PJSS Vol. 79, No. 1, January-June, 2024

PJSS PHILIPPINE JOURNAL OF SURGICAL SPECIALTIES

Trends in Index Case Load and Case Variety in Training Institutions Accredited by the Philippine Society of General Surgeons: A 10-Year Review (2009-2018)

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Rationale/Objective: The competency of surgical trainees is measured by, among other things, summative examinations and operative experience. There is little literature on general surgery training in the Philippines. This study examines the trends in operative case load and variety in training institutions accredited by the Philippine Society of General Surgeons (PSGS) from 2009-2018.
Methods: This is an observational cross-sectional study of the surgical outputs of PSGS accredited training institutions as reflected in their annual reports. The study determined the trends in general surgical case load and variety and their distribution across the different training institution types from 2009 to 2018.
Results: In the study period, there is a trend to an increasing number of operations across all categories/procedures except for trauma surgeries. Overall, the average number of cases credited to residents meets the requirements set by the PSGS. The distribution of cases, however, is not equal among residents of the different institution-types. Changes in scope and differences in interpretation of index operations contributed to significant changes in trends.
Conclusion: Recommendations include a review of definitions of index operations and strict compliance to changes, the utilization of an annual computerized database and the addition of patient outcome measures in the assessment of resident competencies.

Key words: surgical training, surgical education, index operations

The Philippine Society of General Surgeons (PSGS), founded in 1999, is the national organization handling the accreditation and monitoring of General Surgery (GS) training institutions in the country.[1] The PSGS requires trainees to complete a minimum volume of surgical operations in various categories to ensure that they acquire the skills that translate to competence in particular surgical procedures.[2] The surgical curriculum aims to cover all the surgical knowledge and skills necessary for a trainee to learn to provide holistic management for the surgical patient. It is revised and updated regularly to keep pace with evolving teaching and learning strategies for surgical training.

Literature relating to the operative experience of surgeons in training worldwide is limited. Aside from this, there is also a wide variation in the total number of procedures and key index cases required of resident trainees within the training systems of different countries.[3]

In the Philippines, there had only been one local study that has surveyed the scope of GS training. This 1995 study recommended planning and crafting accreditation guidelines based on the epidemiology of local cases.[4] With the introduction of novel procedures such as minimally invasive surgery and other adjuvant therapies, the distribution of surgical procedures would surely have changed since that time.

This study examined the case load and case variety of GS operations done at PSGS-accredited institutions. The authors aspired that this might contribute to revisions or updates to the current general surgical curriculum prescribed by the PSGS.

The aim of this study was to determine the trends in case load and case variety of operations in PSGS-accredited training institutions from 2009-2018. Specifically, the study examined the following: (1) description of general surgery training institutions and the updated list of training programs per institution

type; (2) number of residents per year level within the inclusive period; (3) trends of total number of credited cases, annual average and index operations; (4) average number of cases credited to residents and; (5) ranking of operations based on credited cases.

Methods

This is an observational cross-sectional study involving all accredited training programs of the PSGS. Data were extracted from the standardized annual reports from 2009-2018 archived at the PSGS. The data were collected with permission from the Board of Directors of the PSGS. The study protocol was approved by the UP Manila Ethics Review Board.

Counting of procedures and cases were based on Standard Recommendations and Requirements of the PSGS. No medical records were reviewed and no patient identifying details were collected, assuring data privacy and confidentiality.

Desk review of the annual reports was done by the investigator (CGDD) with the aid of a qualified research assistant. For this review, electronic data of the annual reports were prioritized but in case of missing data, the physical reports were utilized. The research assistant collated and encoded the data into a spreadsheet file (Excel, Microsoft, Redmond WA) and analyzed therein.

In the annual reports, the specific data collected were the following:

1. Number and name of accredited hospitals per institution type
2. Number of residents per year level
3. Number of service and pay operations done by institution, categorized into
    - Thyroidectomy
    - Parotidectomy
    - Neck dissection
    - Modified radical mastectomy
    - Gastric resection
    - Small and large bowel resection
    - Low anterior resection
    - Abdominoperineal resection
    - Anal surgery
    - Appendectomy (open and laparoscopic)
    - Cholecystectomy (open and laparoscopic)
    - Common bile duct exploration
    - Biliary-enteric surgery
    - Pancreatic resection
    - Hepatic resection
    - Thoracostomy
    - Major trauma surgery
    - Vascular access
    - Hernia
    - Soft tissue tumor resection
4. The average number of cases credited to residents
5. Ranking of operations based on credited cases

Data collected would be reported as frequencies and means and were analyzed as to number of index cases and variety of cases completed by each training program/ institution.

The study would likewise describe the types of training institutions as defined by PSGS, the number of surgical trainees during the period covered, and the procedures and cases done.

Definition of Terms

University-type - institutions affiliated with a university that provides medical education and training to current and future health professionals

Government-type - institutions that are operated and fully funded by local government units or the national government

Private - institutions that are owned and operated by organizations other than the state, which may include for profit and non-profit companies.

Consortium - at least 2 (maximum of 3) hospitals whose individual capabilities cannot meet the minimum requirements for accreditation of a general surgery residency training program, that group together to form one program

Index Operation - specific procedures that are minimum case requirements that a training program must handle

annually to ensure residents' exposure to these specific cases

Program Factor - the factor used to compute the case load requirements of an accredited GS training program at a given year based on the resident complement of the program during that particular year. This is calculated by dividing the number of residents in an institution by 5 (the minimum number of residents in an institution).

