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## Bariatric Surgery Trends in the U.S.: 1% is the Loneliest Number

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Surgeons have offered procedures to facilitate weight loss, resolve comorbidities, and improve quality of life for nearly 60 years. Small bowel resection and jejunioileal bypass were among the earliest bariatric surgery options, followed by vertical banded gastroplasty, biliopancreatic diversion/ duodenal switch, and laparoscopic adjustable gastric banding.<sup>1</sup> All have largely fallen out of favor limited efficacy, high complication rates, and/or high reoperation rates.<sup>1–4</sup> For the past 2 decades, the workhorses of bariatric surgery have been the Roux-en-Y gastric bypass and sleeve gastrectomy. Observational studies and randomized trials have found that, compared with medical weight management alone (eg, dietary changes and physical activity), bariatric surgery is the most effective treatment for severe obesity. Bariatric surgery is associated with greater weight loss and comorbidity resolution, longer lifespan, and improved quality of life.<sup>5–7</sup> The safety of bariatric surgery has also improved over the past several decades. Mortality has decreased nearly 10-fold since the 1990s.<sup>8,9</sup> The 30-day mortality rate is now comparable to that of a laparoscopic cholecystectomy.<sup>10</sup> However, despite these improvements in outcomes and safety, utilization of bariatric surgery among patients who meet body mass index (BMI) criteria according to the National Institutes of Health (NIH) (BMI 40kg/m<sup>2</sup> or BMI 35– 39.9kg/m<sup>2</sup> with an obesity-related comorbidity) remains about 1%.<sup>11</sup>

In this issue of *Annals of Surgery*, Campos et al<sup>12</sup> reported trends in bariatric surgery utilization and outcomes in the U.S. over a 23-year period using data from 2 Centers for Disease Control databases: (1) the National Inpatient Sample, which represents a 20% stratified, weighted sample of U.S. hospital discharges; and (2) the National Health and Nutrition Examination Survey, a nationally representative survey that utilizes in-person height and weight measurements. Using the National Inpatient Sample weighting methodology, Campos and colleagues identified immense shifts in operative approach and procedure type. In 1993, open procedures were the norm, with Roux-en-Y gastric bypass and vertical banded gastroplasty as the 2 most common procedures performed. Twenty-three years later, laparoscopic sleeve gastrectomy and Roux-en-Y gastric bypass comprised nearly 98% of all cases. Campos et al also confirmed findings from previous studies demonstrating that bariatric surgery has become significantly safer over the past 2 decades. Complication rates dropped almost 90%, from 11.7% to 1.4% during the study period. Similarly, in-

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hospital mortality decreased by 96%–0.04% in 2016. Hospital length of stay also decreased by almost 70%. The average bariatric patient stayed in the hospital for less than 2 days in 2016.

Despite these improvements, bariatric surgery is still reaching only a small proportion of patients who meet BMI criteria. Using National Health and Nutrition Examination Survey data to estimate the number of patients eligible for bariatric surgery, Campos et al found that bariatric surgery utilization increased slightly during the study period: from 0.07% of patients who met NIH criteria for bariatric surgery in 1993 to 0.5% in 2016. It is particularly concerning that the number of U.S. adults who met NIH criteria for bariatric surgery tripled during this time.

Although there were limitations to this study — datasets were weighted samples of significantly smaller patient populations and only inpatient bariatric surgery procedures and in-hospital complications/deaths were included — this research sheds new light on the changes that have occurred in bariatric surgery over the past 23 years. Laparoscopic sleeve gastrectomy and, to a lesser extent, Roux-en-Y gastric bypass now dominate the landscape and their outcomes have improved considerably. However, as the most effective evidence-based treatment option for adults with severe obesity, bariatric surgery continues to reach only a small fraction of patients who may qualify for it.

This work has important implications and poses compelling questions. In an ideal healthcare system, what percentage of eligible patients should undergo bariatric surgery in a population with a severe obesity prevalence of 15%? Nearly 30 million adults in the U.S. meet NIH criteria for bariatric surgery. Of those who are interested and are reasonable candidates, how many should be offered the most effective treatment option? If we consider other chronic diseases such as breast cancer, 98% of those patients undergo breast surgery<sup>13</sup>; 86% of patients with colorectal cancer undergo surgery for their disease.<sup>14</sup> Why should a chronic disease like obesity be treated differently than a chronic disease like cancer?

From a research perspective, we need to better understand better why bariatric surgery utilization hovers around 0.5%. Recently published studies suggest that numerous barriers to bariatric surgery exist at the individual (patient and provider) and health system or “contextual” levels.<sup>15</sup> Lack of patient interest due to perceived risks, primary care provider hesitancy to refer bariatric patients, skepticism regarding long-term effectiveness of bariatric surgery, and insurance challenges have been found to be important obstacles.<sup>16,17</sup> To support the future growth of bariatric surgery, we also need to consider the growth of the workforce. Presently, the bariatric surgeon workforce increases by roughly 2% annually, which is appropriate for current utilization rates.<sup>11</sup> To increase utilization, the number of bariatric surgeons also needs to expand accordingly. The next decade of research will need to identify interventions that improve obesity treatment education for both patients and providers and create health system solutions that support referral and provision of bariatric surgery. In doing so, we can help ensure that the sickest patients in our health care system — adults with class II or III obesity — are treated like any other patient with a chronic disease, such as cancer or cardiovascular disease, would be treated: with full access to the most effective, evidence-based treatments available.

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