

Does general surgery residency prepare surgeons for community practice in British Columbia?

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Background: Preparing surgeons for clinical practice is a challenging task for post-graduate training programs across Canada. The purpose of this study was to examine whether a single surgeon entering practice was adequately prepared by comparing the type and volume of surgical procedures experienced in the last 3 years of training with that in the first year of clinical practice.

Methods: During the last 3 years of general surgery training, I logged all procedures. In practice, the Medical Services Plan (MSP) of British Columbia tracks all procedures. Using MSP remittance reports, I compiled the procedures performed in my first year of practice. I totaled the number of procedures and broke them down into categories (general, colorectal, laparoscopic, endoscopic, hepatobiliary, oncologic, pediatric, thoracic, vascular and other). I then compared residency training with community practice.

Results: I logged a total of 1170 procedures in the last 3 years of residency. Of these, 452 were performed during community rotations. The procedures during residency could be broken down as follows: 392 general, 18 colorectal, 242 laparoscopic, 103 endoscopic, 85 hepatobiliary, 142 oncologic, 1 pediatric, 78 thoracic, 92 vascular and 17 other. I performed a total of 1440 procedures in the first year of practice. In practice the break down was 398 general, 15 colorectal, 101 laparoscopic, 654 endoscopic, 2 hepatobiliary, 77 oncologic, 10 pediatric, 0 thoracic, 70 vascular and 113 other.

Conclusion: On the whole, residency provided excellent preparation for clinical practice based on my experience. Areas of potential improvement included endoscopy, pediatric surgery and "other," which comprised mostly hand surgery.

Contexte : Préparer les chirurgiens à la pratique clinique pose un défi de taille aux programmes d'études supérieures partout au Canada. La présente étude avait pour but de vérifier si un chirurgien donné était adéquatement préparé pour commencer à exercer, en comparant les types et le volume d'interventions chirurgicales de ses 3 dernières années de formation et de sa première année de pratique clinique.

Méthodes : Durant mes 3 dernières années de formation en chirurgie générale, j'ai consigné toutes mes interventions. Le régime des services médicaux (Medical Services Plan; MSP) de la Colombie-Britannique se charge de faire le suivi de toutes les interventions des chirurgiens en exercice. À partir des rapports de remise du MSP, j'ai compilé les interventions effectuées au cours de ma première année de pratique. J'ai additionné toutes les interventions et je les ai subdivisées en catégories (générale, colorectale, laparoscopique, endoscopique, hépatobiliaire, oncologique, pédiatrique, thoracique, vasculaire et autre). J'ai ensuite comparé la formation en cours de résidence et la pratique communautaire.

Résultats : J'ai effectué en tout 1170 interventions au cours des 3 dernières années de ma résidence, dont 452 durant des stages communautaires. La répartition de ces interventions effectuées pendant ma résidence était la suivante : 392 générales, 18 colorectales, 242 laparoscopiques, 103 endoscopiques, 85 hépatobiliaires, 142 oncologiques, 1 pédiatrique, 78 thoraciques, 92 vasculaires et 17 autres. J'ai réalisé en tout 1440 interventions au cours de ma première année d'exercice et dans ce contexte, la répartition a été la suivante : 398 générales, 15 colorectales, 101 laparoscopiques, 654 endoscopiques, 2 hépatobiliaires, 77 oncologiques, 10 pédiatriques, 0 thoracique, 70 vasculaires et 113 autres.

Conclusion : Dans l'ensemble, ma résidence m'a fourni une excellente préparation en vue de l'exercice clinique, si je me fie à ma propre expérience. Les catégories pour lesquelles une amélioration pourrait être intéressante sont notamment endoscopique, pédiatrique et «autre», cette dernière concernant surtout la chirurgie de la main.

In Canada, there has historically been a great need for “generalists” or comprehensive general surgeons practising in the community setting, but Canadian training programs have been slow to address this need.^{1,2} A generalist could be defined as a surgeon who provides comprehensive surgical care in most or all of the procedures traditionally associated with general surgery as well as some non-general surgery procedures depending on the need of the community in which he or she practises.³ General surgeons practising in smaller communities in other countries such as Australia³ have identified the same need for generalist skills. In a recent questionnaire of community general surgeons, 86% of surgeons felt well prepared or better by their training for community practice.⁴ In this same study, surgeons in smaller communities (< 50 000) performed substantially more non-general surgery procedures such as plastic surgery, urology, gynecology and orthopedics; training to perform these procedures came not from the primary fellowship, but from senior colleagues in the community. Studies from Australia³ and the United States⁶ have shown successful exposure to specialist and generalist training by combining academic and rural training sites. At the University of British Columbia (UBC) based in Vancouver, the general surgery training program allows residents pursuing a career in community surgery to tailor rotations to increase exposure to non-general surgery areas and to community-based training sites. The purpose of this study was to determine whether this approach was successful by examining my experience as a recent graduate of this general surgery training program.