Pay/Private Cases – operations done under the private arm of the hospital, regardless if done by a resident or consultant

Charity/Service Cases – operations done under the charity service, regardless if done by a resident or consultant

Credited Cases – operations credited to resident training; the sum of the number of service cases and 0.35 of the number of pay cases

Results

Accredited Training Institutions

The number of accredited PSGS training institutions from 2009-2018 rose from 67 in the first three years of the study period to 71 in the last three years. Overall, the researchers were able to retrieve 99.7% of the annual reports of the accredited surgical training programs in this 10-year period. Only 2 annual reports were; unaccounted one each for the years 2009 and 2011.

The PSGS classifies training institutions into government, university, private and consortium. Included in the study were 32 government, 21 private, 12 university and 8 consortium programs.

The Philippines had 325 secondary and 116 tertiary hospitals in 2018. This study covered 61.2% of tertiary hospitals and 16.1% of secondary and tertiary hospitals combined.

Surgical Residents

The total number of residents per year level for the 10-year period is summarized in Table 1. The number of trainees decreased as the year-level of training progressed. Over this 10-year interval, there were 1,944 first year residents compared to 1,167 fifth year residents.

Index Operations

The frequencies of index and non-index procedures are shown in Tables 2 and 3, respectively. The top five

Table 1. Number of residents per year level at General Surgery training institutions in the Philippines from 2009-2018.

Year	1st	2nd	3rd	4th	5th	TOTAL
2009	170	149	133	125	71	648
2010	185	144	146	124	104	703
2011	118	108	101	96	87	510
2012	148	156	140	141	121	706
2013	160	135	135	129	147	706
2014	158	143	121	138	140	700
2015	213	154	140	117	130	754
2016	223	204	130	123	115	795
2017	261	204	176	132	122	895
2018	308	227	208	163	130	1036
TOTAL	1944	1624	1430	1288	1167	7453

most common procedures performed were: (1) open appendectomy; (2) vascular access; (3) hernia repair; (4) open cholecystectomy and; (5) thoracostomy. The least common procedure was abdominoperineal resection.

Operation Trends

Figures 1 through 20 reveal the trends in each index and non-index operation. With the exception of trauma surgery, there was a general trend towards an increase in case load.

There was a significant increase in the number of gastric resections in 2018 and soft tissue resections in 2016-2017 respectively as shown in Figures 14 and 15.

Laparoscopic procedures had upward trend. There were increasing numbers of both laparoscopic appendectomies and cholecystectomies across the study period. Figures

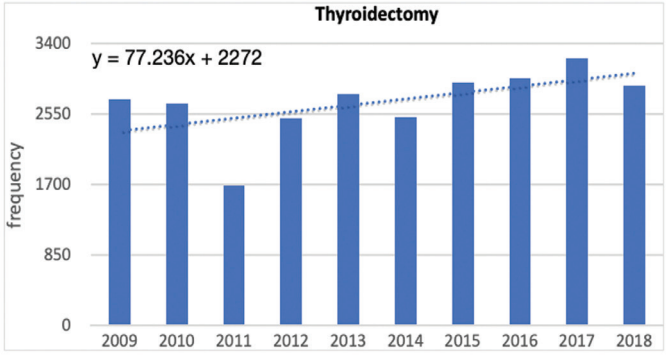

Figure 1. Trend of thyroidectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

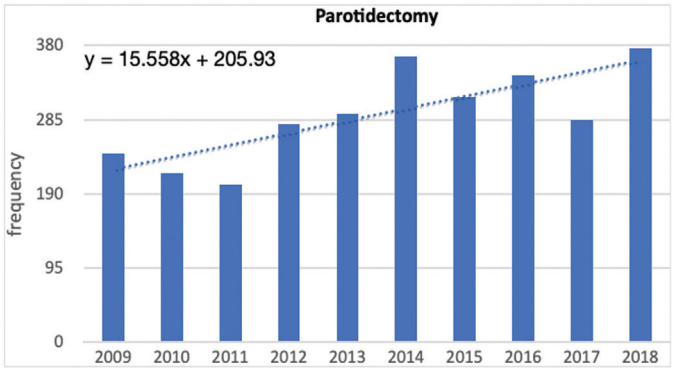

Figure 2. Trend of parotidectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

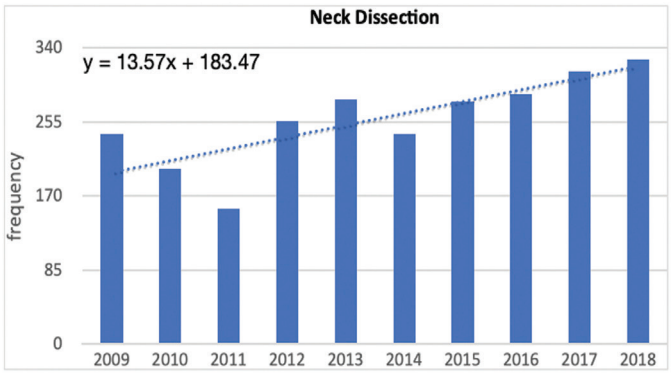

Figure 3. Trend of neck dissections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

