



# A model for a career in a specialty of general surgery: One surgeon's opinion



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## ABSTRACT

**Background:** The integration of general and endocrine surgery was studied as a potential career model for fellowship trained general surgeons.

**Methods:** Case logs collected from 1991–2016 and academic milestones were examined for a single general surgeon with a focused interest in endocrine surgery. Operations were categorized using CPT codes and the 2017 ACGME “Major Case Categories” and their frequencies were determined.

**Results:** 10,324 operations were performed on 8209 patients.  $412.9 \pm 84.9$  operations were performed yearly including  $279.3 \pm 42.7$  general and  $133.7 \pm 65.5$  endocrine operations. A high-volume endocrine surgery practice and a rank of tenured professor were achieved by years 11 and 13, respectively. At year 25, the frequency of endocrine operations exceeded general surgery operations.

**Conclusion:** Maintaining a foundation in broad-based general surgery with a specialty focus is a sustainable career model. Residents and fellows can use the model to help plan their careers with realistic expectations.

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## 1. Introduction

Medical students, residents, fellows and young surgeons have questions about their career choices. This was true for the first author of this study who is considering a career in endocrine surgery and as a result, decided to examine what a career in endocrine surgery consists of. A common goal for students, residents, fellows and young surgeons is to enjoy a satisfying professional career. The path a surgical trainee must take in order to become a competent, skilled surgeon has been extensively debated and it is not always clear how to build and maintain a satisfying surgical career based on competence and expertise.<sup>1</sup>

The Association of American Medical Colleges predicts a deficit of 41,000 general surgeons by the year 2025.<sup>2</sup> Despite the growing need for general surgeons, 80% of surgical residents choose to complete a fellowship in one of many specialty areas of general surgery. Although many studies attribute this to a lack of confidence in independent practice after residency training, many individuals are interested in limiting their practice to a very focused

area.<sup>3–5</sup> As a result, many fellowship graduates begin searching for a job with the intent of focusing only on their specialty.<sup>6,7</sup> Endocrine surgery fellows are no exception. Over half of fellowship graduates in endocrine surgery express a desire to have a focused career path.<sup>8–11</sup> Survey data of practicing fellowship trained endocrine surgeons, however, shows that it is not always practical nor possible to maintain an entirely specialized scope of surgical practice.<sup>8–11</sup>

Fellowship training, under certain circumstances, may be a necessity, given the expanding scope and complexity of patient care. Advanced endocrine training is needed to provide patients with high quality surgical care and to understand the rapidly expanding knowledge base of endocrine diseases and this also true for other specialties.<sup>12</sup> Fellowship graduates, however, should be aware of the potential negative consequences of focusing exclusively on a specialty of general surgery early in their careers. It can take years to develop a successful specialty practice and during this time specialty surgeons may find themselves not operating as much as they would like and, as a result have less exposure to residents, medical students and referring faculty. They also may have difficulty maintaining their operative skills and confidence in managing patients. During this time, active involvement in broad-based general surgery can help maintain operative skills, enhance

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opportunities for interaction with faculty, residents and students and increase income. This has led to the advice that “newly minted attendings should take care to maintain their knowledge of the abdomen”.<sup>13</sup>

In the past, studies have analyzed the demand for endocrine surgeons and the scope of practice.<sup>7,8,11,17,18</sup> Although suggestions for career paths in endocrine surgery have been made based on the analysis of the scope of practice of fellowship trained endocrine surgeons, there has never been a study that provided young surgeons with a potential template for a career model that can be emulated. This study provides one example of a potential option for a long-term career in general surgery with a focused interest in endocrine surgery. It looks at the successful integration of both endocrine and general surgery in an academic career of an endocrine fellowship trained general surgeon who began a career at an institution without an endocrine surgeon.

