical devices, and medicines. The objective of this study was to determine operational cost of obesity surgery in Turkey.

**Materials and Methods:** Expert panel was primary source of data in the study. Following literature review of costs of obesity surgery, questionnaire was designed for expert panel. Form was sent to the experts in advance of panel discussion held to reach consensus. After consensus-building phase, cost of surgical treatment of obesity was estimated based on public reimbursement and auction price.

**Results:** Laparoscopic by-pass surgery had highest cost among obesity surgeries in both operational and postoperative costs, while laparoscopic sleeve operation had highest preoperative cost. Package payment included all costs and services from preoperative period through 15 days after operation. Based on analysis, package reimbursement prices were below actual costs for all surgical methods.

**Conclusion:** Social Security Institution reimburses cost of obesity surgery at fixed amount of 4500 TL, 3100 TL, and 2250 TL for by-pass, sleeve, and banding surgeries, respectively. This fixed amount includes preoperative, operative, and postoperative periods. It was observed that fixed amount provided is lower than real cost of the practice of obesity surgery. As a result, hospital management may avoid performing obesity surgery or reduce the quality of surgical treatment to reduce losses. Decision makers may need to evaluate results of the study to understand accurate picture and take action in order to improve obesity surgery reimbursement.

**Keywords:** Cost of obesity surgery; obesity surgery.



Received: 15.12.2013 Accepted: 10.01.2014

Correspondence: Güvenç Koçkaya, M.D., HEPA, Healthcare Economics and Policy Association, Ufuk Üniversitesi Caddesi, No: 3, The Paragon K-23, Söğütözü, Ankara, Turkey

e-mail: guvenc.kockaya@sepd.org.tr

## Introduction

Health Organization (WHO) defined obesity as an abnormal or excessive fat accumulation that may impair health.<sup>[1]</sup> Obesity is a growing health problem in all countries including Turkey. Comorbidities of obesity have crucial impact on the burden of the illness. Death risk of an obese person may increase 30% for every 15 additional kilogram of weight.<sup>[2]</sup> It was concluded in the 2003 Turkey Burden of Disease Study (TBDS) that 26.006 and 31.136 deaths for males and females, respectively, may be prevented decreasing the prevalence of obesity.<sup>[3]</sup> 30.3% (20.5% of males, 41% of female) of the Turkish population was reported obese in a research.<sup>[4]</sup>

Behavior change, diet, exercise, medicines, and surgery are the reported treatment options for obesity. The surgery named “bariatric/obesity surgery” was reported as a clinically and cost-effective application for moderately to severely obese people compared to other treatment options.<sup>[5–28]</sup>

The real cost of obesity surgery differs from country to country mainly due to differences in the costs of health care services, medical devices and medicines. However, the reimbursement of obesity surgery is needed to be cor-

related with the real cost; it may be lower or higher than the real cost. Social Security Institution (SGK), the largest health care payer organization in Turkey, reimburses the operation of obesity surgery with a fixed amount without considering the severity of patients or comorbidities using the Supplement-2C in the Health Application Statement (SUT Ek-2C) (<http://www.sgk.gov.tr>). It was reported that the operational cost of sleeve gastrectomy was 8.930 TL for a hospital from the Turkish Public Hospital Union Hospitals (TKHK).<sup>[29]</sup> However, as the result is based on a cost analysis of a single hospital, the study does not represent Turkey. The objective of this study is to estimate the real operational cost of obesity surgery in Turkey in order to understand the possible differences between reimbursement price and real costs.