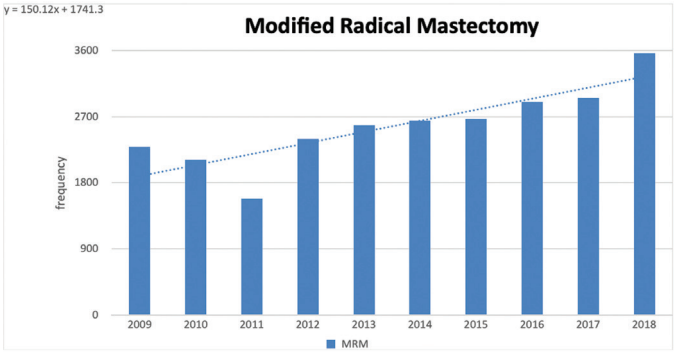

Figure 4. Trend of modified radical mastectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

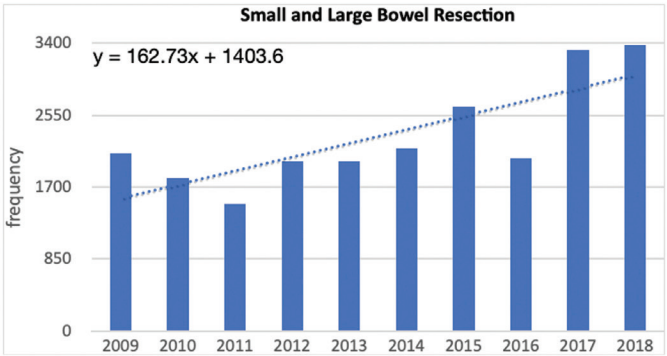

Figure 5. Trend of small and large bowel resections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart

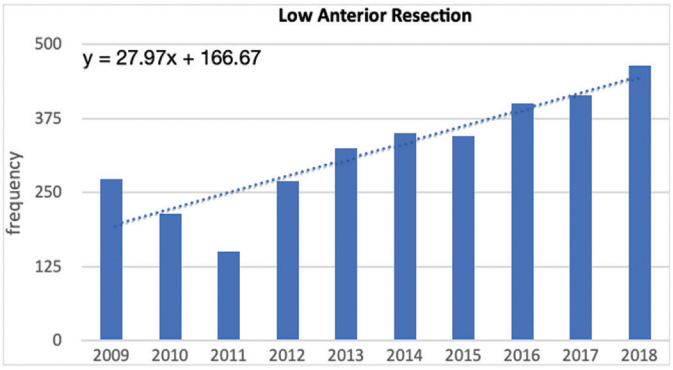

Figure 6. Trend of low anterior resections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

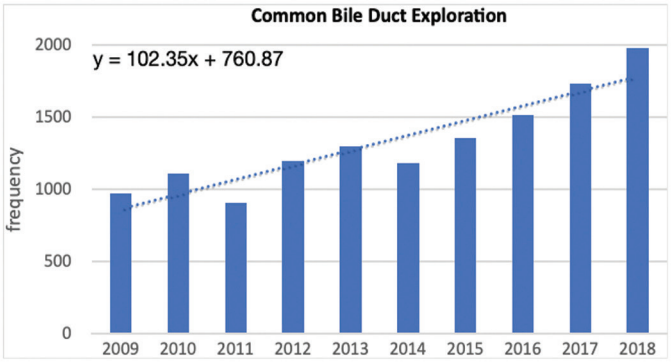

Figure 9. Trend of common bile duct explorations performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

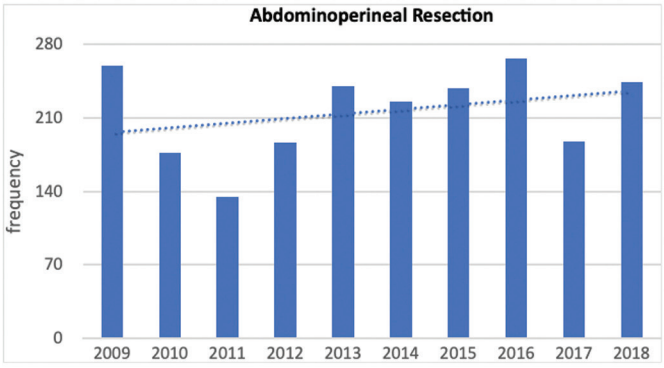

Figure 7. Trend of low anterior resections at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

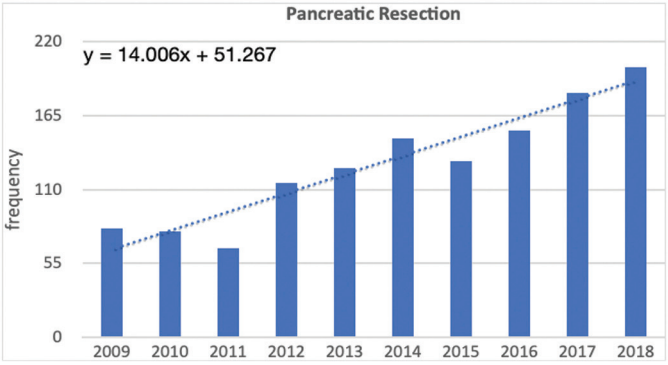

Figure 10. Trend of pancreatic resections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

