

Appendix 1 to Schroeder T, Sheppard C, Wilson D, et al. General surgery in Canada: current scope of practice and future needs. *Can J Surg* 2020.

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Appendix:

Statistics Canada community definitions:

1. Census metropolitan areas (CMA) have a population of at least 100,000.
2. Tracted census agglomeration (TCA) have populations between 50,000 and 100,000.
3. Untracted census agglomerations (UTCA) have populations between 10,000 and 50,000.
4. Rural communities were defined as metro influenced zones (MIZ) outside of urban centres. These are municipalities outside of CMA and census agglomerations.

Table S1. List of Canadian Institute of Health Information definitions for included surgical procedures.

Colon and Intestines - Colectomy	Total and hemi-colectomies and payments for other procedures performed at the same time; surgical removal of all or part of the large intestine and other intestine surgery, entero-enterostomy, enterostomy, enterotomy or cecostomy; colostomy and colo-colotomy; colon surgeries not including colonoscopy (see NGS 103); small intestine, small bowel surgeries
Rectum, Proctectomy, and Anus	Hemorrhoidectomies by cryotherapy and banding are excluded; includes proctotomy and other anus, rectum, rectal prolapse and peri-rectal tissue operations
Appendectomy	Excision of the appendix
Laparotomy	Any laparotomy performed as a surgical procedure
Gallbladder and Biliary Tract	All cholecystectomies and any additional payments made for other procedures performed at the same time; gallbladder removal, including cholecystostomy, cholecystotomy and all operations on the gallbladder, bile duct and biliary tract; includes lithotripsy/litholapaxy performed on the biliary tract and/or bile duct
Tonsillectomy	Both adult and child tonsillectomies and payments for adenoidectomies performed at the same time

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Hernia Repair	All forms of hernia repair surgery
Gastroscopy, Colonoscopy, and Sigmoidoscopy	Services and payments for both these endoscopies as well as payments for procedures performed at the same time as the endoscopy
Mastectomy and Breast Surgery	Simple, radical or modified radical; unilateral or bilateral; female or male; partial mastectomy or wedge resection; breast augmentation, reduction and mammoplasty
Breast Tumour Excision and Biopsy	Tumour or tissue for biopsy and/or treatment
Varicose Veins Repair	Ligation and stripping of varicose veins but excluding injection of varicose veins; vein repair, venous anastomosis and suture of veins
Fractures	Bone and joint fractures, including dislocations
Cardiac Electrophysiology	Electrophysiological study (partial or full); HIS bundle; atrial pacing; catheter ablation; and insertion of pacemaker, defibrillator and VAD devices, including insertion of permanent endocardial electrodes, implantation of pack, permanent replacement and repair
Vasectomy	Unilateral or bilateral ligation
Incision Abscess	Incision of abscesses or hematomas under local or general anesthesia
Removal Foreign Body	Foreign body removal under local or general anesthesia
Excision Tumour	Excision of verruca, papilloma, keratosis, pyogenic granuloma, moles, etc.
Suture Wound	Repair, debridement and dressing
Excision Nail	Excision and/or destruction of fingernail or toenail
Hysterectomy	Total, subtotal, abdominal or vaginal or radical hysterectomies
Sterilization	Tubal occlusion/interruption/removal by any method or

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	approach
Caesarian Section	The procedure only
Service At Delivery	Attendance at delivery or Caesarean section, repair of third-degree/vaginal/cervical laceration, removal of retained placenta, scalp sampling, fetal monitoring and induction of labour
Other Obstetrical Services	Fetoscopy, stress test, hypertension, fetal transfusion, toxemia of pregnancy, oxytocin challenge test, abortions (missed, threatened, without dilatation and curettage, incomplete, menstrual extraction and spontaneous), amniocentesis, ectopic pregnancy, suture for incomplete cervix during pregnancy, uterine inversion and emergency removal of sutures
Dilatation Curettage	Dilatation and curettage and payments for procedures performed at the same time

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Table S2. Royal College of Physicians and Surgeons of Canada specialty of general surgery training objective surgical procedure by community size described as percentage (n) of procedures performed by general surgery in each community with statistical analysis.