## Materials and Methods

Delphi Panel Technique was used to determine the operational cost of obesity. In the literature, Delphi Panel Technique is described as a valuable scientific method where the topic is discussed with local experts as consultants to ensure consensus. Seven experts from different institutes have participated in the Delphi panels. After reaching a consensus in the Delphi panel, an operational cost of obe-

**Table 1. Prices of health care services, medical devices and pharmaceuticals for pre-operation, operation and post-operation for different obesity surgery technics\***

Resource	Laparoscopic banding (US \$)	Laparoscopic sleeve gastrectomy (US \$)	Laparoscopic gastric by-pass (US \$)
Pre-operation	155	478	202
Physician visits	24	342	34
Hospital stays	0	6	32
Medicines	0	5	16
Medical devices	0	0	8
Laboratories and diagnostic tests	131	131	131
Operation	1.766	3.029	3.721
Medicines	8	2	4
Medical devices	1.566	2.872	3.572
Anesthesia	144	144	144
Laboratories and diagnostic tests	0	10.59	0
Post-operation	90	142	166
Hospital stay	43	76	86
Medicines	27	28	43
Medical devices	0	16	8
Laboratories and diagnostic tests	20	21	28

\*Numbers were rounded.

sity surgery calculation model has been developed for the study. Prices of health care services and pharmaceuticals have been reached from SGK (<http://www.sgk.gov.tr>) to estimate the cost of health care services for the year 2012. The average price of medical devices has been obtained from Public Procurement Authority (KIK) (<http://www.ihale.gov.tr>) to calculate the cost of medical devices for the same year. The exchange rate for Turkish Liras (TL) to United States Dollars (US \$) was used as 1.84 for the year 2012. Pre-operation, operation and post operation costs covered by reimbursement payment were calculated for laparoscopic gastric by-pass, sleeve gastrectomy and banding operations. Surgeon fee was not included in the calculation due to the differences in the fees of the surgeons set by the hospitals.

## Results

Table 1 presents the prices of health care services, medical devices and pharmaceuticals used in each operation based on the results of the Delphi panel for pre-operation, operation and post operation. Pre-operation costs are US\$ 155 for laparoscopic banding, US\$ 478 for laparoscopic sleeve gastrectomy and US\$ 202 for laparoscopic gastric by-pass operations. Pre-operative, operative and post operative costs were calculated as US\$ 1766, US\$ 3.029 and US\$ 3721 for laparoscopic banding, laparoscopic sleeve gastrecto-

my and laparoscopic gastric by-pass, respectively in Table 2. Pre-operative, operative and post operative costs were calculated as US\$ 478, US\$ 3.029 and US\$ 142 for sleeve gastrectomy, respectively. The comparison of the cost of bariatric surgical procedures and SSI package prices from Delphi panel are presented in Table 3. In Table 3, the price differences are US\$ 1659 for gastric bypass, US\$ 1975 sleeve gastrectomy and US\$ 749 form banding. The percentage of differences form gastric bypass, sleeve and banding are 68%, 117% and 61%, respectively.

## Discussion

The practice of obesity surgery is an increasing trend in the morbid obese people. Laparoscopic procedures serve less mortality and morbidity for obesity surgery.<sup>[30]</sup> Quality of life may improve with weight loss after surgery. On the other hand, it was reported that obesity surgery is more costly than non-surgical treatment options.<sup>[31-35]</sup> In spite of the increased cost, obesity surgery serves better clinical outcomes than non-surgical treatment options and is also reported cost effective.<sup>[36]</sup>

SGK reimburses the obesity surgery with a fixed amount of 4500, 3100 and 2250 Turkish liras for by-pass, sleeve and banding surgeries, respectively. This fixed amount covers pre-operative, operative and post-operative period. It was shown that the fixed amount is lower than

**Table 2. The cost of methods used in obesity surgery in comparison to prices before, during and after the operation\***

Cost of periods	Cost of Surgical Methods (US \$)		
	Laparoscopic banding	Laparoscopic sleeve gastrectomy	Laparoscopic gastric bypass
Pre-operative	155	478	202
Operative period	1.766	3.029	3.721
Post-operative	90	142	166

\*Numbers were rounded.