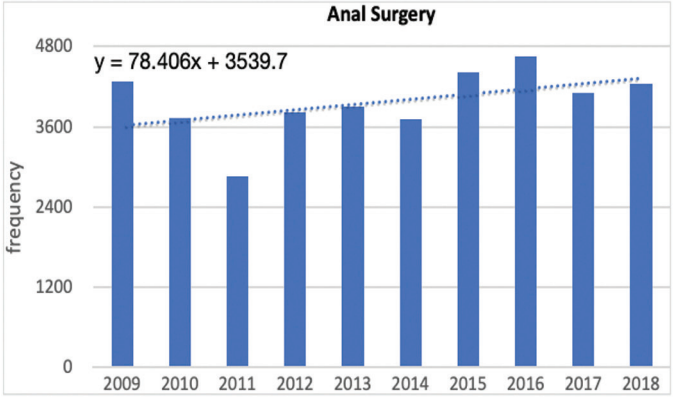

Figure 8. Trend of anal surgeries performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

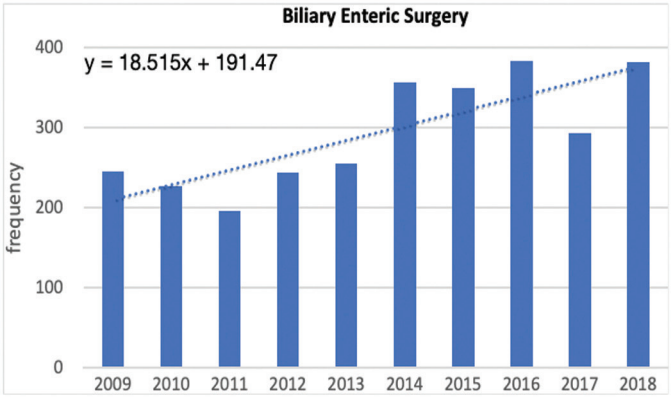

Figure 11. Trend of biliary enteric surgeries performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

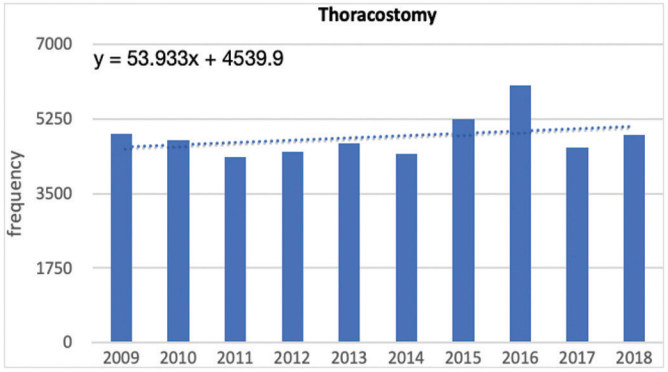

Figure 12. Trend of thoracostomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

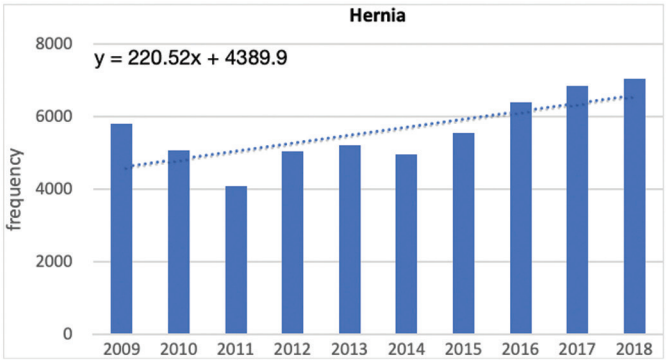

Figure 13. Trend of hernia surgeries performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart

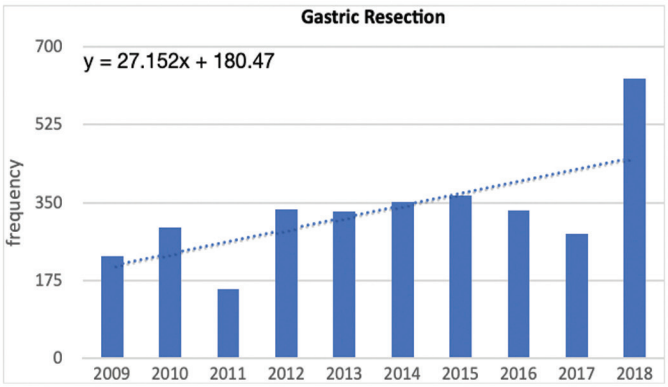

Figure 14. Trend of gastric resections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

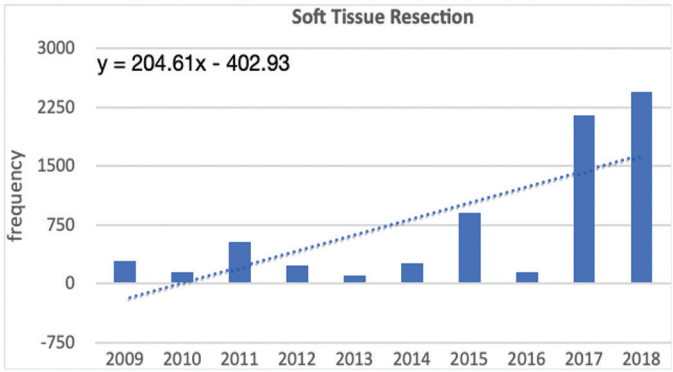

Figure 15. Trend of soft tissue resections performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