## 2. Material and methods

A retrospective study was performed at MetroHealth Medical Center in Cleveland, Ohio that involved the review of all major operations completed by a single surgeon over a 25-year period from 1991 to 2016. A major operation was defined as any operation completed in an operating room of the main hospital or at an ambulatory site. Operations performed in the outpatient clinic were considered minor and were not included. During this time period, the surgeon initiated and developed an endocrine surgery program and was the only endocrine surgeon at the institution. This occurred in a competitive marketplace characterized by as many 7 other endocrine surgeons at 2 other larger health centers in the same city. The study did not involve the use of any patient health information. The study was determined to be exempt from institutional review board approval by the institutional review board at MetroHealth Medical Center.

Surgery case logs, collected over the 25-year period were reviewed. The 2017 Current Procedure Terminology (CPT) codes and the Accreditation Council for Graduate Medical Education (ACGME) tracked codes report, a reference used by surgical residents to log cases, were used to identify and then categorize the operations.<sup>14</sup> Operations were further categorized based on the 2017 ACGME procedure “type” (Table 1).<sup>15</sup> The number of operations performed per year was determined. Multiple operations performed during a single case were counted separately.

Based on the tracked codes report and ACGME defined categories, the operations performed between 1991 and 2016 were separated into the following categories: skin and soft tissue and

breast; head and neck; alimentary tract; abdominal; vascular; operative trauma; thoracic; and endocrine.<sup>14,15</sup> If applicable, operations were also categorized under basic and complex laparoscopic case categories. The operations were then further divided into sub-categories. Alimentary tract cases included operations performed on the esophagus, stomach, small intestine, large intestine, and anorectum. The abdominal category included liver, gallbladder, bile duct, pancreas, spleen, hernia and “general” operations. Examples of “general” operations in the abdominal category, based on the ACGME tracked codes report, included drainage of intra-abdominal abscess, exploratory laparotomy, diagnostic laparoscopy, omentectomy, and others.<sup>14</sup> A miscellaneous category was for procedures not otherwise categorized. An example of a miscellaneous procedure was a complex wound closure and muscle biopsy.<sup>14</sup> Endocrine surgery was sub-categorized into adrenal, pancreas, thyroid, parathyroid, and other head and neck procedures. Other head and neck procedures pertinent to endocrine diagnoses, such as selective lateral neck dissection and modified radical neck dissection for thyroid cancer, were included as a part of endocrine surgery in this study.

The time to develop a high volume endocrine practice was determined. Because of variable definitions for high volume endocrine procedures, we chose to determine the year in which the combination of 50 or more thyroidectomies, 50 or more parathyroidectomies and 6 or more adrenalectomies were performed. Using smaller threshold numbers, we also determined the year in which 30 or more thyroidectomies, 30 or more parathyroidectomies and 4 or more adrenalectomies were performed. Other milestones examined included: the year in which 100 or more thyroidectomies were performed, the year when 100 or more parathyroidectomies were performed and the year when 10 or more adrenalectomies were performed. The timing of academic appointment and promotion and department leadership positions were also examined.

We also chose to examine the volumes of some of the most commonly performed general surgery operations and when high-surgical volumes of these procedures were achieved. Surgical volumes of laparoscopic cholecystectomy and hernia repair surgeries were analyzed. Hernias were separated into two categories: inguinal and femoral hernia repairs; and ventral hernia repairs (epigastric, incisional, and umbilical hernias). Greater than 25 laparoscopic cholecystectomies per year and greater than or equal to 25 inguinal herniorrhaphies per year were chosen to define high surgical-volume. These threshold numbers were based on the results of previous studies that show improved patient outcomes associated with greater surgical volume.<sup>24–27</sup>

Continuous data is presented as a mean  $\pm$  the standard deviation. Frequencies of patients, operations, and case types were measured yearly for the 25-year period. Subsequent qualitative analysis of the data was also performed.