Sigmoidoscopy	Sterilization	Suture Wound	Tonsillectomy	Varicose Veins Repair	Vasectomy	Total Integumentary
1.23 (953)	0.13 (104)	1.06 (819)	0.06 (44)	0.46 (352)	1.18 (910)	12.71 (9,604)
2.04 (4,033)	0.035 (69)	0.72 (1,428)	0.016 (31)	0.52 (1,025)	0.50 (995)	16.00 (18,408)
3.00 (2,363)	0.0013 (1)	1.45 (1,139)	0.013 (10)	0.61 (483)	0.51 (401)	14.40 (6,175)
7.87 (57,180)	0.0021 (15)	0.87 (6,302)	0.00014 (1)	0.69 (4,978)	0.16 (1,143)	5.73 (47,480)
Overall: p<0.001 Cramér's V: 0.1155 CMA:TCA p<0.001 phi: 0.056 (very weak) CMA:UTCA p<0.001 phi: 0.096 (very weak) CMA:R p<0.001 phi: 0.076 (very weak) TCA:UTCA p<0.001 phi: 0.029 (very weak) TCA:R p<0.001 phi: 0.061 (very weak) UTCA:R p<0.001 phi: 0.027 (very weak)	Overall: p<0.001 Cramér's V: 0.0264 CMA:TCA p=1.00 phi: 0.00053 (very weak) CMA:UTCA p<0.001 phi: 0.014 (very weak) CMA:R p<0.001 phi: 0.032 (very weak) TCA:UTCA p<0.001 phi: 0.0096 (very weak) TCA:R p<0.001 phi: 0.026 (very weak) UTCA:R p<0.001 phi: 0.018 (very weak)	Overall: p<0.001 Cramér's V: 0.0184 CMA:TCA p<0.001 phi: 0.018 (very weak) CMA:UTCA p<0.001 phi: 0.0065 (very weak) CMA:R p<0.001 phi: 0.0061 (very weak) TCA:UTCA p<0.001 phi: 0.034 (very weak) TCA:R p<0.001 phi: 0.017 (very weak) UTCA:R p<0.001 phi: 0.017 (very weak)	Overall: p<0.001 Cramér's V: 0.0168 CMA:TCA p<0.001 phi: 0.010 (very weak) CMA:UTCA p<0.001 phi: 0.011 (very weak) CMA:R p<0.001 phi: 0.022 (very weak) TCA:UTCA p=0.729 phi: 0.0011 (very weak) TCA:R p<0.001 phi: 0.012 (very weak) UTCA:R p<0.001 phi: 0.011 (very weak)	Overall: p<0.001 Cramér's V: 0.1028 CMA:TCA p=0.020 phi: 0.0026 (very weak) CMA:UTCA p<0.001 phi: 0.021 (very weak) CMA:R p<0.001 phi: 0.0083 (very weak) TCA:UTCA p=0.003 phi: 0.0058 (very weak) TCA:R p<0.001 phi: 0.011 (very weak) UTCA:R p=0.035 phi: 0.0040 (very weak)	Overall: p<0.001 Cramér's V: 0.0499 CMA:TCA p<0.001 phi: 0.024 (very weak) CMA:UTCA p<0.001 phi: 0.030 (very weak) CMA:R p<0.001 phi: 0.060 (very weak) TCA:UTCA p<0.859 phi: 0.00033 (very weak) TCA:R p<0.001 phi: 0.037 (very weak) UTCA:R p<0.001 phi: 0.037 (very weak)	Overall: p<0.0001 Cramér's V: 0.1227 CMA:TCA p<0.0001 phi: 0.059 (very weak) CMA:UTCA p<0.0001 phi: 0.11 (very weak) CMA:R p<0.0001 phi: 0.071 (very weak) TCA:UTCA p<0.0001 phi: 0.016 (very weak) TCA:R p<0.0001 phi: 0.020 (very weak) UTCA:R p<0.0001 phi: 0.037 (very weak)