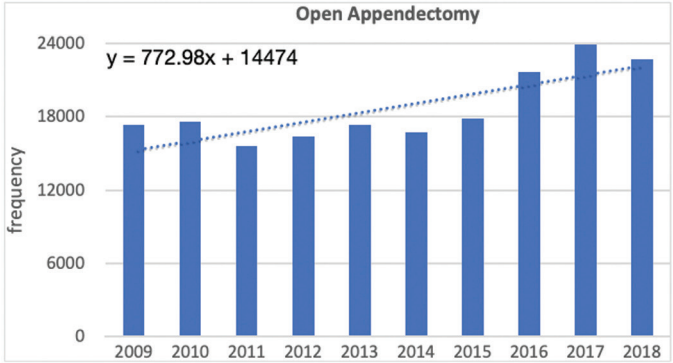

Figure 16. Trend of open appendectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

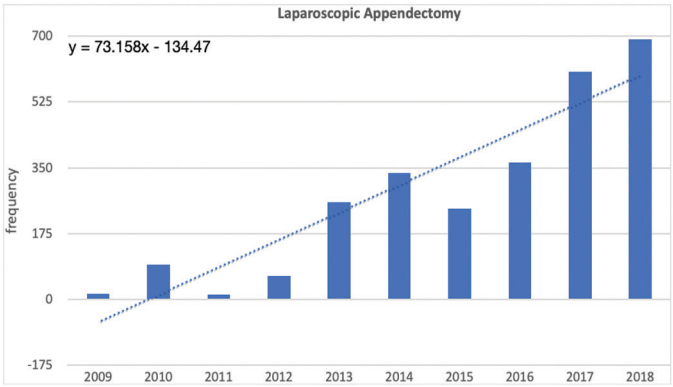

Figure 17. Trend of laparoscopic appendectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

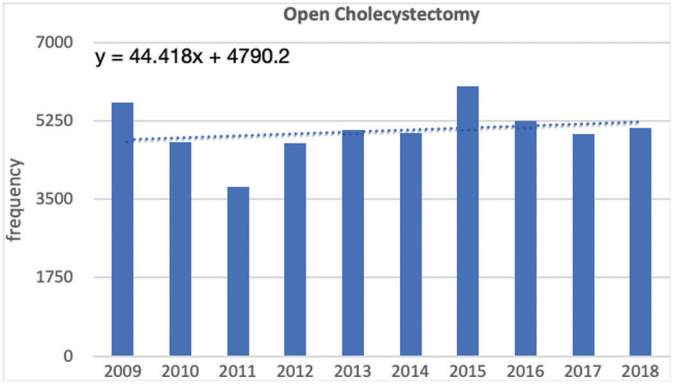

Figure 18. Trend of open cholecystectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

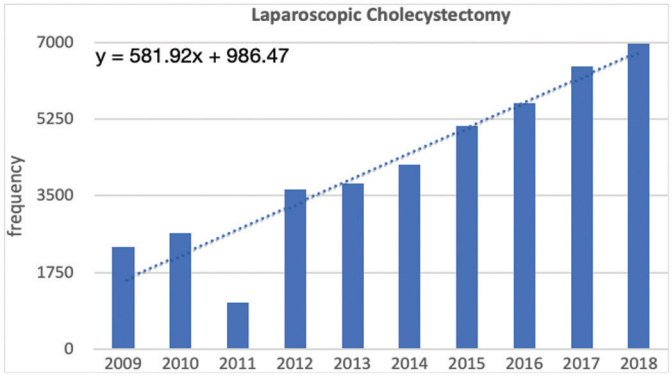

Figure 19. Trend of laparoscopic cholecystectomies performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

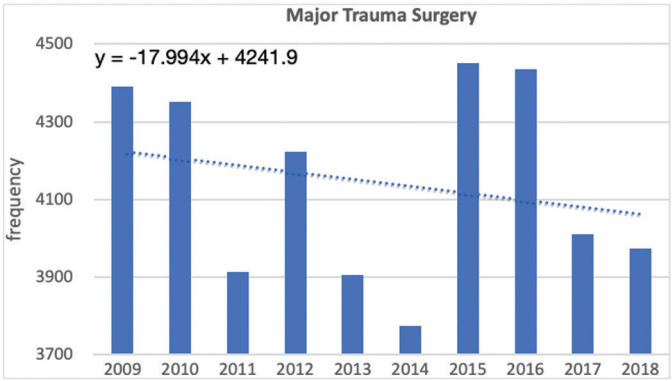

Figure 20. Trend of major truma surgeries performed at General Surgery training institutions in the Philippines from 2009-2018. Dotted line indicates regression line, regression equation in the upper left corner of the chart.

16 and 17 show the trend of open and laparoscopic appendectomies while Figures 18 and 19 show the trend of open and laparoscopic cholecystectomies.

As shown in Figure 20, the slope of the trend in trauma surgeries is -17.99, with the decrease noted to start in 2017.

Credited Cases Per Resident

Trainees must meet the required minimum number of cases per index operation in order to qualify for the diplomate board certification while the training programs need to meet the minimum number of cases for accreditation.

