Thoracic Surgery Workforce: Report of STS/AATS Thoracic Surgery Practice and Access Task Force—Snapshot 2010

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Background: The Society of Thoracic Surgeons (STS) and the American Association for Thoracic Surgery (AATS) have intermittently surveyed their combined membership. These manpower surveys have provided snapshots of thoracic surgery, documenting practice changes over time. At this critical time in US health care reform the physician workforce is of critical importance. This survey updates the data obtained from the 2000 and 2005 surveys.

Methods: The survey instrument was updated from the 2005 survey. It was received by 5265 surgeon members of the STS/AATS during November and December 2009. There was a superb 50% return rate. The data were entered into a comprehensive database. Perception Solutions, Inc, independently performed the analysis.

Results: The median age of the active US thoracic surgeons is 52.9 years. Women comprise 3.4% of adult cardiac, 5.2% of congenital heart, and 7.9% of general thoracic surgeons. The decision to pursue a career in thoracic surgery was made before or in medical school by 45.3% of surgeons. The majority of survey respondents had a mean of 8.7 years of residency training after medical school graduation. The cumulative average educational debt was $56,000. Overall career satisfaction was 46% (very or extremely satisfied). Database participation was 84%. Operative volume over the past 12 months decreased for 30% of surgeons. Malpractice premiums have steadily increased over the past 5 years from $55,947 to $59,673. The number of additional years the currently active US cardiothoracic surgeon plans to practice is 12.6 years. Therefore, the projected retirement age of the thoracic surgery workforce will be 65. This is consistent among all surgeons: adult cardiac, 66 years; congenital heart, 65 years; and general thoracic, 67 years.

Conclusions: These data give a clear profile of the specialty at this time. The major challenges remain length of training and educational debt of the thoracic surgeon. Case volume, scope of practice, malpractice costs, and career satisfaction remain major elements to provide a positive environment to recruit new surgeons in to the specialty. The resident pool has contracted while the workforce ages and retirement looms. Significant shortages may develop as the US population ages in the environment of health care reform. (J Thorac Cardiovasc Surg 2012;143:39-46)

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The Society of Thoracic Surgeons (STS) and the American Association for Thoracic Surgery (AATS) have conducted surveys of its membership since 1974.[1-5] This activity has provided valuable longitudinal information for the profession. In recent years (since the Millennium Survey published in 2000), the data have provided information for us to understand our membership's demographics, practice patterns, clinical volume, educational debt, retirement, and perceptions about our specialty.[6] This information has provided the data for our professional organizations to better serve the membership. In addition, the data have enhanced the advocacy efforts. The results of the current survey update the surveys performed in 2000 and 2005.

METHODS

The survey instrument was updated from the 2005 survey instrument by the STS/AATS Task Force on Practice and Access and was approved by the STS Board of Directors and the AATS Council. The survey consisted of 56 questions (see Appendix E1). It was received by 5265 surgeon members of STS or AATS or both during November and December 2009. Members with valid e-mail addresses (4085) received as many as six reminder e-mails. Paper surveys with a cover letter and postage-paid envelopes were mailed to 1,494 members with no e-mail addresses or bad or failed e-mail addresses. A second mailing went to 227 US members. There were 314 members with bad addresses who never received the survey.

A total of 2648 members completed the survey, resulting in a superb 50% return rate. This is a survey participation rate much higher than that

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for 2005 (39%) and also for 2000 (43%). Questions answered by all respondents have an error of ±5%, within 95% confidence limits.

This report excludes 866 non-US surgeons who completed the survey. The 1,782 responding US surgeons included 315 responses from fully retired surgeons. Thus, this report profiles active US thoracic surgeons and includes data on physician retirement, practice patterns, certification, malpractice insurance, Medicare participation, STS database participation, and career satisfaction.

The data were carefully entered into a comprehensive database, using quality control and verification measures. Each survey response was checked for inconsistencies and errors, and then cleaned. The survey data were downloaded and rigorously analyzed. Perception Solutions, Inc, independently performed the analysis. The data elements were checked for accuracy to ensure the appropriate respondent groups were chosen according to their demographic information relative to answering specific questions. For example, Canadian or other international members and retired versus actively practicing surgeons were analyzed separately or excluded to have the appropriate and relevant group survey answers for a specific question. This report focuses on active and retired US surgeons' career satisfaction, male and female surgeons, length of training, educational debt, and projections about retirement age.