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Hysterectomy	Incision Abscess	Laparotomy	Mastectomy & Breast	Other Obstetrical Services	Pacemaker	Rectum, proctectomy, & Anus	Removal of Foreign Body	Service at Delivery
0.019 (15)	1.54 (1,188)	0.21 (164)	1.08 (837)	0.065 (50)	0.14 (105)	1.08 (831)	0.29 (227)	0.0065 (5)
0.024 (47)	1.73 (3,423)	0.21 (411)	1.12 (2,220)	0.029 (57)	0.46 (911)	1.25 (2,4567)	0.25 (496)	0.011 (22)
0.0013 (1)	1.08 (847)	0.39 (306)	1.86 (1,463)	0.0063 (5)	0.53 (417)	1.74 (1,372)	0.28 (223)	-
0.0076 (55)	1.62 (11,777)	0.48 (3,465)	3.22 (23,413)	0.0043 (31)	0.20 (1,433)	2.47 (17,913)	0.15 (1,082)	0.0062 (45)
Overall: p<0.001 Cramér's V: 0.0068 (very weak) CMA:TCA p=0.041 phi: 0.0022 (very weak) CMA:UTCA p<0.001 phi: 0.0032 (very weak) CMA:R p=0.003 phi: 0.0037 (very weak) TCA:UTCA p<0.001 phi: 0.0077 (very weak) TCA:R p<0.001 phi: 0.0090 (very weak) UTCA:R p=0.573 phi: 0.0013 (very weak)	Overall: p<0.001 Cramér's V: 0.0123 (very weak) CMA:TCA p<0.001 phi: 0.013 (very weak) CMA:UTCA p<0.001 phi: 0.0036 (very weak) CMA:R p=0.087 phi: 0.0019 (very weak) TCA:UTCA p<0.001 phi: 0.024 (very weak) TCA:R p<0.001 phi: 0.020 (very weak) UTCA:R p<0.001 phi: 0.0068 (very weak)	Overall: p<0.001 Cramér's V: 0.0182 (very weak) CMA:TCA p<0.001 phi: 0.0038 (very weak) CMA:UTCA p<0.001 phi: 0.018 (very weak) CMA:R p<0.001 phi: 0.012 (very weak) TCA:UTCA p<0.001 phi: 0.016 (very weak) TCA:R p<0.001 phi: 0.016 (very weak) UTCA:R p=0.817 phi: 0.048 (very weak)	Overall: p<0.001 Cramér's V: 0.0585 (very weak) CMA:TCA p<0.001 phi: 0.023 (very weak) CMA:UTCA p<0.001 phi: 0.052 (very weak) CMA:R p<0.001 phi: 0.037 (very weak) TCA:UTCA p<0.001 phi: 0.029 (very weak) TCA:R p<0.001 phi: 0.032 (very weak) UTCA:R p=0.373 phi: 0.0017 (very weak)	Overall: p<0.001 Cramér's V: 0.0354 (very weak) CMA:TCA p=0.394 phi: 0.00092 (very weak) CMA:UTCA p<0.001 phi: 0.010 (very weak) CMA:R p<0.001 phi: 0.018 (very weak) TCA:UTCA p<0.001 phi: 0.0068 (very weak) TCA:R p<0.001 phi: 0.016 (very weak) UTCA:R p=0.373 phi: 0.0082 (very weak)	Overall: p<0.001 Cramér's V: 0.0249 (very weak) CMA:TCA p<0.001 phi: 0.021 (very weak) CMA:UTCA p<0.001 phi: 0.022 (very weak) CMA:R p<0.001 phi: 0.0041 (very weak) TCA:UTCA p=0.021 phi: 0.0044 (very weak) TCA:R p<0.001 phi: 0.034 (very weak) UTCA:R p<0.001 phi: 0.024 (very weak)	Overall: p<0.001 Cramér's V: 0.0388 (very weak) CMA:TCA p<0.001 phi: 0.014 (very weak) CMA:UTCA p<0.001 phi: 0.035 (very weak) CMA:R p<0.001 phi: 0.027 (very weak) TCA:UTCA p<0.001 phi: 0.019 (very weak) TCA:R p<0.001 phi: 0.066 (very weak) UTCA:R p<0.001 phi: 0.0070 (very weak)	Overall: p<0.001 Cramér's V: 0.0131 (very weak) CMA:TCA p<0.001 phi: 0.0099 (very weak) CMA:UTCA p<0.001 phi: 0.010 (very weak) CMA:R p<0.001 phi: 0.011 (very weak) TCA:UTCA p=0.812 phi: 0.00011 (very weak) UTCA:R p=0.391 phi: 0.0021 (very weak)	