Table 2 shows the 10-year totals for each index procedure/category and the aver-age number of cases per resident. Table 3 shows the same data for non-index procedures. In the computation for the minimum requirements, the PSGS accounts for all residents of the institution in computing for the program factor. The average is multiplied by the number of residents in the program and is used to determine if the program can reach the requirements of PSGS. With a required minimum of 5 residents for a training program, the average number of cases per resident is more than adequate.

The PSGS surgical curriculum has designated certain surgical procedures to be performed at particular year levels of training. For example, major surgeries like certain rectal procedures can only be performed at year level 5 while those considered as medium surgeries like anal surgeries can be performed starting at year level 2.

The average cases done by a resident in this 10-year period, taking into account the actual number of residents (based on year level) expected to perform the procedure is shown in Table 4. The 10-year total of each operation is divided by the number of residents per year level that perform the operation. In terms of eligibility requirements, the number of cases would still be adequate since the average number of cases is multiplied by the number of years the residents get to perform the procedure. It is important to note that even though trauma surgeries have been declining since 2017, the average number of cases performed is still more than adequate to fulfill the minimum requirement for eligibility to take the diplomate exam.

Table 2. Total of index procedures and the average number of cases credited per resident at General Surgery training institutions in the Philippines from 2009-2018.

Procedure	10-Year Total	Average Number of Credited Cases per Resident (N=7,453)	Program Requirement
Thyroidectomy	26,968	3.62	10
Parotidectomy	2,915	0.39	1
Neck Dissection	2,581	0.35	1
Modified Radical Mastectomy	25,699	3.45	10
Gastric Resection	3,298	0.44	1
Small and Large Bowel Resection	22,986	3.08	10
Low Anterior Resection	3,205	0.43	1*
Abdominoperineal Resection	2,160	0.29	1*
Anal Surgeries	39,709	5.33	10
Open Appendectomy	187,253	25.12	20
Laparoscopic Appendectomy	2,679	0.36	
Open Cholecystectomy	50,345	6.75	10
Laparoscopic Cholecystectomy	41,870	5.62	5
Common Bile Duct Exploration	13,238	1.78	1
Biliary Enteric Surgery	2,933	0.39	1
Thoracostomy	48,365	6.49	5
Major Trauma Surgery	41,429	5.56	8
Vascular Access	64,537	8.66	5
Hernia	56,028	7.52	15
Soft Tissue Resection	7,224	0.97	5

*Program requirement for Low Anterior Resection or Abdominoperineal Resection is 1

Table 3. Average non-index major operations done by residents General Surgery training institutions in the Philippines from 2009-2018.

Procedure	10-Year Total	Year Level Competency	Total Number of Residents Doing the Procedure	Average Cases Done	Eligibility Requirement
Pancreatic Resection	1,283	5th	1,167	1.10	
Hepatic Resection	724	5th	1,167	0.62	

Table 4. Average index operations done by a resident based on year level competencies at General Surgery training institutions in the Philippines from 2009-2018.

Procedure	10-Year Total	Year Level Competency	Total Number of Residents Doing the Procedure	Average Cases Done Based on Year Level Competency	Eligibility Requirement
Thyroidectomy	26,968	4th, 5th	2,455	10.98	10
Parotidectomy	2,915	4th, 5th	2,455	1.19	1
Neck Dissection	2,581	5th	1,167	2.21	1
Modified Radical Mastectomy	25,699	4th, 5th	2,455	10.47	10
Gastric Resection	3,298	5th	1,167	2.83	1
Small and Large Bowel Resection	22,986	4th, 5th	2,455	9.36	10
Low Anterior Resection	3,205	5th	1,167	2.75	1*
Abdominoperineal Resection	2,160	5th	1,167	1.85	1*
Anal Surgeries	39,709	2nd, 3rd, 4th, 5th	5,509	7.21	10
Open Appendectomy	187,253	1st, 2nd, 3rd, 4th, 5th	7,453	25.12	10+
Laparoscopic Appendectomy	2,679	4th, 5th	2,455	1.09	
Open Cholecystectomy	50,345	3rd, 4th, 5th	3,885	12.96	10
Laparoscopic Cholecystectomy	41,870	4th, 5th	2,455	17.05	5
Common Bile Duct Exploration	13,238	4th, 5th	2,455	5.39	1
Biliary Enteric Surgery	2,933	4th, 5th	2,455	1.19	1
Thoracostomy	48,365	1st, 2nd, 3rd, 4th, 5th	7,453	6.49	5
Major Trauma Surgery	41,429	4th, 5th	2,455	16.88	8
Vascular Access	64,537	2nd, 3rd, 4th, 5th	5,509	11.71	5
Hernia	56,028	2nd, 3rd, 4th	4,342	12.90	15
Soft Tissue Resection	7,224	3rd, 4th, 5th	3,885	1.86	5

*Eligibility requirement for Low Anterior Resection or Abdominoperineal Resection is 1
+Includes laparoscopic appendectomy

Operations by Institution Type

The total number of index cases done by the different institution types during the study period are listed in Table 5.

Ratio of Service to Pay Cases

Table 6 illustrates the percentages of the cases classified under service and pay. Overall, there were more service cases credited to the training programs. More

Table 5. Distribution of index cases by type General Surgery training institution in the Philippines from 2009-2018.