**Table 3. Comparison of the cost of bariatric surgical procedures and SGK package prices from Delphi panel\***

Methods of surgery	Package price (A) (US \$)	Cost per Service; Pre-Operative, Operative, and Post-Operative (US\$) (B)	Difference (C) (A-B)	Percentage of Difference (C/A)
Gastric by-pass	2432	4.090	-1659	68%
Sleeve gastrectomy	1.675	3650	-1975	117%
Banding	1.216	1.965	-749	61%

\*Numbers were rounded.

the real cost of obesity surgery. The highest reimbursement and real cost are reported for by-pass gastrectomy. However, major difference was calculated for sleeve gastrectomy with 117%. In other words, should a hospital management allow to perform sleeve gastrectomy, hospital budget suffers more loss than the reimbursement amount. Less loss and percentage of deficit may be obtained by banding operation.

As stated earlier, the operational cost of sleeve gastrectomy was found to be 8.930 Turkish liras for a hospital from the Turkish Public Hospital Union Hospitals (TKHK).<sup>[30]</sup> However, the reported result of TKHK is above the results of the study; both studies show that the reimbursement amount of SGK for obesity surgery is lower than the real cost.

This study has some limitations. The study was not based on real patient claims data, but on the opinions of 7 experts from different institutions. In addition, the cost of health care services was acquired as SGK price, not real cost to the hospital budgets due to lack of information on hospital databases.

## Conclusion

There are two different published guidelines for obesity treatment in Turkey; however, recommendations are similar to the literature. Obesity surgery was recommended for severe medical patients with BMI >40 kg/m<sup>2</sup> or BMI=35–39.9 kg/m<sup>2</sup> together with a severe co-morbidity in the “National Obesity Prevention and Treatment Guideline” by “Obesity Research Association of Turkey” and “The Turkish Society of Endocrinology and Metabolism” in “Obesity Treatment Guideline and Lifestyle Advices”.<sup>[37,38]</sup> However, the payment by SGK is only offered for patients with BMI >40 kg/m<sup>2</sup>. Present study reveals that the reimbursement of the practice of obesity surgery was lower than the real cost, meaning the budget of an hospital to be influenced negatively if the surgery was allowed. As a result, hospital managements can avoid performing obesity surgery or reduce the quality of the surgical treatment by lowering the possible loss. Patients needing obesity surgery may be influenced by these possibilities. They may not get treated or get poorly treated with low quality service leading to an increase in the possible morbidity and mortality rate. Decision makers may need to evaluate the results of the study to understand the real picture and take action in order to improve the reimbursement of obesity surgery.

