

Appendix 1. List of diagnostic, intervention, and medical service billing codes used to select individuals in the three groups.

Obesity	ICD-9-CM diagnostic codes	ICD-10-CA diagnostic codes
	278.0 and 278.9	E65-E66
Bariatric surgery	CCP (ICD-9) intervention codes¹	CCI (ICD-10) intervention codes¹
	5693: Gastric partition for obesity	1.NF.78: Repair by decreasing size, stomach
	5694: Insertion of gastric bubble or balloon	1.NF.78.XP: using vertical banded technique, open approach
	5559: Partial gastrectomy with anastomosis to esophagus	1.NF.78.EJ: using adjustable banding technique, endoscopic (laparoscopic) approach
	5589: Other partial gastrectomy (not specified)	1.NF.78.XO: using vertical banded technique, endoscopic (laparoscopic) approach
		1.NF.78.WJ: using vertical (sleeve) gastrectomy technique, open approach
		1.NF.78.GB: using vertical (sleeve) gastrectomy technique, endoscopic (laparoscopic) approach
		1.NF.78.SH: using gastric bypass technique with gastroenterostomy [e.g. Roux-en-Y], open approach
		1.NF.78.DQ: using gastric bypass technique with gastroenterostomy [e.g. Roux-en-Y], endoscopic (laparoscopic) approach
		1.NF.78.SJ: using gastric bypass technique with gastroenterostomy and biliopancreatic bypass [to terminal ileum] [e.g. biliopancreatic diversion], open approach
		1.NF.78.DO: using gastric bypass technique with gastroenterostomy and biliopancreatic bypass [to terminal ileum]

[e.g. biliopancreatic diversion], endoscopic (laparoscopic) approach

1.NF.78.SI: using gastric bypass technique with enteroenterostomy and biliopancreatic bypass [to terminal ileum] [e.g. duodenal switch], open approach

NF.78.DI: using gastric bypass technique with enteroenterostomy and biliopancreatic bypass to terminal ileum] [e.g. duodenal switch], endoscopic (laparoscopic) approach

Bariatric surgery

Medical service billing codes²

+05114 Partial or subtotal gastrectomy with vagotomy

+05115 Partial or subtotal gastrectomy without vagotomy

+5308 Biliopancreatic diversion including gastrectomy and all digestive anastomoses

+5309 Biliopancreatic diversion including gastrectomy and all digestive anastomoses with cholecystectomy, supplement

+05355 Gastroplasty for morbid obesity

+05305 Adjustable prosthetic gastroplasty including, when necessary, repair of hiatus hernia by closure of esophageal hiatus with diaphragmatic pillars plication and installation of subcutaneous reservoir and of its ulterior calibration.

+05527 Revision or exeresis of adjustable prosthetic and/or of catheter and its reservoir, all techniques, all approaches, under general anaesthesia.

+05526 Vertical sleeve gastrectomy for morbid obesity, all techniques, all approaches.

+05306 Gastric by-pass Roux-in-Y including all digestive anastomoses.

+05528 Second surgeon.

CCI, Canadian Classification of Interventions; CCP, Canadian Classification of Diagnostic, Therapeutic, and Surgical procedures; ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification; ICD-10-CA, International Classification of Diseases, 10th Revision, Canada. ¹ In the hospital discharges database (Med-Echo). ² In the physician-billing claims database (PCD).

Appendix 2. Baseline characteristics of the patients by type of bariatric procedure (for the period between 2006 and 2014)