Procedure	10-Year Total	Government	Private	University	Consortium
Thyroidectomy	27,739	11,895 (43%)	7,717 (28%)	4,951 (18%)	3,176 (11%)
Parotidectomy	2,994	1,511 (51%)	551 (18%)	446 (15%)	486 (16%)
Neck Dissection	2,667	1,112 (42%)	572 (21%)	543 (21%)	435 (16%)
Modified Radical Mastectomy	26,408	10,882 (41%)	6,338 (24%)	6,513 (25%)	2,675 (10%)
Gastric Resection	3,361	1,594 (47%)	563 (17%)	656 (20%)	548 (16%)
Small and Large Bowel Resection	23,321	12,016 (52%)	3,682 (16%)	4,026 (17%)	3,597 (15%)
Low Anterior Resection	3,308	1,323 (40%)	730 (22%)	754 (23%)	501 (15%)
Abdominoperineal Resection	2,213	1,044 (47%)	405 (18%)	431 (20%)	333 (15%)
Anal Surgeries	40,822	18,430 (45%)	10,451 (26%)	6,633 (16%)	5,308 (13%)
Open Appendectomy	132,835	59,808 (45%)	31,011 (23%)	24,959 (19%)	17,057 (13%)
Laparoscopic Appendectomy	2,711	842 (31%)	789 (29%)	751 (28%)	329 (12%)
Open Cholecystectomy	51,751	28, 863 (56%)	10,249 (20%)	7,704 (15%)	4,935 (9%)
Laparoscopic Cholecystectomy	43,924	13,541 (31%)	16,698 (38%)	9.638 (22%)	4,047 (9%)
Common Bile Duct Exploration	13,470	7,778 (58%)	1,662 (12%)	2,262 (17%)	1,768 (13%)
Biliary Enteric Surgery	2,977	1,567 (53%)	306 (10%)	688 (23%)	416 (14%)
Thoracostomy	49,046	28,256 (58%)	5,875 (12%)	5,984 (12%)	8,931 (18%)
Major Trauma Surgery	41,624	24,924 (60%)	4,551 (11%)	5,631 (13%)	6,518 (16%)
Vascular Access	65,305	39,907 (61%)	8,481 (13%)	6,973 (11%)	9,944 (15%)
Hernia	56,799	33,071 (58%)	8,101 (14%)	7,432 (13%)	8,195 (15%)
Soft Tissue Resection	7,231	4,216 (58%)	1,420 (20%)	690 (10%)	905 (12%)

Table 6. Ratio of service to pay cases in the different types at General Surgery training institutions in the Philippines from 2009-2018.

Operation Type	Overall	Government	Private	University	Consortium
Pay/Private	41%	13%	83%	56%	32%
Service/Charity	59%	87%	17%	44%	68%

service cases were credited in government institutions while more pay cases were credited in private institutions. For university training programs, there were more private cases credited while more service cases were credited for consortium programs.

Discussion

Within the 10-year study period there was a gradual increase in the number of residents across all year levels, except during 2011 where the number of trainees across all year-levels decreased by an average of 27%. This may have been due to the shift of medical practitioners from medicine to the nursing profession, as this was the year of increased hiring of nurses abroad.

The increase of residents thereafter was due to the increase in the number of accredited training programs, gradually increasing from 67 to 71 programs. There was also an increase in case load that enabled the programs to also increase the number of trainees.

In 2017, there were major changes in how the PSGS defined certain surgeries were done by the PSGS. The 2017 PSGS Accreditation Manual, gastric resections which were previously limited to total and partial gastrectomies, were expanded to include wedge resections, significantly increasing the number of gastric resections for 2018 by 53%.

There was an increasing trend of both low anterior resections (LAR) and abdominoperineal resections (APR). With the more widespread use of neoadjuvant chemoradiotherapy in the management of rectal cancers, it was expected that rectal surgeries would also decrease, however this was not the case. The average annual number of cases done by residents was 2.75 and 1.85 for LAR and APR respectively, which was more than the training requirement. The majority of cases are seen in institutions with colorectal training programs. This can be a point of further study in the future, to investigate if the increasing utilization of neoadjuvant treatments will significantly decrease the number of rectal surgeries.

Four of the top ten institutions for anal surgeries were private hospitals. This could be attributed to the increasing coverage of anal surgeries by health insurance, hence the propensity to have the surgery performed in a private institution. However, the average number of cases done annually by residents is 7.21. This number is still short of the training requirement of 10 anal surgeries annually.

For major trauma surgeries, as per the PSGS guidelines[2] both operative and non-operative management of intra-abdominal injuries are counted to the training requirement. Despite this, it was the only procedure exhibiting a decreasing trend. Despite the decrease in volume, however, the average number of cases done by residents was still twice that of the training requirement. The majority of the trauma cases (60%) were performed in government hospitals, which are high volume centers for trauma in the Philippines. The smaller training programs that do not have as many trauma cases send their residents to rotate in these high volume centers. While the overall requirement for experience in trauma management is being achieved, there is maldistribution of cases to the larger government hospitals. This is not surprising, given the demographic of trauma patients in the country.

There was an observed increase in the trend for open cholecystectomies though the increase is not as high as in the other categories (Fig. 18). This is in contrast to the trend for laparoscopic cholecystectomy where a steep rise in the number of procedures performed year by year is seen (Fig. 19). On average around 5000 open cholecystectomies are performed annually while around 4100 laparoscopic cholecystectomies are performed every year. That is a difference of almost 900 procedures. After 2015, there were more laparoscopic cholecystectomies performed as compared to open cholecystectomies.