## 3. Results

There were 8209 patients operated on and 10,326 total major operations performed over 25 years with an average of  $328.4 \pm 73.7$  patients operated on and  $412.0 \pm 84.9$  operations done per year (Table 2). There was an average of  $279.3 \pm 42.7$  general surgery operations and  $133.8 \pm 65.5$  endocrine operations performed yearly (Table 3). From year 1–24, the number of general surgery operations exceeded the number of endocrine operations (Fig. 1). In year 25, the number of endocrine operations ( $n = 315$ ) exceeded the number of general surgery operations ( $n = 195$ ) (Fig. 1). The increase in Endocrine surgery volume and increase in specialization in the department of surgery lead to a decision to end involvement in trauma care in year 20. The increasing specialization in the

**Table 1**  
ACGME major case categories.

Skin, Soft Tissue, Breast
Head and Neck
Alimentary Tract
Abdomen
Liver
Pancreas
Vascular
Endocrine
Operative Trauma
Non-operative Trauma
Thoracic
Pediatrics
Plastics
Surgical Critical Care
Laparoscopic Basic
Endoscopy (Upper Endoscopy, Colonoscopy)
Laparoscopic Complex

department of surgery over time with an increase in more complex laparoscopic procedures lead to a decline in certain open operations.

When examining a 25-year average, the three most common categories of general surgery operations performed were “Abdomen” ( $160.7 \pm 52.2$  cases per year), “Laparoscopic-Basic” ( $66.8 \pm 28.3$  cases per year) and “Alimentary Tract” ( $43.9 \pm 15.8$  cases per year) (Table 3). All categories of general surgery operations were similar in frequency during earlier years. In later years, biliary and hernia surgeries, categorized under “Abdomen” and/or “Laparoscopic basic”, and skin and soft tissue procedures were performed at higher rates than all other procedure categories combined (abdominal, alimentary tract, operative trauma, vascular, pancreas, liver, and thoracic), which decreased in frequency over the years (Fig. 3). Approximately  $33.6 \pm 9.9$  skin and soft tissue procedures were performed yearly with a range of 23–60 surgeries per year over 25 years. A high-volume of laparoscopic cholecystectomies was achieved in year 3 when 32 operations were done. On average,  $63.2 \pm 26.3$  laparoscopic cholecystectomies (range: 20–111) and  $7.0 \pm 4.1$  open cholecystectomies (range: 0–17) were done yearly. A high volume of open inguinal hernia repairs was achieved in year 5 when 32 operations were performed. By year 15 over 50 inguinal hernia repairs were done. Inguinal and femoral hernia repairs ranged from 18 to 84 with yearly average of  $41.8 \pm 15.9$  and ventral hernia repairs ranged from 10 to 83 cases with a yearly average of  $36.5 \pm 18.9$  over 25 years.

Overall, the number of endocrine operations increased yearly (Fig. 2 and Table 4). The total number of thyroid, parathyroid, and other endocrine associated head and neck surgeries increased year to year as well and reached their peak in year 25. Thyroid operations ranged from 28 to 163 per year with a yearly average of  $71.8 \pm 34.4$ ; parathyroid operations ranged from 16 to 108 per year with a yearly average of  $42.4 \pm 22.6$ ; adrenal operations ranged from 2 to 13 per year with a yearly average of  $6.1 \pm 2.8$ , and other endocrine head and neck cases ranged from 3 to 36 with a yearly average of  $14.3 \pm 8.8$ . The highest spike in case numbers for adrenal operations was seen between years 15–20 (Table 4). There were few endocrine pancreas operations done over the twenty-five years ( $1.0 \pm 0.0$  cases per year).

High surgical-volumes of endocrine operations, which have been suggested based on improved patient outcomes, were achieved for thyroidectomy, parathyroidectomy and adrenalectomy. A threshold of 30 or more thyroidectomies per year was achieved in year 2 ( $n = 36$ ). A threshold of 50 or more thyroidectomies was achieved by year 10 ( $n = 58$ ) and by year 18 the number of thyroid operations exceeded 100 ( $n = 101$ ). In the 10th year of practice, the threshold of 30 parathyroidectomies was exceeded ( $n = 40$ ) and in year 11 more than 50 parathyroidectomies were performed ( $n = 57$ ). A threshold of 4 or more adrenalectomies per year was achieved in year 8 ( $n = 4$ ); a threshold of 6 or more adrenalectomies per year was achieved in year 11, and a threshold of 10 or more adrenalectomies per year in year 16. It was in year 11 that the thresholds for all three operations, >50 thyroidectomies, >50 parathyroidectomies and >4 adrenalectomies, were exceeded achieving a high volume endocrine surgical practice, 65

**Table 2**  
Total and average yearly frequency of patients seen and procedures done in 25 years.

Total patients	8209
Average number of patients per year ( $\pm$ SD <sup>a</sup> )	$328.4 \pm 73.7$
Total operations	10324
Average number of operations per year ( $\pm$ SD <sup>a</sup> )	$412.9 \pm 84.9$

<sup>a</sup> SD = standard deviation.