RESULTS

Respondents' Profile

The median age of the active US thoracic surgeons is 52.9 years. The median age for adult cardiac (AC) surgeons is 52.5 years; for congenital heart (CH) surgeons, 49.6 years; and for general thoracic (GT) surgeons, 52.0 years. Women comprise 4.6% of the survey respondents—3.4% of AC, 5.2% of CH, and 7.9% of GT surgeons.

The decision to pursue a career in thoracic surgery was made before or in medical school by 45.3% of surgeons; of the remainder, 24% decided during the first 2 years of general surgery residency, and 26% decided during the last 3 years of general surgery residency. The decision to pursue a career in cardiothoracic surgery while in medical school was similar for the fully retired cohort.

Length of Training

The majority of survey respondents had 7 to 9 years of residency training after medical school graduation (mean, 8.7; median, 8.0). Twenty-five percent of AC surgeons, 56% of CH surgeons, and 32% of GT surgeons reported more than 9 years of residency training.

Educational Debt

The cumulative average educational debt was $56,000 at the time the surgeon began active practice. This figure was similar for AC ($59,000), CH ($59,000), and GT surgeons ($54,000). This debt trend has continued to rise compared with prior surveys. The average education debt was $41,000 in the 2000 survey and $39,000 in the 2005 survey.[5] The geographic regions with the highest debt were the New England states ($61,743) and the Mountain states ($67,680). Debt burden was more than $100,000 for 5% of medical school graduates between the years 1970 and 1979, for 17% between 1980 and 1989, for 32% between 1990 and 1999, and for 33% for graduates after 2000 (Table 1).

Career Satisfaction

Historically, career satisfaction in cardiothoracic surgery has been very high. The level of satisfaction declined in the 2000 and 2005 surveys. In the current survey, overall career satisfaction has improved to 46% (very or extremely satisfied); 26% of respondents were satisfied, and 28% were somewhat or dissatisfied. Congenital heart surgeons were the most satisfied with their careers (69%), compared with AC surgeons (42%) and GT surgeons (55%). Of satisfied respondents, 27% were AC, 19% were CH, and 25% were GT surgeons. Adult cardiac surgeons had the most somewhat satisfied or not satisfied respondents (32%), compared with 12% of CH and 20% of GT surgeons (Table 2).

The respondents' outlook regarding medicine as a profession was reflected by only 58% responding "yes" to the question whether "they would encourage their children or grandchildren to go into medicine." Moreover, only 37% responded positively to the question regarding "encouraging their children or grandchildren to go into cardiothoracic surgery."

Congenital heart surgeons were the most enthusiastic, with 72% encouraging a medical career (AC 56%; GT

TABLE 1. Cumulative educational debt at time active surgical practice began

	Active US members (2009)		Before 1950	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000+
	Sample size	%	%	%	%	%	%	%	%
6. Please estimate your cumulative educational debt at the time you began active surgical practice. (in US$)									
$0	579	33.7%	50.0%	57.1%	60.0%	44.0%	25.8%	25.2%	0.0%
$1-$20,000	252	14.7%	16.7%	14.3%	20.7%	24.3%	11.9%	6.8%	0.0%
$20,001-$40,000	209	12.2%	16.7%	4.8%	8.9%	12.0%	16.3%	6.8%	16.7%
$40,001-$60,000	163	9.5%	16.7%	9.5%	3.7%	7.0%	11.6%	10.0%	50.0%
$60,001-$100,000	239	13.9%	0.0%	0.0%	5.2%	7.4%	17.7%	18.9%	0.0%
$100,001 or more	277	16.1%	0.0%	14.3%	1.5%	5.3%	16.6%	32.3%	33.3%
Total	1719	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Mean debt:		$56,688	$16,667	$31,190	$13,785	$28,571	$66,136	$88,023	$100,500
Median debt:		$25,000	$10,000	$0	$0	$10,000	$35,000	$65,000	$50,000

Data from the 2009 STS/AATS Practice Survey (Active US Surgeons).

TABLE 2. Career satisfaction

	Active US members (2009)		Adult cardiac surgeons	Congenital heart surgeons	General thoracic surgeons
	Sample size	%	1211	100	290
37. Overall, how would you rate your current career satisfaction?					
Extremely satisfied	292	17.5%	15.3%	29.3%	21.4%
Very satisfied	479	28.7%	26.8%	39.4%	33.3%
Satisfied	431	25.8%	26.8%	19.2%	24.6%
Somewhat satisfied	355	21.3%	24.3%	11.1%	14.4%
Not at all satisfied	113	6.8%	6.8%	1.0%	6.3%
Total	1670	100.0%	100.0%	100.0%	100.0%

Overall, 72% of survey participants were satisfied, very satisfied, or extremely satisfied with their current careers; 29% of congenital heart surgeons were extremely satisfied (versus 15% of adult cardiac surgeons and 21% of general thoracic surgeons). Data from the 2009 STS/AATS Practice Survey (Active US Surgeons).