Certain high volume centers can be identified for some procedures like hepatic, pancreatic, small and large bowel resections. Institutions where a many of these procedures are performed have their own colorectal and hepatobiliary programs.

While the operative training requirements set by the PSGS were being met, the operative cases were not equally distributed among the types of programs. Most of the operations, with the exception of laparoscopic cholecystectomy, were performed at government hospitals. This situation left residents from other types of institutions with fewer surgical cases and less operative experience.

This is a cause of concern since case volume remains a metric against which surgical proficiency and success are gauged. Wheeler in 1993 stated that "what primarily defines surgical training experience is the number of surgical procedures that are available for residents to do, as determined by the prevalence of diseases."[5] According to Shaban et al., 22 papers cited operative volume as the most referenced quality indicator in surgical training.[6] The link between operative volume and positive outcomes is well-established at the institutional[7] and individual surgeon level.[8]

The correlation between the higher number of cases and better treatment outcomes have been well-documented in colorectal, surgical oncology, hepatobiliary, pancreatic, and upper gastrointestinal surgery.[9] The systematic review by Morche comparing outcomes of high versus low volume surgeons for certain major procedures showed inconsistent results. In terms of mortality and morbidity, statistically significant results favoring high volume surgeons were seen in colorectal, bariatric, major vascular, esophageal, orthopedic, prostatic, pancreatic and breast surgical procedures. Results favoring high volume surgeons were seen in head & neck, trauma and pulmonary surgical procedures.[10] This can rationalize holding outside rotations in high volume centers for certain operations that are more frequent in institutions with subspecialty programs. Among those identified were colorectal, gastric and pancreatic resections for certain government hospitals and hepatic resection for certain university-type institutions.

Distribution of operations according to institution-type

There are 31 government, 12 university, 21 private and 8 consortium accredited programs. Except for laparoscopic cholecystectomy (38% of cases done in private hospitals), the majority of index operations were being performed in government hospitals. This could be attributed to the volume of government hospitals as well as the fact that these are generally service/charity hospitals. The distribution of selected operations indicate the presence of high volume centers. Majority of gastric (47%) and colorectal (40% LAR, 47% APR) procedures as well as major trauma surgeries (60%), are performed in government hospitals where fellowship programs have been established.

The annual average shows a different picture. Majority are still being performed in government hospitals. There are more cases being performed in university and consortium programs compared to programs in private institutions.

In comparing the ratio of service to pay cases, trauma surgeries, open appendectomy and thoracostomy had the highest ratio of service to pay cases. On the other hand, laparoscopic cholecystectomy, liver resection and laparoscopic appendectomy had the lowest service to pay case ratio.

Taking the number of hospitals per institution-type into consideration, the average number of operations done per institution-type, were distributed differently. Thyroidectomy, anal surgery and open appendectomy were evenly distributed to all institution types. More university and consortium hospitals performed neck dissection, LAR, pancreatic resection, gastric resection, laparoscopic appendectomy and APR.

A consortium is typically composed of 2-3 hospitals but is considered as 1 training program in PSGS. Therefore, the average number of operations for each consortium-type institution can be an overestimation of the actual operations done by each hospital of that institution-type.

Importance of outcomes in assessing competencies of trainees

As much as the resident logbooks and annual reports can give quantitative descriptions of surgical practice in training institutions, they do not completely assess the competencies of the surgical trainees. After all, surgical volume should not be the only metric of the development of technical skills and surgical decision making.

The measurement of how surgical technique is learned can be classified into two categories: measures of surgical process and measures of patient outcome. Measures of surgical process include factors such as operative time, blood loss, and adequacy of resection. On the other hand, patient outcome measures have a wider scope which include morbidity and mortality rates, cumulative survival, analgesia and transfusion requirements and length of stay in the hospital.[11]

Patient outcomes, which reflect the overall success of the operation and patient health, are favored over surgical process measures. However, not all patient outcomes can be easily measured.[12] It is difficult to attribute morbidity directly to poor operative technique due to patient and hospital differences. Moreover, some complications can manifest years after surgery. Due to these, measures of surgical process are more commonly used because the data is readily available. In this study, the authors focused purely on operation counts since no qualitative measures are being assessed at the moment.

Conclusions

Only GS index cases were reviewed and analyzed. The study presents the actual data of surgical experience in the different training institutions. This can serve to establish baseline information regarding the country's surgical case load. The results of this study may have an impact on the current surgical curriculum prescribed by the PSGS. The data obtained may also be utilized to determine realistic standards and requirements not only in the accreditation of training programs, but also, in the certifications of surgical competence in the country.

Recommendations

The definition of several index operations have been subject to interpretation by training programs. To address this issue, the authors recommend for a review of the definitions and scope of each index operation, as well as strict implementation of compliance to these changes. In adjunct to this, they recommend the utilization of a computerized database wherein operations of accredited institutions can be encoded annually for easier compilation and checking of data from the annual reports submitted.

The authors also recommend the inclusion of patient outcome measures in the assessment of competencies of residents in addition to their operation counts. The combination of the quantitative and qualitative outcomes will give a more detailed assessment of the skill of trainees.

Acknowledgements

This study was sanctioned and funded by the PSGS through its Committee on Research.

Conflicts of Interest Statement

There are no financial, personal or institutional conflicts of interest relevant to the work reported in this manuscript.

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