## References

1. World Health Organization (WHO). Obesity and overweight. Fact sheet No: 311. Available at: <http://www.who.int/media-centre/factsheets/fs311/en/index.html>. Accessed Dec 15, 2013.
2. OECD. Obesity and the economics of prevention fit not fat executive summary. Available at: <http://www.oecd.org/els/health-systems/46004918.pdf>. Accessed Dec 15, 2013.
3. Republic of Turkey The Ministry of Health, Refik Saydam Hygiene Center Presidency, School of Public Health, Turkey Burden of Disease Study, 2006. Available at: [http://ekutuphane.tusak.gov.tr/kitaplar/turkiye\\_hastalik\\_yuku\\_calismasi.pdf](http://ekutuphane.tusak.gov.tr/kitaplar/turkiye_hastalik_yuku_calismasi.pdf). Accessed Dec 12, 2013.
4. The Ministry of Health of Turkey, Public Health Institution, Department of Obesity, Diabetes and Metabolic Diseases. Available at: <http://beslenme.gov.tr/index.php?lang=tr&page=40>. Accessed Dec 15, 2013.
5. Karason K, Wallentin I, Larsson B, Sjöström L. Effects of obesity and weight loss on left ventricular mass and relative wall thickness: survey and intervention study. *BMJ* 1997;315:912–6.
6. Karason K, Wikstrand J, Sjöström L, Wendelhag I. Weight loss and progression of early atherosclerosis in the carotid artery: a four-year controlled study of obese subjects. *Int J Obes Relat Metab Disord* 1999;23:948–56.
7. Karason K, Mølgaard H, Wikstrand J, Sjöström L. Heart rate variability in obesity and the effect of weight loss. *Am J Cardiol* 1999;83:1242–7.
8. Karason K, Lindroos AK, Stenlöf K, Sjöström L. Relief of cardiorespiratory symptoms and increased physical activity after surgically induced weight loss: results from the Swedish Obese Subjects study. *Arch Intern Med* 2000;160:1797–802.
9. Karlsson J, Sjöström L, Sullivan M. Swedish obese subjects (SOS)-an intervention study of obesity. Two-year follow-up of health-related quality of life (HRQL) and eating behavior after gastric surgery for severe obesity. *Int J Obes Relat Metab Disord* 1998;22:113–26.
10. Narbro K, Agren G, Jonsson E, Larsson B, Näslund I, Wedel H, et al. Sick leave and disability pension before and after treatment for obesity: a report from the Swedish Obese Subjects (SOS) study. *Int J Obes Relat Metab Disord* 1999;23:619–24.
11. Sjöström CD, Lissner L, Wedel H, Sjöström L. Reduction in incidence of diabetes, hypertension and lipid disturbances after intentional weight loss induced by bariatric surgery: the SOS Intervention Study. *Obes Res* 1999;7:477–84.
12. Sjöström CD, Peltonen M, Wedel H, Sjöström L. Differentiated long-term effects of intentional weight loss on diabetes and hypertension. *Hypertension* 2000;36:20–5.
13. Sjöström CD, Peltonen M, Sjöström L. Blood pressure and pulse pressure during long-term weight loss in the obese: the Swedish Obese Subjects (SOS) Intervention Study. *Obes Res* 2001;9:188–95.
14. Agren G, Narbro K, Jonsson E, Näslund I, Sjöström L, Peltonen M. Cost of in-patient care over 7 years among sur-