59%) and 59% encouraging a cardiothoracic surgery career (AC 33%; GT 42%). In contrast, retired surgeons were much more positive: 69% would encourage pursuing a medical career, and 53% would encourage a career in cardiothoracic surgery.

Practice Specialty

The 1601 active US surgeons who responded to the survey were primarily identified as AC surgeons (1,211 [76%]), followed by 290 surgeons (18%) whose primary practice was GT surgery, and 100 CH surgeons (6%).

The primary designation of an individual surgeon was determined by each surgeon's response to the survey questions on types of cases he or she performed. Only 305 of the 1601 AC surgeons (19%) had a practice solely limited to AC surgery cases. These surgeons reported an average case volume of 190 procedures. The majority of AC surgeons (598) also performed pulmonary procedures (598) and esophageal procedures (243); their average caseload was 136 cardiac cases, 66 pulmonary cases, and 11 esophageal cases. There were 79 AC surgeons performing CH procedures. Only 27 AC surgeons reported performing congenital pediatric operations. Additionally, 229 AC surgeons reported performing AC, GT, and CH surgery. Among these 229 surgeons, the adult surgery volume was 154 cases, 60 pulmonary cases, 8 esophageal cases, and 7 adult congenital cases and 25 pediatric congenital cases. As has been found in prior surveys, approximately 80% of AC surgeons continue to practice other aspects of the specialty (primarily GT and CH surgery) in significant numbers (Table 3).

The STS Database

Database participation was 84%. Participation was 91% for AC surgeons, 95% for CH surgeons, and 60% for GT surgeons. Participation in a state or regional database was 41% for AC, 39% for CH, and only 17% for GT surgeons. The main reason for nonparticipation was financial (50%). Fewer than 10% of AC and GT surgeons questioned the value of the database. More than 50% of current nonparticipants plan to join the STS database. This decision is driven by Physician Quality Reporting Initiative (PQRI) reimbursement incentives and American Board of Thoracic Surgery (ABTS) requirements for maintenance of certification. Current participation in PQRI is 66%; nonparticipation in PQRI is due to inadequate financial incentives (6%) and administrative difficulties (14%).

The average cost reported for database participation was $53,000 per year for the data coordinator's salary and benefits, more than $11,000 for software costs, and $6000 for participation fees. More than 90% of these costs were paid for by the surgeon's hospital (Table 4). Larger programs have additional costs associated with personnel required for data collection.

Practice Profile

An urban practice was the most common setting (56%). Congenital heart surgeons practiced 79% of the time in an urban setting, compared with 51% for AC surgeons and 62% for GT surgeons. Overall, rural settings constituted 3% of practices; small or medium-size communities, 23% of practices; and suburban settings, 19% of practices.

TABLE 3. Profile of participants by practice specialty and case volume

	Adult cardiac		Pulmonary		Esophageal		Cong.-adult		Cong.-child	
	#	Avg case	#	Avg case	#	Avg case	#	Avg case	#	Avg case
Adult cardiac only (a)	305	189.9								
Adult cardiac & pulmonary/esophageal (a+b/c)	598	135.8	598	65.5	243	10.9				
Adult cardiac & congenital heart (a+d/e)	79	168.2					76	23.3	27	109.6
Adult cardiac & pulmonary/esophageal & congenital heart (a+b/c+d/e)	229	153.5	225	59.5	139	8.3	215	6.8	56	24.8
Total	1211		823		382		291		83	

Data from the 2009 STS/AATS Practice Survey (Active US Surgeons). *Cong*, Congenital.

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TABLE 4. STS database participation costs for active US members (2009)

49. If you ARE a database participant, what are your approximate costs?	Active US members (2009)			
Database	Qualified respondents	Participation (average US$)	% of the costs covered by hospital	% of the costs covered by others*
STS National Database participation fee (if applicable)	426	$6047.9	91.6%	8.4%
Regional or state database participation fee (if applicable)	226	$5147.2	81.4%	18.6%
Software costs	299	$11,396.8	88.7%	11.3%
Salary and benefits for data coordinator and other personnel who maintain database	354	$52,576.3	88.9%	11.1%

Data from the 2009 STS/AATS Practice Survey (Active US Surgeons). *STS*, The Society of Thoracic Surgeons. *Calculated by subtracting % costs covered by hospital from 100%.