METHODS

The UBC general surgery training program is a 6-year program consisting of mandatory and elective rotations. Because of its extra year and relatively few mandatory rotations, a great deal of flexibility is allowed in the selection of rotations. My residency rotation schedule is shown in Table 1. Mandatory rotations, including at least 3 months of community surgery, for all residents are indicated by an asterisk. I had 21 months of general surgery training at 2 academic hospitals based in Vancouver, and I spent 12 months at 5 community hospitals based in Vernon, Chilliwack, New Westminster, Prince George and Vancouver, British Columbia. This is considered to be a typical experience for a resident planning a career in community surgery. Selection of rotations is determined by the residency program director, but strong consideration is given to resident requests based on career goals and meetings with the program director at regular 6-month intervals.

I accepted a general surgery position at the Vernon Jubilee Hospital (VJH) immediately after finishing residency and took over a busy established general surgical practice in July 2006. The North Okanagan has a population of about 77 000.⁷ The catchment population within 1 hour's drive is

about 100 000 based on 2001 census data.⁸ The VJH is a 125-bed facility with 4 full-time and 2 semiretired general surgeons, 5 orthopedic surgeons, 4 gynecologists, 2 urologists and an otolaryngologist. Thoracic and vascular surgery services were centralized to Kelowna, a community 55 km away, prompting the exit of the surgeon who provided these services. There are no plastic surgeons or neurosurgeons at VJH, currently or historically. Other service providers at VJH include 1 part-time and 8 full-time fellowship-trained anesthesiologists, 1 part-time and 5 full-time internists and 2 pathologists. There are 4 general radiologists and 1 nuclear medicine radiologist, and services include radiography, fluoroscopy, ultrasonography, computed tomography and nuclear medicine. There is a 10-bed intensive/critical care unit and a 27-bed emergency department, including a 2-bed trauma bay open 24 hours a day.

I kept operation logs for the last 3 years of the training program (Jul. 1, 2003, to Jun. 30, 2006) using software for a personal digital assistant device. The software, T-Res, was provided free of charge by Resilience Software (Vancouver). Operation logs using this program were mandatory for all residents, and my rate of compliance was 100%. I recorded the date, procedure, hospital, staff surgeon and role for each surgery. I included in this study only procedures for which I was the primary operator or first assistant and excluded procedures for which I was second assistant or observer. I tabulated the number of procedures performed in my first year of practice (Jul. 1, 2006, to Jun. 30, 2007) using electronic medical record software, Accuro 3.1 (Optimed Software Corporation), based on submissions to the British Columbia Medical Services Plan. There was 100% capture of all procedures performed in the time

Table 1. Rotation schedule of a recent graduate of the general surgery residency training program at the University of British Columbia, by year of training (varies slightly from resident to resident)

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
GS VGH*	TPN	GS CGH†	GS PGRH*†	GS VGH*	Vascular
Trauma*	Trauma*	GS CGH†	GS PGRH*†	GS VGH*	Vascular
Medicine	GS VGH*	Research	GS PGRH*†	GS VGH*	Vascular
Medicine	GS VGH*	GS RCH†	Research	Research	GS VGH*
Vascular	Ped surg*	GS RCH†	Research	Research	GS VGH*
Vascular*	Ped surg*	Trauma*	Research	Research	GS VGH*
Emergency* ICU*	Trauma*	GS VGH	Thoracics	Thoracics	GS MSJ†
Orthopedic	ICU*	GS RCH†	GS VGH	Thoracics	GS MSJ†
GS VGH*	GS VJH*†	GS RCH†	GS VGH	Thoracics	EM
GS VGH*	GS SPH	GI*	GS SPH*	GS VGH*	Ambulatory
Neurosurg	Thoracic*	GI*	GS SPH*	GS VGH*	Ambulatory
Urology	Thoracic*	GI*	GS SPH*	GS VGH*	Ambulatory

CGH = Chilliwack General Hospital; EM = esophageal motility; GI = gastroenterology; GS = general surgery; ICU = intensive care unit; MSJ = Mt. Saint Joseph's Hospital; Neurosurg = neurosurgery; Ped surg = pediatric surgery; PGRH = Prince George Regional Hospital; RCH = Royal Columbian Hospital; SPH = St. Paul's Hospital; TPN = total parenteral nutrition; VGH Vancouver General Hospital; VJH = Vernon Jubilee Hospital.