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Colon & Intestine - Colectomy	Colonoscopy	D&C	Excision nail	Excision Tumour	Fractures	Gallbladder & Biliary Tree	Gastroscopy	Hernia Repair
1.69 (1,304)	48.62 (37,536)	0.044 (34)	1.31 (1,008)	8.24 (6,362)	0.13 (102)	3.66 (2,823)	20.81 (16,067)	4.67 (3,608)
2.31 (4,567)	50.08 (98,854)	0.035 (70)	0.88 (1,744)	5.73 (11,317)	0.032 (64)	3.93 (7,756)	20.91 (41,269)	5.06 (9,982)
3.26 (2,565)	46.59 (3,689)	0.0013 (1)	0.74 (584)	4.29 (3,382)	0.0013 (1)	5.33 (4,198)	18.80 (14,804)	6.31 (4,971)
4.35 (31,585)	44.54 (323,528)	0.0019 (14)	0.58 (4,199)	3.32 (24,120)	0.013 (92)	5.65 (41,042)	13.40 (97,331)	7.06 (51,273)
Overall: p<0.001 Cramér's V: 0.051 (very weak) CMA:TCA p<0.001 phi: 0.016 (very weak) CMA:UTCA p<0.001 chi: 0.043 CMA:R p<0.001 phi: 0.040 (very weak) TCA:UTCA p<0.001 phi: 0.027 (very weak) TCA:R p<0.001 phi: 0.050 (very weak) UTCA:R p<0.001 phi: 0.019 (very weak)	Overall: p<0.001 Cramér's V: 0.045 (very weak) CMA:TCA p<0.001 phi: 0.012 (very weak) CMA:UTCA p<0.001 phi: 0.10 (very weak) CMA:R p<0.001 phi: 0.024 (very weak) TCA:UTCA p<0.001 phi: 0.15 (weak) TCA:R p<0.001 phi: 0.020 (very weak) UTCA:R p<0.001 phi: 0.013 (very weak)	Overall: p<0.001 Cramér's V: 0.0151 (very weak) CMA:TCA p=1.00 phi: 0.00045 CMA:UTCA p<0.001 phi: 0.014 (very weak) CMA:R p<0.001 phi: 0.016 (very weak) TCA:UTCA p<0.001 phi: 0.0096 TCA:R p<0.001 phi: 0.014 (very weak) UTCA:R p=0.326 phi: 0.0020 (very weak)	Overall: p<0.001 Cramér's V: 0.0248 (very weak) CMA:TCA p<0.001 phi: 0.0063 CMA:UTCA p<0.001 phi: 0.016 (very weak) CMA:R p<0.001 phi: 0.027 (very weak) TCA:UTCA p<0.001 phi: 0.0070 (very weak) TCA:R p<0.001 phi: 0.028 (very weak) UTCA:R p<0.001 phi: 0.019 (very weak)	Overall: p<0.001 Cramér's V: 0.027 (very weak) CMA:TCA p<0.001 phi: 0.016 (very weak) CMA:UTCA p<0.001 phi: 0.051 (very weak) CMA:R p<0.001 phi: 0.076 (very weak) TCA:UTCA p<0.001 phi: 0.029 (very weak) TCA:R p<0.001 phi: 0.080 (very weak) UTCA:R p<0.001 phi: 0.046 (very weak)	Overall: p<0.001 Cramér's V: 0.0201 (very weak) CMA:TCA p<0.001 phi: 0.0031 (very weak) CMA:UTCA p<0.001 phi: 0.0062 (very weak) CMA:R p<0.001 phi: 0.023 (very weak) TCA:UTCA p<0.001 phi: 0.0092 (very weak) TCA:R p<0.001 phi: 0.025 (very weak) UTCA:R p<0.001 phi: 0.14 (very weak)	Overall: p<0.001 Cramér's V: 0.035 (very weak) CMA:TCA p<0.001 phi: 0.0041 (very weak) CMA:UTCA p<0.001 phi: 0.032 (very weak) CMA:R p<0.001 phi: 0.026 (very weak) TCA:UTCA p<0.001 phi: 0.031 (very weak) TCA:R p<0.001 phi: 0.040 (very weak) UTCA:R p=0.001 phi: 0.0064 (very weak)	Overall: p<0.001 Cramér's V: 0.0915 (very weak) CMA:TCA p<0.001 phi: 0.046 (very weak) CMA:UTCA p<0.001 phi: 0.086 (very weak) CMA:R p<0.001 phi: 0.063 (very weak) TCA:UTCA p<0.001 phi: 0.024 (very weak) TCA:R p<0.001 phi: 0.025 (very weak) UTCA:R p=0.598 phi: 0.0010 (very weak)	Overall: p<0.001 Cramér's V: 0.0371 (very weak) CMA:TCA p<0.001 phi: 0.0087 (very weak) CMA:UTCA p<0.001 phi: 0.033 (very weak) CMA:R p<0.001 phi: 0.028 (very weak) TCA:UTCA p<0.001 phi: 0.025 (very weak) TCA:R p<0.001 phi: 0.036 (very weak) UTCA:R p<0.001 phi: 0.0079 (very weak)