The mode of practice was 12% private multispecialty groups, 11% private solo practice; 32% private practice surgical group; 15% academic single-specialty group; and 21% academic multispecialty group. Forty percent of AC surgeons were predominantly in private practice surgical groups, versus 4% of CH surgeons and 13% of GT surgeons. The CH surgeons were predominantly in academic groups (81%). The majority of GT surgeons (55%) were in academic practice (Table 5).

As individual surgeons, 86% of CH, 57% of GT, and 28% of AC surgeons held full-time academic positions. Academic practice predominated in New England (51%) and in the mid-Atlantic region (43%). Private practice positions predominated among AC surgeons (67%), followed by GT surgeons (38%) and CH surgeons (13%). New England was the region with the fewest surgeons (33%) in private practice.

The practice groups had 5.7 surgeons on average. This figure was similar for AC (5.8), CH (5.5), and GT (6.0) surgeons. Employment of a cardiothoracic surgeon to primarily serve as a first assistant was reported by 10% of respondents. The average group practice operated at 3.3 hospitals. This finding was similar in all regions. An individual surgeon in these groups operated at 2.1 hospitals. The CH surgeons were more likely to operate at only one hospital. Individual surgeons operating at more than one hospital were more likely to be in the East–North Central, Mountain, and West–South Central regions.

Operative Volume

Operative volume decreased over the previous 12 months for 30% of surgeons. The largest reduction was 34% for AC, followed by 20% for GT and 13% for CH. The average decline in cases was 20%: 20% for AC, 19% for CH, and 22% for GT. Increased volume was experienced by 25% of surgeons: AC 22%, CH 37%, and GT 33%. The average case volume increase was 18%: AC 18%, CH 16%, and GT 19%. Volume remaining the same was 45%: AC 44%, CH 50%, and GT 48%. There was very little regional variation in increased or decreased volume.

The AC surgeons reported performing 155 adult cardiac cases per year. The CH surgeons reported 191 pediatric congenital cases and 28 adult congenital cases per year. The GS surgeons reported 174 pulmonary operations and 40 esophageal operations per year (Table 6).

Organ transplantation was performed by 18% of surgeons (AC 17%, CH 61%, GT 13%). Implantation of cardiac assist devices was performed by 27% of surgeons (AC 35%, CH 57%, and GT 2.1%). Endovascular aortic procedures were performed by 36% of AC surgeons. Peripheral vascular surgery was performed by 33% of surgeons (AC 41%, CH 10%, and GT 22%). The Southwest region

TABLE 5. Practice profiles

	Active US members (2009)		Adult cardiac surgeons	Congenital heart surgeons	General thoracic surgeons
	Sample size	%	1211	100	290
14. Please select which of following best indicates the mode of the majority of your practice.					
Private multi-specialty group	*204*	11.8%	12.7%	7.0%	10.7%
Private solo practice	189	10.9%	10.5%	3.0%	15.5%
Private practice surgical group	545	31.5%	39.9%	4.0%	13.4%
Academic single-specialty group	266	15.4%	12.1%	42.0%	22.4%
Academic multi-specialty group	370	21.4%	17.1%	39.0%	33.1%
Other	157	9.1%	7.8%	5.0%	4.8%
Total	1731	100.0%	100.0%	100.0%	100.0%

Approximately 32% of survey respondents were full-time academicians. More than half of survey respondents were in full-time private practices. More adult cardiac surgeons were in full-time private practices than were congenital heart surgeons and general thoracic surgeons. Conversely, more congenital heart surgeons and general thoracic surgeons were in academic settings than were adult cardiac surgeons. Data from the 2009 STS/AATS Practice Survey (Active US Surgeons).

TABLE 6. Operative volume by specialty

	Active US members (2009)		Adult cardiac surgeons	Congenital heart surgeons	General thoracic surgeons
	Sample size	%	1211	100	290
23. Please indicate which of the following surgical procedures you personally perform.					
Adult cardiac surgery	*Estimated number of annual cases:*	154.6	155.0		
Pulmonary surgery		91.7	63.9	21.8	173.8
Esophageal surgery		21.7	9.8		40.1
Congenital heart surgery in the adult		14.6	10.7	27.7	
Congenital heart surgery in the infant and child		118.1	46.5	190.5	

Data from the 2009 STS/AATS Practice Survey (Active US Surgeons).

(63%) and Mountain region (49%) were areas where performing peripheral vascular surgery predominated.

Only 8.5% of surgeons were certified in peripheral vascular surgery (AC 8.2%, CH 0%, and GT 7.5%). This figure is similar to the 2005 survey, 9%. Certification in critical care was reported by 6.4% (AC 5.9%, CH 6.1%, and GT 8.4%). Critical care certification was most common in the East–South Central region (11%).