*Mandatory rotation.

†Community rotation.

period of study. I grouped procedures by type into 9 categories: general, laparoscopic, endoscopic, hepatobiliary, oncologic, pediatric, thoracic, vascular and other. I tabulated and entered the data into a Microsoft Excel 2002 spreadsheet.

Table 2. Overview of the operations performed by a recent graduate of the general surgery residency training program at the University of British Columbia during residency versus community practice

Type of procedure	Operations during residency, no. (%)	Community rotations during residency, no.	Operations during community practice, no. (%)
General	392 (33.5)	140	398 (27.6)
Colorectal	18 (1.5)	3	15 (1.0)
Laparoscopic	242 (20.7)	46	101 (7.0)
Endoscopic	103 (8.8)	69	654 (45.4)
Hepatobiliary	85 (7.3)	2	2 (0.1)
Oncologic	142 (12.1)	83	77 (5.3)
Pediatric	1 (0.1)	1	10 (0.7)
Thoracic	78 (6.7)	3	0 (0.0)
Vascular	92 (7.9)	89	70 (4.9)
Other	17 (1.5)	16	113 (7.8)
Total	1170 (100)	452	1440 (100)

RESULTS

Table 2 provides an overview of the operative experience broken down by category. I performed proportionally fewer general, laparoscopic, hepatobiliary, oncologic, thoracic and vascular procedures in community practice than in residency. Conversely, I performed proportionally more endoscopic, pediatric and other procedures in practice than in residency. Only colorectal procedures were similar between the 2 periods. Notably, endoscopic procedures accounted for more than 45% of all the procedures I performed in the first year of community practice, and I performed almost no hepatobiliary and thoracic procedures.

Table 3 shows a selection of procedures of interest. I had adequately experienced most procedures that I encountered in practice during the residency training period; however, there were some notable exceptions. These included fine needle aspirate of a solid or cystic lesion, muscle biopsy, hemorrhoid banding, core breast biopsy, mastectomy for gynecomastia, most pediatric procedures, varicose vein surgery, most hand procedures, vasectomy and orchiectomy. Additionally, I had experienced many of the procedures that I encountered in practice only during

Table 3. Comparison of the number of selected procedures of interest performed by a recent graduate of the general surgery residency training program at the University of British Columbia

Procedure	Residency	Community rotations	Community practice	Procedure	Residency	Community rotations	Community practice
General				Hepatobiliary			
Inguinal hernia	51	29	58	Liver resection	24	0	1
Ventral hernia	36	12	13	Whipple	17	1	0
Appendectomy	32	15	1	Choledochoenterostomy	14	1	0
FNA solid or cystic lesion	1	1	18	Oncologic			
Excision skin/subcutaneous	15	9	69	Thyroidectomy	26	8	8
Hemorrhoid banding	0	0	104	Mastectomy ± axilla	38	30	16
Colorectal				SLN biopsy	16	12	4
Anorectal fistula repair	6	1	1	Fine wire breast biopsy	22	22	19
Rectal prolapse repair	4	0	2	Core breast biopsy	0	0	13
Transanal excision tumour	3	0	7	Pediatric			
Sphincterotomy	3	2	1	Inguinal hernia	1	1	4
Laparoscopic				Umbilical hernia	0	0	1
MIS cholecystectomy	83	40	57	Other	0	0	5
MIS appendectomy	41	0	16	Thoracic			
MIS colectomy	39	5	6	Lung resection	29	1	0
MIS inguinal hernia	22	0	14	Esophagectomy	9	0	0
MIS Heller/Nissen	21	0	5	Thoracoscopic procedure	17	0	0
MIS adrenalectomy	13	0	0	Vascular			
MIS splenectomy	5	0	0	Pacemaker insertion	20	20	13
MIS gastric resection	3	0	0	Vascular access	12	12	10
MIS liver resection	7	0	0	Carotid endarterectomy	16	16	0
MIS ventral hernia	1	0	1	AAA	9	9	0
Endoscopic				Varicose vein procedure	0	0	47
Gastroscopy	37	25	182	Other			
Colonoscopy	31	31	419	Median nerve decompression	9	9	53
ERCP	30	10	0	Other hand surgery	1	1	17
				Vasectomy	1	1	12

AAA = abdominal aortic aneurysm; ERCP = endoscopic retrograde cholangiopancreatography; FNA = fine-needle aspiration; MIS = minimally invasive surgery; SLN = sentinel lymph node.

community rotations in residency. These procedures included colonoscopy, endoscopic variceal banding, fine wire breast biopsy, pacemaker insertion, temporal artery biopsy and toenail resection.