- gically and conventionally treated obese patients. *Obes Res* 2002;10:1276–83.
15. Agren G, Narbro K, Näslund I, Sjöström L, Peltonen M. Long-term effects of weight loss on pharmaceutical costs in obese subjects. A report from the SOS intervention study. *Int J Obes Relat Metab Disord* 2002;26:184–92.
  16. Rydén A, Karlsson J, Sullivan M, Torgerson JS, Taft C. Coping and distress: what happens after intervention? A 2-year follow-up from the Swedish Obese Subjects (SOS) study. *Psychosom Med* 2003;65:435–42.
  17. Rydén A, Sullivan M, Torgerson JS, Karlsson J, Lindroos AK, et al. A comparative controlled study of personality in severe obesity: a 2-y follow-up after intervention. *Int J Obes Relat Metab Disord* 2004;28:1485–93.
  18. Sjöström CD. Surgery as an intervention for obesity. Results from the Swedish obese subjects study. *Growth Horm IGF Res* 2003;13 Suppl A:S22–6.
  19. Torgerson JS, Lindroos AK, Näslund I, Peltonen M. Gallstones, gallbladder disease, and pancreatitis: cross-sectional and 2-year data from the Swedish Obese Subjects (SOS) and SOS reference studies. *Am J Gastroenterol* 2003;98:1032–41.
  20. Sjöström L, Lindroos AK, Peltonen M, Torgerson J, Bouchard C, Carlsson B, et al; Swedish Obese Subjects Study Scientific Group. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. *N Engl J Med* 2004;351:2683–93.
  21. Sjöström L, Peltonen M, Jacobson P, Sjöström CD, Karason K, Wedel H, et al. Bariatric surgery and long-term cardiovascular events. *JAMA* 2012;307:56–65.
  22. Sjöström L, Narbro K, Sjöström CD, Karason K, Larsson B, Wedel H, et al; Swedish Obese Subjects Study. Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med* 2007;357:741–52.
  23. Karlsson J, Taft C, Rydén A, Sjöström L, Sullivan M. Ten-year trends in health-related quality of life after surgical and conventional treatment for severe obesity: the SOS intervention study. *Int J Obes (Lond)* 2007;31:1248–61.
  24. Gummesson A, Sjöström L, Lystig T, Carlsson L. Effects of bariatric surgery on cancer incidence in Swedish obese subjects. *Int J Obes* 2008;32:S24.
  25. Stoeckli R, Chanda R, Langer I, Keller U. Changes of body weight and plasma ghrelin levels after gastric banding and gastric bypass. *Obes Res* 2004;12:346–50.
  26. von Mach MA, Stoeckli R, Bilz S, Kraenzlin M, Langer I, Keller U. Changes in bone mineral content after surgical treatment of morbid obesity. *Metabolism* 2004;53:918–21.
  27. Christ-Crain M, Stoeckli R, Ernst A, Morgenthaler NG, Bilz S, Korbonits M, et al. Effect of gastric bypass and gastric banding on proneurotensin levels in morbidly obese patients. *J Clin Endocrinol Metab* 2006;91:3544–7.
  28. Buddeberg-Fischer B, Klaghofer R, Krug L, Buddeberg C, Müller MK, Schoeb O, et al. Physical and psychosocial outcome in morbidly obese patients with and without bariatric surgery: a 4 1/2-year follow-up. *Obes Surg* 2006;16:321–30.
  29. Turkish Public Hospital Union. The Analysis of Cost of Obesity, Sleeve Gastrectomy in Karaman City, Ankara: 2013. Available at: <http://www.tkhk.gov.tr/Eklenti/2423,obezite-sleev-raporu-04092013.pdf?0>. Accessed Dec 15, 2013.
  30. Kirshtein B, Lantsberg L, Mizrahi S, Avinoach E. Bariatric emergencies for non-bariatric surgeons: complications of laparoscopic gastric banding. *Obes Surg* 2010;20:1468–78.
  31. Salem L, Devlin A, Sullivan SD, Flum DR. Cost-effectiveness analysis of laparoscopic gastric bypass, adjustable gastric banding, and nonoperative weight loss interventions. *Surg Obes Relat Dis* 2008;4:26–32.
  32. Campbell J, McGarry LA, Shikora SA, Hale BC, Lee JT, Weinstein MC. Cost-effectiveness of laparoscopic gastric banding and bypass for morbid obesity. *Am J Manag Care* 2010;16:e174–87.
  33. Clegg A, Colquitt J, Sidhu M, Royle P, Walker A. Clinical and cost effectiveness of surgery for morbid obesity: a systematic review and economic evaluation. *Int J Obes Relat Metab Disord* 2003;27:1167–77.
  34. Terranova L, Busetto L, Vestri A, Zappa MA. Bariatric surgery: cost-effectiveness and budget impact. *Obes Surg* 2012;22:646–53.
  35. Health Quality Ontario. Bariatric surgery for people with diabetes and morbid obesity: an evidence-based analysis. *Ont Health Technol Assess Ser* 2009;9:1–23.
  36. Dixon JB, Zimmet P, Alberti KG, Rubino F; International Diabetes Federation Taskforce on Epidemiology and Prevention. Bariatric surgery: an IDF statement for obese Type 2 diabetes. *Diabet Med* 2011;28:628–42.
  37. National Obesity Prevention and Treatment Guideline – Turkey Obesity Research Association, August 2009.
  38. Turkish Endocrinology and Metabolism Association, Obesity Treatment Guideline and Life Style Suggestions, Istanbul; 2009. Available at: <http://www.turkendokrin.org/files/pdf/Obezite.pdf>. Accessed Dec 15, 2013.