Adult cardiac surgeons practiced in hospitals that had a dedicated cardiac surgery intensive care unit (ICU) 60% of the time. The unit director was a cardiac surgeon who had critical care boards only 6% of the time and a cardiac surgeon without critical care boards 33% of the time; 23% of directors were nonsurgeons. A dedicated pediatric ICU was present in 70% of CH surgeons' hospitals; the unit director was not a cardiothoracic surgeon 60% of the time. The GT surgeons reported 20% of their hospitals had a dedicated GT ICU, with the director a GT surgeon certified in critical care (2%) or noncertified (7%).

Shared responsibility for postoperative care has involved cardiologists, pulmonologists, and intensivists. That is particularly the practice in heart transplantation, lung transplantation, circulatory support, and pediatric ICU care.

Malpractice

Malpractice premiums have steadily risen over the past 5 years, from $55,947 to $59,673. In 2009, it was $62,362 for AC, $53,829 for CH, and $51,088 for GT. Premiums were highest in New England ($104,016) and lowest in the Pacific region ($28,071) (Table 7). Over the past 2 years, 47% of surgeons have not had a change in their malpractice premium, whereas 36% have had a decrease and 18%, an increase. Five percent of AC, 23% of CH, and 22% of GT surgeons reported increased premiums. Twenty-nine percent of AC, 24% of CH, and 25% of GT surgeons reported decreased premiums. The mid-Atlantic region had the greatest number of surgeons experiencing an increase (77%); New England had the smallest number experiencing an increase (8%) (Table 7).

Tort reform in the state where the surgeon practiced was reported by only 29%, and predominated in the West–South Central region and Pacific region. The Pacific region has the longest history of tort reform (California).

TABLE 7. Malpractice insurance premiums

	Active US members (2009)		Adult cardiac surgeons	Congenital heart surgeons	General thoracic surgeons
	Sample size	%	1211	100	290
26. Since 2005, please select the years you were in active clinical practice and your individual malpractice insurance premiums for those years.					
	Sample size	Mean US$*	Mean US$*	Mean US$*	Mean US$*
2005	1037	$55,947	$57,659	$53,172	$47,360
2006	1048	$52,692	$53,489	$51,514	$49,164
2007	1071	$52,807	$53,223	$54,824	$51,101
2008	1085	$52,314	$53,165	$56,722	$49,824
2009	1142	$59,673	$62,362	$53,829	$51,088
29. During the past two years have your malpractice premiums:					
Increased	97	17.7%	4.8%	22.5%	22.2%
Decreased	191	35.6%	28.6%	23.9%	25.0%
Remained the same	275	46.7%	66.7%	53.5%	52.8%
Total	563	100.0%	100.0%	100.0%	100.0%

Data from the 2009 STS/AATS Practice Survey (Active US Surgeons). *Note: All zeros and outliers have been removed (premiums under $1000).

Malpractice insurance was from commercial carriers (27%), university or hospital-based captives (33%), physician-owned cooperatives (20%), self-insurance (7%), and others (13%). The CH surgeons were most likely insured by a university or hospital-based captive (62%) as compared with 30% of AC surgeons and 47% of GT surgeons.

Medicare

Medicare participation was 97%; this was consistent by specialty (AC 97%, CH 91%, GT 98%) and across all regions. Among the 52 surgeons who are nonparticipants, 18 (35%) never participated and 23 (44%) stopped participating more than 5 years ago. Fourteen percent of respondent surgeons are considering becoming Medicare nonparticipants; 40% of AC surgeons and 31% of GT surgeons believe they could not afford to be nonparticipants.

New Hires

The average practice has not hired a new surgeon in 4 years; that finding is similar for all regions. The average CH practice has not hired in 2.4 years. However, 60% of practices (AC 60%, CH 47%, GT 53%) plan to hire at least one surgeon over the next 2 years. The practice will recruit a recent graduate (30%), experienced surgeon (39%), or surgeon with a specific skill set (23%). The CH practices reported that they prefer an experienced surgeon (41%) versus a recent graduate (19%). Surgeons with specific skills will be sought by 25% of AC, CH, and GT surgeons.

Retirement

The number of additional years the currently active US cardiothoracic surgeon plans to practice is 12.6 years. Therefore, the projected retirement age of the thoracic surgery workforce will be 65 years. This is consistent among all surgeons (AC 66 years, CH 65 years, GT 67 years). Among currently active surgeons, 28% have deferred retirement (AC 26%, CH 11%, GT 26%). The predominant reason to remain in practice is financial or a high degree of career satisfaction.