**Table 3**  
Average yearly frequency of procedure areas based on ACGME Category.

Category	Average $\pm$ SD
General Surgery	$279.3 \pm 42.7$
Skin, Soft Tissue, Breast	$33.6 \pm 9.9$
Head and Neck <sup>a</sup>	$10.0 \pm 5.2$
Alimentary tract	$43.9 \pm 15.8$
Abdomen	$160.7 \pm 52.2$
Liver	$3.1 \pm 2.4$
Pancreas <sup>a</sup>	$2.5 \pm 2.4$
Vascular	$1.2 \pm 0.4$
Operative Trauma	$12.0 \pm 11.0$
Thoracic	$1.2 \pm 0.4$
Laparoscopic Basic	$66.8 \pm 28.3$
Laparoscopic Complex	$1.6 \pm 1.9$
Miscellaneous	$20.8 \pm 8.9$
Endocrine Surgery	$133.8 \pm 65.5$

Note: Non-operative trauma, plastics, pediatrics, surgical critical care, and endoscopy were removed from the table.

<sup>a</sup> Not associated with an endocrine procedure.

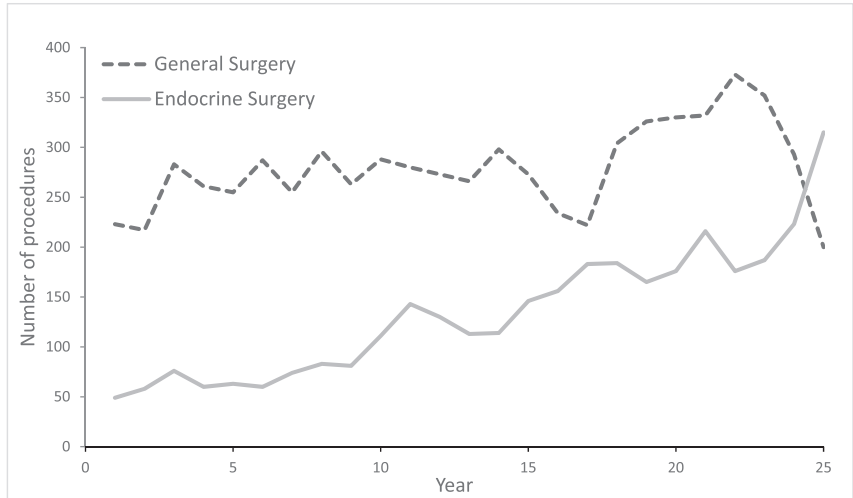
thyroidectomies, 57 parathyroidectomies and 6 adrenalectomies were performed.

Initial hiring included a medical school faculty appointment as an assistant professor of surgery. Promotion to an associate professor of surgery occurred in year 6. Promotion to a tenured professor of surgery occurred in year 13. Other academic milestones included: appointment to the position of director of general surgery in year 9 and appointment to vice chairman of surgery in year 14.

#### 4. Discussion

In this study, we dissected the first 25 years of practice of a fellowship trained endocrine surgeon in order to examine a career model for general surgeons with fellowship training in a specialty of general surgery. A surgeon in search of their first job should recognize that their career will last for approximately 35 years. A career model can provide future specialty surgeons with realistic expectations about building a specialty practice, which in the case of endocrine surgery consists primarily of thyroidectomy, parathyroidectomy, adrenalectomy and neck dissections for thyroid cancer and less commonly small bowel and pancreatic resection for neuroendocrine tumors. It can also provide them with a template to help structure and plan their own career. In this model, non-endocrine general surgery cases accounted for a majority of cases for most of the career. We found a progressive increase in endocrine surgery cases over time and a comparable increase in certain general surgery operations such as hernia repair and cholecystectomy.