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Locations	Appendectomy	Breast Tumour Excision	Caesarian Section
Rural	1.31 (1010)	0.52 (399)	0.44 (339)
10,000-50,000	1.45 (2,855)	0.53 (1,037)	0.14 (269)
50,000-100,000	2.26 (1,781)	0.95 (745)	0.0013 (1)
>100,000	2.55 (18,520)	0.80 (5,842)	0.0041 (30)
Statistics	<p>Overall: p<0.001 Cramér's V: 0.0332 (very weak) CMA:TCA p<0.001 phi: 0.0055 (very weak) CMA:UTCA p<0.001 phi: 0.030 (very weak) CMA:R p<0.001 phi: 0.024 (very weak) TCA:UTCA p<0.001 phi: 0.029 (very weak) TCA:R p<0.001 phi: 0.036 (very weak) UTCA:R p=0.006 phi: 0.0053 (very weak)</p>	<p>Overall: p<0.001 Cramér's V: 0.0156 (very weak) CMA:TCA p<0.001 phi: 0.0047 (very weak) CMA:UTCA p<0.001 phi: 0.016 (very weak) CMA:R p<0.001 phi: 0.0096 (very weak) TCA:UTCA p<0.001 phi: 0.024 (very weak) TCA:R p<0.001 phi: 0.025 (very weak) UTCA:R p=0.814 phi: 0.00053 (very weak)</p>	<p>Overall: p<0.001 Cramér's V: 0.0481 (very weak) CMA:TCA p=0.361 phi: 0.0014 (very weak) CMA:UTCA p<0.001 phi: 0.030 (very weak) CMA:R p<0.001 phi: 0.060 (very weak) TCA:UTCA p<0.001 phi: 0.020 (very weak) TCA:R p<0.001 phi: 0.047 (very weak) UTCA:R p<0.001 phi: 0.029 (very weak)</p>