There were 276 US surgeon respondents who were fully retired. Their mean educational debt was $13,135, but 57% graduated without any educational debt. They responded that 46% had retired earlier than planned. The reasons for early retirement were career change for 18%, health reasons for 40%, financial reasons for 30%, and lack of professional satisfaction for 25%. Overall, these surgeons had a high degree of career satisfaction. More than 70% would encourage their children or grandchildren to pursue a career in medicine, and 50% would encourage a career in cardiac thoracic surgery.

COMMENT

Professional workforce surveys performed on a periodic basis provide a series of snapshots to follow broad demographic and practice trends as well as attitudes of the physician workforce. National concern about the physician workforce has resulted in studies and projections by several professional societies, the Association of American Medical Colleges (AAMC), as well as the federal government. The changing demographics of the US population and the disease burden have predicted shortages in many specialties over the next few decades.[8-26]

The combined STS/AATS Task Force on Practice and Access has continued to expand the work that the STS/AATS workforce committee has performed since the first report in 1974.[1] The information has enabled the leadership to develop programs and policy and to focus advocacy efforts. The data have helped inform the ABTS of practice trends and provided valuable data.

In part, that AC surgeons continue to perform GT and congenital procedures has affected ABTS policies regarding maintenance of certification and has helped STS and AATS provide appropriate programs and educational opportunities for the membership. The ABTS and STS/AATS will perform joint surveys of surgeons presenting for the secure examination in the 10th year of the maintenance of certification cycle. This survey will provide more accurate information every year on individual surgeons who have been in practice 10, 20, or 30 years after their initial Board certification.

Thoracic surgery in recent years has struggled with a constrained job market owing to numerous factors. The correct size of the workforce has been of intense interest. The thoracic surgery workforce is aging (53 years old), and half of the currently practicing surgeons project retirement in 12 years. The number of approved residency programs in thoracic surgery has declined to 70 independent programs (47 2-year and 23 3-year programs) and 14 integrated programs. First-year positions in the independent program (124) have only 97 filled, and 11 filled in the integrated programs. The supply of new surgeons will not keep up with the retirees. A further concern is that the failure rate on the ABTS qualifying examinations (33%) has risen in recent years. Clearly, an adequate and qualified workforce is the responsibility of the profession and the expectation of the public. The increased failure rate on the ABTS qualifying oral examination has caused concern about the knowledge base of new surgeons entering practice. The Thoracic Surgery Resident Review Committee, the Thoracic Surgery Directors Association, and the Joint Council on Thoracic Surgery Education are actively addressing the quality of thoracic surgery residency programs and the quality of the educational experience within current work hour constraints.

These issues combined with the burden of heart disease in the United States, the diabetes epidemic, and the aging population may indicate that a ''perfect storm'' may be brewing. The potential shortage of cardiothoracic surgeons may be critical in a decade. Corrective action is difficult in the short

term because of the long ''pipeline'' of 6 to 9 years required to train a cardiothoracic surgeon. Steps have been taken to reduce the time to 6 years with the new integrated programs accepting residents directly from medical school. There appears to be great enthusiasm among medical students for this pathway. That is not surprising as the decision to pursue a cardiothoracic surgery career was made in medical school by 45% of currently practicing and retired surgeons.

STS and AATS commissioned the AAMC to study and project the manpower needs of the specialty in 2025.[7] The investigators projected that by 2025, the demand for cardiothoracic surgeons could increase by 46% on the basis of the increasing percentage of elderly in the United States population, adjusting for the burden of cardiovascular disease and potential disruptive intervention of new technologies. The reduced number of residency programs and residents in training coupled with the aging current workforce will lead to projected shortages. Cardiothoracic practices appear to be planning to hire new surgeons out of residency, especially if they have a special surgical skill to supplement the practice.

Early retirement is driven by health issues or midcareer changes. Surgeons taking nonoperative leadership positions affect the clinically active workforce. The hours and work effort in thoracic surgery have been excessive and intense compared with most specialties. That has had a disproportionate impact on the aging surgeon and on the attraction of women to the specialty. Professional demands clearly compete with the balance between personal life and professional life. There have been sincere, but only partially effective, attempts to address these issues.