DISCUSSION

The results of this study were very similar to those of previous studies in Canada and Australia.^{2,3} Overall, the level of preparation for practice was excellent and the model of broad-based training at UBC was successful, as were other similar training programs in the United States⁶ and Australia.⁵ This study did uncover some interesting successes of the UBC training program as well as some deficiencies. I recorded more than 120 different operations, and a selection of these procedures of interest is listed in Table 3.

The residency program provided a wide range of experience in the general category, including cutaneous and subcutaneous, abdominal, gastric, intestinal, colonic and benign breast procedures. However, 2 procedures that I encountered very frequently in practice but not at all in residency were fine needle aspirate of a solid or cystic lesion and hemorrhoid banding. I performed the latter procedure 104 times in the first year of practice. This may reflect the hospital-based emphasis of residency training as these 2 procedures are performed in an outpatient setting. It may also reflect the need to incorporate more ambulatory-based training in residency.

The colorectal training was good overall. There was procedure overlap with other areas. For the purposes of this study, I included intestinal and colorectal resection and hemorrhoidectomy as part of the general category, and I included laparoscopic colon resection as part of the laparoscopic category. The inclusion of full-time colorectal specialists on the faculty has proven to be beneficial for residency training.⁹ The UBC training program includes a mandatory rotation at St. Paul's Hospital, where there are several full-time colorectal surgeons on staff. As a result, preparation for practice was excellent.

Recently, there has been a great demand for fellowship training in laparoscopic surgery based on a perceived inadequate volume of advanced laparoscopic cases in the United States.¹⁰ In contrast, the laparoscopic experience provided at UBC is excellent, as shown in Table 3. A fellowship in laparoscopic surgery would be redundant for procedures commonly performed in the community, specifically cholecystectomy, appendectomy, colectomy, inguinal and ventral hernia repair and antireflux surgery. I encountered no laparoscopic procedures in practice that I hadn't encountered in residency training.

The endoscopy experience in training was barely adequate. The main endoscopy rotation was in the third year, which is why the numbers appear low since only the fourth through sixth years are included in this study. With the addition of the third-year endoscopy procedures the total

number of colonoscopies during residency was 105 and gastroscopies 123. The minimum number of colonoscopies for competency is generally accepted at 100.¹¹ Despite a moderate exposure during training, I did not perform endoscopic retrograde cholangiopancreatography in practice because this service was regionalized to Kelowna.

I encountered a wide range of hepatobiliary procedures during residency, the top 3 being liver resection, whipple and choledocho-enterostomy. Others included distal pancreatectomy, pseudocyst operations, pancreaticojejunostomy, portosystemic shunt placement, bile duct resections, organ retrieval, liver transplant and pancreas transplant. I performed 2 types of hepatobiliary procedures in practice, both in the trauma setting: one was a wedge liver resection of the left lateral lobe in a patient with a ruptured hemangioma after a motor vehicle crash and the other was a hepatorrhaphy in a patient with a liver fracture after an all-terrain vehicle rollover. The well-rounded experience in training proved useful in both of these patients' cases.

Oncology training was another success of the UBC training program. In addition to procedures listed in Table 3, there was also exposure to parathyroidectomy, adrenalectomy, sarcoma, peritonectomy for pseudomyxoma and groin dissection for melanoma. However, I did not encounter core breast biopsy, which was a common procedure performed in practice, in the last 3 years of residency.