Certain milestones were documented in the first 25 years of an ongoing career. It was in year 11 that a “high volume” endocrine practice was achieved (50 or more parathyroidectomies per year, 50 or more thyroidectomies per year, 6 or more adrenalectomies per year); emphasizing that patience is required to develop a specialty practice.<sup>21–23</sup> During these first 11 years, an active general surgery practice was maintained. This was critically important to help maintain laparoscopic skills especially since the number of laparoscopic adrenalectomies performed per year were  $2.5 \pm 0.7$  and  $4.0 \pm 0.8$ , during the first and second 5 year periods, respectively. It was also important to remain up to date on technologic advances. Furthermore, it was valuable for helping to get involved in professional activities such as ad hoc editorial reviews of journal articles, appointment to editorial boards, participation in regional and national organizations that were general and specialty specific and development of a regional and national reputation, all of which



**Fig. 1.** Yearly frequency of general and endocrine operations.

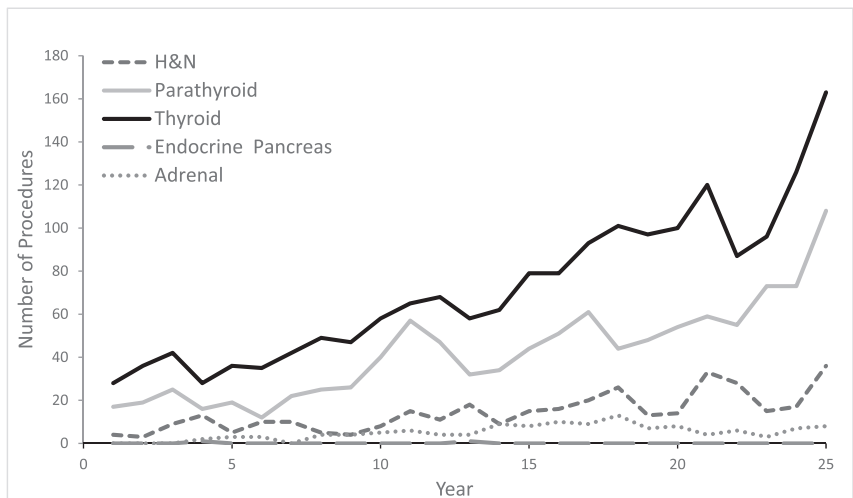
were important for faculty promotion. It was also instrumental in attaining leadership positions in the department of surgery. It wasn't until the 25th year of practice that the number of endocrine operations exceeded the number of general surgery operations. This was related to conscious decisions to end involvement in care of trauma patients and to start reducing the number of general surgery cases concomitantly with the maturation of the endocrine surgery practice.

In addition to helping maintain important surgical skills, active involvement in general surgery provides a surgeon with opportunities to acquire new skills, to expand scholarly activity and enhance the role as a teacher and mentor for residents and medical students, all of which provide additional sources of intellectual stimulation and personal satisfaction. It is important to recognize that most successful applicants for endocrine surgery fellowships have had formal endocrine surgery faculty at their institution, which in turn increased their exposure to training and scholarly activities in the field.<sup>16,17</sup>

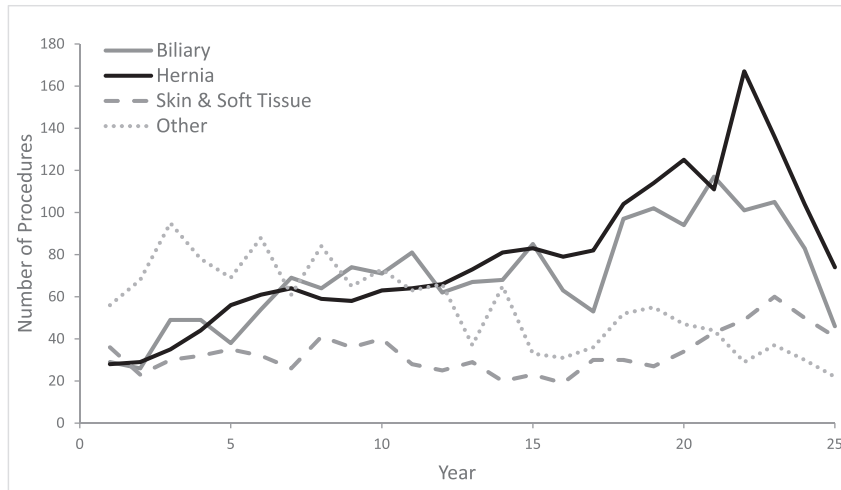
Maintaining active involvement in broad-based general surgery also helps fulfill certain needs in a surgery department including helping with the general surgery workload and assisting with call responsibilities. At the same time it also increases a surgeon's