The trends in reorganization of our practice model from solo private practice to the single-specialty private group practice has been apparent in serial survey data over the past 30 years. The growing popularity of private or academic multispecialty group practice is most common for CH and GT surgeons. Future surveys will need to track this trend. Future surveys also will need to study the growth in hospital-employed surgeons. There are elements of health care reform and the reorganization into Accountable Care Organizations that may economically favor this model.[27]

Malpractice insurance and tort reform remain important issues for surgeons. A few states that have adopted tort reform have seen a reduction or stabilization of the liability premium. There is significant regional variation. Presidential and congressional progress in this area has been limited. A national approach to tort reform in medical malpractice is unfinished business in health care reform.

The length of training of a thoracic surgeon also has been a major concern. However, it varies little from that of other surgical specialties, in which 5 years of general surgery and an additional fellowship period (eg, for colorectal, transplantation, trauma, breast, and so forth) of 1 to 2 years are taken. The escalating educational debt accumulated by medical school graduates is compounded during the training years. The ability to repay the debt in the setting of the uncertain job market and reimbursement environment has discouraged applications to our training program.

STS National Database has matured into a powerful tool for quality in thoracic surgery. More than 90% of adult cardiac and 95% of congenital cardiac surgical practices contribute considerable effort and expense to be a participant in the Database. That confirms the recognition of its value. Moreover, hospital confirmation of its value is attested to by hospitals' financial contributions to cover the majority of the cost of participation, infrastructure, and personnel. The GT surgery database has grown to 60%. Nonparticipation is due to financial causes.

In spite of the challenges facing thoracic surgery, more than 72% of surgeons are satisfied or very/extremely satisfied with their careers. The advances in transplantation, circulatory support, arrhythmia surgery, endovascular approaches to the thoracic aorta and valvular heart disease, thoracic oncology, and critical care are a few of the areas that have expanded our scope of practice and provided increased practice opportunity. This renewed enthusiasm, new training paradigms, and innovations in teaching with simulation tools has stimulated a very positive perception in the future of thoracic surgery. The US physician workforce needs our skills, innovation, and leadership, portending a bright future for thoracic surgery.

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APPENDIX E1.

2009 STS/AATS Practice Survey

Directions: Please take 15 minutes to complete this vital questionnaire on the characteristics of your practice. Your participation in this survey is very important as we work to collect critical data about the profession of cardiothoracic surgery, and will allow for future planning by the STS/AATS Workforce on Health Policy, Reform and Advocacy. Survey results will be reported only in the aggregate and individual answers will not be linked to you personally.

E-mail: Those who complete this survey will receive a **COMPLIMENTARY COPY** of the Executive Summary of the survey findings by e-mail. Please provide your e-mail address: _____

Mail: Please return your completed survey by either fax: 630-692-1428 or mail: Perception Solutions, Inc., 2472 Wentworth Lane, Aurora, IL 60504 by no later than December 31, 2009.

1) What year did you graduate from medical school? _____

2) In what state or country did you graduate from medical school? _____

3) Please indicate where you practice.

- ☐ Inside the United States
- ☐ Outside the United States (Please specify country.) _____

4) How many years of post MD training did you have prior to entering practice? _____

5) Please indicate if you have earned an advanced professional degree since obtaining your MD.
(Please select all that apply.)

- ☐ Doctor of Philosophy (PhD) _____ Year Obtained
- ☐ Juris Doctor (JD) _____ Year Obtained
- ☐ Masters of Business Administration (MBA) _____ Year Obtained
- ☐ Masters of Public Administration (MPA) _____ Year Obtained
- ☐ Masters of Public Health (MPH) _____ Year Obtained
- ☐ Other (Please specify) _____ Year Obtained

_____

6) Please estimate your cumulative educational debt at the time you began active surgical practice. US$ _____

7) In what year did you begin practicing cardiothoracic surgery, excluding military services or residency? _____

8) Are you fully retired?

☐ Yes ☐ No (If No, skip to Question 11.)

9) In what year did you retire? _____

10) Did you retire earlier than planned?
(If Yes, please select all the reasons why, then skip to Question 51.)

- ☐ No
- ☐ Yes – Elective career change
- ☐ Yes – Health
- ☐ Yes – Lack of professional satisfaction
- ☐ Yes – Inadequate surgical volume
- ☐ Yes – Practice not economically viable
- ☐ Yes – Reimbursement/liability insurance issues
- ☐ Yes – Other (Please specify) _____

11) Have you deferred retirement?
(If Yes, please select only one reason why.)

- ☐ No
- ☐ Yes – Cannot recruit a replacement
- ☐ Yes – High level of career satisfaction
- ☐ Yes – Other (Please specify) _____
- ☐ Yes – Cannot afford to retire
- ☐ Yes – Practice is economically viable

12) Beginning in 2010, how many more years do you expect to continue your practice as an active surgeon prior to retirement?