Characteristics	Adjustable gastric banding (n=3,887)	Sleeve gastrectomy (n=2,554)	Roux-en-Y gastric bypass (n=873)	Biliopancreatic diversion (n=1,986)	P value¹
Duration of follow-up, years	3.1 (1.8-4.8)	1.3 (0.6-2.5)	2.7 (1.1-5.2)	4.4 (2.5-6.1)	
Women	2,894 (74.4)	1,768 (60.2)	622 (71.2)	1,385 (69.7)	<0.001
Age, years	42.7 (11.6)	45.0 (11.4)	43.3 (10.5)	42.7 (10.7)	<0.001
Area of residence					<0.001
Montreal census metropolitan area	1,762 (45.3)	931 (36.5)	440 (50.4)	165 (8.3)	
Other census metropolitan area (≥100 000 inhabitants)	390 (10.0)	562 (22.0)	96 (11.0)	819 (41.2)	
Census agglomeration areas (between 10,000 and 100,000 inhabitants)	978 (25.2)	403 (15.8)	145 (16.6)	367 (18.5)	
Small towns and rural areas	750 (19.3)	652 (25.5)	192 (22.0)	624 (31.4)	
Missing	7 (0.2)	6 (0.2)	0 (0.0)	11 (0.6)	
Material deprivation ² , quintile					0.02
Q1 (more privileged)	508 (13.1)	285 (11.2)	79 (9.0)	251 (12.6)	
Q2	744 (19.1)	442 (17.3)	161 (18.4)	357 (18.0)	
Q3	782 (20.1)	525 (20.6)	184 (21.1)	398 (20.0)	
Q4	883 (22.7)	547 (21.4)	194 (22.2)	423 (21.3)	
Q5 (more disadvantaged)	848 (21.8)	638 (25.0)	222 (25.4)	484 (24.4)	
Missing	122 (3.1)	117 (4.6)	33 (3.8)	73 (3.7)	
Social deprivation ² , quintile					0.002
Q1 (more privileged)	766 (19.7)	473 (18.5)	134 (15.3)	405 (20.4)	
Q2	782 (20.1)	490 (19.2)	129 (14.8)	407 (20.5)	
Q3	751 (19.3)	508 (19.9)	185 (21.2)	414 (20.8)	
Q4	742 (19.1)	468 (18.3)	186 (21.3)	348 (17.5)	
Q5 (more disadvantaged)	724 (18.6)	498 (19.5)	206 (23.6)	339 (17.1)	
Missing	122 (3.1)	117 (4.6)	33 (3.8)	73 (3.7)	
History of fracture (prior to the index date)	467 (12.0)	310 (12.1)	99 (11.3)	212 (10.7)	<0.001
Number of comorbidities ³					<0.001
None	1,341 (34.5)	696 (27.3)	223 (25.5)	583 (29.4)	
1-2	2,094 (53.9)	1,403 (54.9)	500 (57.3)	1,125 (56.6)	
≥3	452 (11.6)	455 (17.8)	150 (17.2)	278 (14.0)	
Type of comorbidities ³					
Cardiovascular disease ⁴	193 (5.0)	243 (9.5)	56 (6.4)	153 (7.7)	0.002
Hypertension	1,057 (27.2)	755 (29.6)	247 (28.3)	577 (29.0)	0.44

Chronic pulmonary disease	641 (16.5)	469 (18.4)	172 (19.7)	361 (18.2)	0.42
Diabetes	976 (25.1)	966 (37.8)	367 (42.0)	737 (37.1)	<0.001
Hypothyroidism	247 (6.3)	173 (6.8)	57 (6.5)	112 (5.6)	0.11
Renal failure	27 (0.7)	68 (2.7)	11 (1.3)	20 (1.0)	<0.001
Depression	826 (21.3)	587 (23.0)	201 (23.0)	382 (19.2)	0.03
Osteoporosis	19 (0.5)	23 (0.9)	5 (0.5)	7 (0.4)	0.12

Data are presented as n (%), mean (SD) or median (IQR). ¹ For the difference between groups using chi-squared test for age and sex and univariate conditional multinomial regression for other characteristics. ² Based on six socio-economic indicators: the education level, the employment rate, the average income of the population, the living status (alone or not), the marital status, and the proportion of single-parent families in the population. ³ In the past five years. ⁴ Includes heart failure, cardiac arrhythmias, valvular disease, pulmonary circulation disorders, peripheral vascular disorders.