exposure to primary care physicians who will eventually become a significant part of the referral base for endocrine cases. It helps a surgeon develop a favorable reputation more rapidly in their medical center and in their community and it helps raise peoples' awareness of a surgeon's interests and expertise. It is also a way for a surgeon to earn the necessary work RVUs to justify their compensation. It is important for young surgeons to recognize that most surgeons do not stay at one institution for their entire career and that a career in general surgery with a focused interest in a specialty of general surgery makes a surgeon more marketable if they decide to look for a new job elsewhere or decide to pursue a leadership position.

Graduates of surgery fellowships may find that preconceived notions of what constitutes a job in a specialty of surgery do not match the realities of the job market.<sup>8,10</sup> A graduating fellow should be prepared to examine various types of jobs during their search and to beware of becoming too specialized too soon in their career. Although some are able to find jobs, which are exclusively in their specialty, graduates must be flexible. More than half of the job opportunities available to graduating endocrine surgery fellows involve combining an endocrine surgery practice with other general surgery.<sup>8,10</sup> Moreover, 40–50% of job applicants find



**Fig. 2.** Yearly frequency of endocrine operations.



**Fig. 3.** Yearly frequency of general surgery operations. \* Surgeries in the “other” category include alimentary tract procedures and other abdominal cases (spleen, liver, pancreas), vascular, and thoracic. Examples of “General” category procedures per ACGME codes report/CPT include drainage of intra-abdominal abscess, laparotomy, laparoscopy, omentectomy, etc.

themselves practicing in an established general surgery group rather than an endocrine surgery group.<sup>11</sup> In some states, such as Oregon and Wisconsin, there were only 2 strictly endocrine surgery jobs present in the metropolitan areas during the period from 2008-2012.<sup>7</sup> Many of the employment opportunities were for jobs that did not always require fellowship training.

As fellows investigate job opportunities, they should be aware that fellowship training warrants appointment as an assistant professor of surgery rather than instructor, although this may vary at different institutions. In this study, the time to earn academic promotion to associate professor and then full professor with tenure was documented to be 6 and 13 years, respectively. Clinical activities were not a direct determinant of academic promotion, although they had significant indirect effects. Processes and length of time for academic promotion will vary by institution. Active involvement in general surgery may be also instrumental in helping to attain departmental and national leadership positions.

A study looking at active endocrine surgeons in the American Association of Endocrine Surgeons showed that only 52% and 57% of the surveyed surgeons were in the high volume category for adrenalectomy (4 or more cases per year), thyroid (100 or more cases per year) and parathyroid (50 or more cases per year) procedures.<sup>18</sup> Based on our study, we can conclude that a high volume endocrine surgery practice can be achieved while maintaining a broad based general surgery practice. It may enhance academic opportunities and productivity. It expands the network of academicians that a surgeon will interact with and enhances opportunities to participate and earn leadership positions in both traditional general surgery and endocrine societies.

