

## Supplementary Online Content

Bailly L, Fabre R, Pradier C, Iannelli A. Colorectal cancer risk following bariatric surgery in a nationwide study of French individuals with obesity. *JAMA Surg.* Published online March 11, 2020. doi:10.1001/jamasurg.2020.0089

**eAppendix.** The French National Health Insurance Information System

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**eTable.** Propensity-Matched Hazard Ratios for CRC and Colorectal Benign Polyps in Matched Groups of Bariatric Surgery vs No Bariatric Surgery patients With Morbid Obesity (Referent)

This supplementary material has been provided by the authors to give readers additional information about their work.

## eAppendix. The French National Health Insurance Information System

### Système National des Données de Santé SNDS

The French National Health Insurance Information System includes electronic health data related to health care consumption in all French public and private hospitals. Data are based on standardized definitions for patients admitted as inpatients, as well as for patients treated at an outpatient surgical facility or at an emergency facility. Information is derived from anonymous discharge summaries completed at the end of each hospital stay (PMSI “*Programme de Médicalisation du Système d’Information*”) and include: age at each hospital stay, gender, main diagnoses (DP), related diagnoses (DR) or associated diagnoses (DA), coded according to the ICD-10; healthcare facility data, i.e. annual number of surgical procedures performed. It provides comprehensive information related to all surgical interventions in France. All institutions have been instructed to provide prospective billing data for each patient. Data are extracted by medical doctors and certified reviewers. Institutions and facilities are audited annually for accuracy by the National Health Insurance Medical service, which randomly selects and investigates medical records.

Each patient is allocated an anonymous and unique identifier allowing for linkage of each stay over time and across facilities, meaning that once a patient is admitted to any French hospital, he or she keeps the same identifier throughout his or her life and any hospital episode is then captured. No hospitalized patients can have been lost to follow-up during the study period, which is the period of availability of this large database, i.e. ten years.

In 2016 and 2017, a healthcare system modernization law act<sup>1,2</sup>, established a National health data institute (“Institut national des données de santé” INDS), responsible for facilitating the use of healthcare data and ensuring the security of these data, as well as specifying the rules of access to the French National Health Insurance Information System (“Système National des Données de Santé” SNDS). On the server of the Technical Agency for Hospital Information (“Agence Technique de l’Information Hospitalière”)<sup>3</sup> we had access to the French national hospital health care consumption database for all patients discharged between 2009 and 2018 with diagnosis codes for obesity based on the International Classification of Disease, 10th edition: E66-00 to E66-09, E66-8 to E66-89 and E66-90 to E66-99. Outcomes of interest in our study were CRC and colorectal benign polyp. The codes retained from the International Classification of Diseases, 10th edition (ICD10), as main diagnosis or related diagnosis were the following: C18 (0-9), C19, C20 for CRC D01, D12, D37 for colorectal benign polyp, and E66-0 (0-9), E66-8 (0-9) and E66-9 (0-9) for obesity. Other data extracted from the French National Health Insurance Information System included age, gender, Body Mass Index (BMI), alcohol abuse, smoking, specific digestive conditions, cardiovascular and metabolic comorbidities (Hypertension (HT), myocardial infarction (MI), type 2 diabetes (T2D), dyslipidemia, obstructive sleep apnea syndrome (OSAS), non-alcoholic steatohepatitis (NASH)), using the ICD10 coding algorithms defined by Quan<sup>4</sup>.

Bariatric surgery procedures were identified with the following CCAM codes: open (HFMA009, HFMA006, HFMA011, HFKA001, HFKA002) and laparoscopic (HFMC007, HFMC005, HFMC008, HFKC001) adjustable gastric banding (AGB), open (HFCA001, HGCA009), and laparoscopic (HFCC003, HGCC027) gastric bypass (GB), open (HFMA010) and laparoscopic (HFMC006) sleeve gastrectomy (SG). During the study period 2009-2018, the total number of bariatric surgery procedures for each patient was collected, allowing an adjustment on it. These statistical analyses was applied to compare outcomes of interest according to surgical procedures, i.e. operated patients with revisional procedures compared to operated patients with revisional procedures, and operated patients without revisional procedures compared to operated patients without revisional procedures.

Other specific codes from the International Classification of Diseases, 10th edition, were identified: ascites (R18), for abdominal hernia by codes K46 (0 to 9), for gallbladder disease by codes K80 to K 83 (0 to 9), for diverticular disease by code K57, for non-alcoholic steatohepatitis NASH by code K75.8, for Barrett’s esophagus by K22 (0 to 9) and for gastroduodenal ulcer by K25 and K26 (0 to 9).

### eReferences.

1. LOI N° 2016-41 Du 26 Janvier 2016 de Modernisation de Notre Système de Santé.; 2016.
2. Arrêté du 22 mars 2017 relatif au référentiel de sécurité applicable au Système national des données de santé | Legifrance. <https://www.legifrance.gouv.fr/eli/arrete/2017/3/22/AFSE1705146A/jo/texte>. Accessed July 10, 2019.
3. Activité hospitalière | Publication ATIH. <https://www.atih.sante.fr/rapports-etudes/activite-hospitaliere?secteur=MCO>. Accessed July 10, 2019.

4. Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care*. 2005;43(11):1130-1139.

**eTable. Propensity-Matched Hazard Ratios for CRC and Colorectal Benign Polyps in Matched Groups of Bariatric Surgery vs No Bariatric Surgery patients With Morbid Obesity (Referent)**

	<b>Matched<sup>a</sup> HR (N=71,300)</b>	<b>CRC</b>	<b>Matched<sup>a</sup> HR Colorectal benign polyps (N=66,516)</b>
<b>All patients</b>	<b>0.68 [0.60 – 0.77]</b>		<b>0.56 [0.53 – 0.59]</b>
<b>Women</b>	<b>0.66 [0.57 – 0.77]</b>		<b>0.59 [0.56 – 0.63]</b>
<b>Men</b>	<b>0.72 [0.57 – 0.89]</b>		<b>0.47 [0.43 – 0.52]</b>

<sup>a</sup> Matched on age, gender, Body Mass Index, follow-up, Hypertension, diabetes, Obstructive Sleep Apnea Syndrome, Non-alcoholic steatohepatitis, smoking, alcohol, ascites, gastro-duodenum ulcer, Barret's esophagus, gallbladder disease, abdominal hernia and diverticular disease.

**CRC: Colorectal cancer, HR: Hazard Ratios**