The pediatric surgery experience during residency at UBC was relatively poor; I performed only 1 procedure (a pediatric hernia while on rotation in Prince George) during the last 3 years of training. In my first year of practice, I performed a total of 8 procedures in patients younger than 16 years. I performed these procedures based on experience recalled from my second year of training. Although the procedures were all successful, operator confidence would have been better if there had been more recent exposure during residency. My experience concurs with that in previous reports.¹²

Thoracic and vascular surgery experience, as with hepatobiliary experience, was excellent during training thanks to dedicated rotations in thoracic surgery in the fifth year and vascular surgery in sixth year. In addition to the thoracic procedures listed in Table 3, there was exposure to bronchoscopy and mediastinoscopy, decortication, pericardectomy and other esophageal procedures. Additional vascular procedures included femorodistal or aortoiliac bypass, arteriovenous fistulae, repair of vessel lacerations, other aneurysms, amputation and profundoplasty. The only deficiency was in the treatment of varicose veins, including compression sclerotherapy, saphenofemoral ligation and ligation of tributaries, which I encountered frequently in practice but not at all in my final 3 years of training. However, because of the vascular surgery experience in training, proficiency in these procedures was not difficult to acquire.

The “other” category of surgeries that I encountered in practice comprised mostly hand surgeries. Other than median nerve decompression, hand procedures, including ganglion cyst excision, palmar fasciectomy and trigger finger tenolysis, were rarely encountered in training. Other procedures that I encountered in practice but not in residency included ulnar nerve transposition, toenail resection, vasectomy, orchiectomy, temporal artery biopsy and muscle biopsy.

A recent Canadian Association of General Surgeons survey⁴ found that deficiencies in training were adequately supplemented by “on the job” mentoring by senior general surgical colleagues. The determining factor that guided whether a certain procedure was adopted or not was necessity. Common problems such as Dupuytren contracture, varicose veins or need for sterilization and the relatively long waiting lists to see other specialists who perform these procedures was the main driving force for general surgeons to learn these procedures and meet the needs of their communities. Problems that were less commonly encountered outside the realm of general surgery were more likely to be referred to another specialist.

In conclusion, general surgery residency at UBC prepares surgeons well for community practice, with few exceptions. Experience may vary from resident to resident, but in my experience, I performed procedures in my first year of practice that I had not encountered in my last 3 years of training. In some procedures such as fine needle aspirate of a solid or cystic lesion, hemorrhoid banding, core breast biopsy and varicose vein surgery, proficiency was relatively easy to acquire based on general principles acquired during training. On the other hand, I was much less comfortable performing pediatric procedures and hand procedures, the latter requiring some mentoring from a senior colleague. These deficiencies could have been remedied by scheduling rotations with exposure in these areas closer to the end of training.

Competing interests: None declared.

References

1. Hinchey EJ. The future of general surgery in Canada. *Can J Surg* 1988;31:94-6.
2. Chiasson PM, Henshaw JD, Roy PD. General surgical practice patterns in Nova Scotia: the role of the “generalist” general surgeon. *Can J Surg* 1994;37:285-8.
3. Tulloh B, Clifforth S, Miller I. Caseload in rural general surgical practice and implications for training. *ANZ J Surg* 2001;71:215-7.
4. Pollett WG, Dicks E. Training of Canadian general surgeons: Are they really prepared? CAGS questionnaire on surgical training. *Can J Surg* 2005;48:219-24.
5. Wong K, Birks D. Operative experience in the Victorian general surgical training programme. *ANZ J Surg* 2003;73:1036-40.
6. Cheadle WG, Franklin GA, Richardson JD, et al. Broad-based general surgery training is a model of continued utility for the future. *Ann Surg* 2004;239:627-32.
7. Census of Canada. 2006 Community Profiles — North Okanagan Available: www12.statcan.ca/census-recensement/2006/dppd/prof/92591/details/page.cfm?Lang=E&Geo1=CD&Code1=5937&Geo2=PR&Code2=59&Data=Count&SearchText=north%20okanagan&SearchType=Begins&SearchPR=01&B1=All&Custom= (accessed 2007 Mar. 14).
8. Schuurman N, Fiedler RS, Grzybowski SCW, et al. Defining rational hospital catchments for non-urban areas based on travel-time. *Int J Health Geogr* 2006;5:43.
9. Hyman NH. Impact of a colon and rectal surgeon on a general surgery residency training program. *Dis Colon Rectum* 1999;42:249-51.
10. Rattner DW, Apelgren KN, Eubanks WS. The need for training opportunities in advanced laparoscopic surgery. *Surg Endosc* 2001;15:1066-70.
11. Tassios PS, Ladas SD, Grammenos I, et al. Acquisition of competence in colonoscopy: the learning curve of trainees. *Endoscopy* 1999; 31:702-6.
12. Poenaru D, Fitzgerald P. Training general surgery residents in pediatric surgery: a Canadian survey. *J Pediatr Surg* 2001;36:706-10.