Numerous studies have looked at surgeon volume and adequacy of operation performed and subsequent complication rates. The number of thyroidectomies per year that has been suggested to

constitute “high volume” is highly variable in the literature with a range from 30 to 100.<sup>9,19–21</sup> A threshold of 30 cases per year has been reported to be associated with a decrease in post-operative complications and an improved adequacy of resection for differentiated thyroid cancer.<sup>19</sup> In our study, we found that the threshold of 30 thyroidectomies per year was exceeded in the second year of practice. At 50 or more thyroidectomies per year, notable differences in iodine uptake in patients are observed.<sup>19</sup> In our study, a threshold of 50 thyroidectomies was achieved in year 10. Other data has shown that when 100 thyroidectomies per year is used for what constitutes high volume, complication rates can be further reduced to 0.6–5%.<sup>9,21</sup> There is a difference in TSH-stimulated thyroglobulin levels in high versus low volume surgeons at greater than 100 thyroidectomies per year.<sup>19</sup> In this study, the threshold of 100 thyroidectomies per year was achieved in year 18. Surgeons performing greater than 50 parathyroidectomies per year also have a lower incidence of operative failures, despite operating more often on patients with multifocal disease compared to low-volume surgeons.<sup>22</sup> Our study showed that the 50 parathyroidectomies per year threshold was achieved in year 11. Improved surgical outcomes are also evident in patient's whose surgeons perform more than 4 adrenalectomies, more than 15 to 26 laparoscopic cholecystectomies and more than 25 open inguinal hernia repairs.<sup>23–27</sup> Our data shows that these numbers are more than sufficiently acquired in this career path for other common surgical procedures like laparoscopic cholecystectomies and open inguinal hernia repairs. Therefore, it is possible to build a robust general surgery practice as well. An important conclusion from our study is that a high volume endocrine surgery practice can be built successfully at an institution without a pre-existing program in endocrine surgery in a competitive marketplace. The absence of an endocrine surgeon at an institution and a competitive market place should not deter a graduating fellow from building a new program while they also build and maintain a general surgery practice.

Our study has limitations. One limitation is that external factors that may affect the case mix and number of cases in a clinical practice, such as changes in local and regional providers and insurance contracts, were not considered. A second limitation is that the practice development pattern that was described over the past 3 decades may not necessarily be the best model for the next three decades, although their still appears to be a significant need for surgeons who can perform broad based general surgery. Our data

**Table 4**  
Average frequency of endocrine operations over five year increments.

Years	Thyroid	Parathyroid	H&N	Adrenal
1–5	34 ± 6.0	19.2 ± 3.5	6.8 ± 4.1	2.5 ± 0.7
6–10	46.2 ± 8.5	25 ± 10.0	7.4 ± 2.8	4.0 ± 0.8
11–15	66.4 ± 7.9	42.8 ± 10.2	13.6 ± 3.6	6.2 ± 2.3
16–20	94 ± 3.9	51.6 ± 6.4	17.8 ± 5.3	9.4 ± 2.3
21–25	118.4 ± 29.7	73.6 ± 20.9	25.8 ± 9.4	5.6 ± 2.1

and discussion only considered a single surgeon's career in general and endocrine surgery. Our data analysis and interpretation is based on frequencies of operations performed without specific outcome data, which across the twenty-five-year period may have provided us with a more robust argument for our proposed career model. Furthermore, we did not examine how academic and administrative roles affected the frequency of operations performed.

Nevertheless, we provide a unique look into the career of a fellowship trained endocrine surgeon as a model of practice for future specialty trained general surgeons. The landscape of general surgery is one that is ever-changing. Career opportunities that allow for change and adaptation through the incorporation of a broad-based general surgery practice can sustain a surgeon's job satisfaction, maintain quality patient outcomes, and provide us with the chance to educate the general and specialty surgeons of the future.

## 5. Conclusions

A career that combines broad-based general surgery and a specialty of general surgery can be a rewarding practice model with many benefits for an endocrine-fellowship trained surgeon. A high-volume practice can be achieved over time in both a specialty of general surgery and broad based general surgery. Having a clinical practice model for a career in general surgery with a focused interest in a specialty of general surgery provides a young surgeon with realistic expectations and a template to help plan their own careers.

## Conflict of interest

The manuscript was presented as a Poster at the annual meeting of the American Association of Endocrine Surgeons, on May 2, 2017 in Orlando, FL, USA. The manuscript has been seen and approved by all authors and the material is previously unpublished. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. There are no conflict of interests with this study.

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