_____

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2009 STS/AATS Practice Survey

13) Please select which of the following best describes your current position and activity in the field of cardiothoracic surgery.
(Please select one appropriate full-time position OR as many part-time positions as applicable.)

Academic
- ☐ Full-time
- ☐ Part-time

Consultant
- ☐ Full-time
- ☐ Part-time

Research
- ☐ Full-time
- ☐ Part-time

Expert Witness
- ☐ Full-time
- ☐ Part-time

Administration (no clinical surgery)
- ☐ Full-time
- ☐ Part-time

Scientist
- ☐ Full-time
- ☐ Part-time

Private Practice
- ☐ Full-time
- ☐ Part-time

Other (Please specify) _____
- ☐ Full-time
- ☐ Part-time

14) Please select which of following best indicates the mode of the majority of your practice.
- ☐ Private Multi-Specialty Group
- ☐ Private Solo Practice
- ☐ Private Practice Surgical Group
- ☐ Academic Single-Specialty Group
- ☐ Academic Multi-Specialty Group
- ☐ Other (Please specify) _____

15) In order to accurately evaluate future growth areas and job opportunities, please indicate the official name of your practice/group: _____

16) How many cardiothoracic surgeons practice in your surgical or multi-specialty group?
(Include yourself and both part-time and full-time surgeons.)

_____

17) Do you employ surgeons who function primarily as first assistants?
☐ Yes ☐ No

18) What is the total number of physicians (surgeons plus non-surgeons) in your multi-specialty group? _____

19) At how many hospitals do you personally operate and/or practice? _____

20) At how many hospitals do physicians from your group operate and/or practice? _____

21) Do you perform clinical cardiothoracic and/or vascular surgery regularly?
(If No, please select the best reason why not, then skip to Question 26.)
- ☐ Yes
- ☐ No - Not economically worthwhile
- ☐ No - Health
- ☐ Not my major source of career satisfaction
- ☐ Other (Please specify) _____

22) Please indicate if the total number of major operative procedures you have performed in the last 12 months has:
- ☐ Decreased compared to the prior 12 months
  _____ Percentage Decreased
- ☐ Increased compared to the prior 12 months
  _____ Percentage Increased
- ☐ Remained about the same compared to the prior 12 months

2009 STS/AATS Practice Survey

23) Please indicate which of the following surgical procedures you personally perform.
(Please select all that apply.)

- ☐ Adult Cardiac Surgery _____ Estimated number of annual cases
- ☐ Pulmonary Surgery _____ Estimated number of annual cases
- ☐ Esophageal Surgery _____ Estimated number of annual cases
- ☐ Congenital Heart Surgery in the Adult _____ Estimated number of annual cases
- ☐ Congenital Heart Surgery in the Infant and Child _____ Estimated number of annual cases
- ☐ Not applicable

24) Please indicate which of the following surgical procedures you personally perform.
(Please select all that apply.)

Organ transplantation
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

MAZE (any technique) for atrial fibrillation
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

Implant cardiac assist devices
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

Endovascular aortic procedures
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

Peripheral vascular surgery
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

Other (Please specify) _____
- ☐ Yes
  _____ Estimated number of annual cases
- ☐ Planning to start
- ☐ No

25) If you perform peripheral vascular surgery, are you certified in vascular surgery by the American Board of Surgery?
☐ Yes ☐ No

26) Since 2005, please select the years you were in active clinical practice and your individual malpractice insurance premiums (to the nearest $1,000) for those years.

- ☐ 2005 US$ _____ Cost of Malpractice Insurance Premium
- ☐ 2006 US$ _____ Cost of Malpractice Insurance Premium
- ☐ 2007 US$ _____ Cost of Malpractice Insurance Premium
- ☐ 2008 US$ _____ Cost of Malpractice Insurance Premium
- ☐ 2009 US$ _____ Cost of Malpractice Insurance Premium

27) Has your state passed Tort Reform legislation?

- ☐ Yes
- ☐ No (Please skip to Question 30.)
- ☐ Unsure (Please skip to Question 30.)

28) What year was Tort Reform implemented? _____

29) During the past two years have your malpractice premiums:

- ☐ Increased
- ☐ Decreased
- ☐ Remained the same

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30) From which of the following do you obtain malpractice insurance?
(Please select all that apply.)
- ☐ Commercial insurance carrier
- ☐ University or hospital-based captive carrier
- ☐ State insurance program
- ☐ Physician-owned/Cooperative
- ☐ Self-insured
- ☐ Other (Please specify) _____

31) Are you a Medicare participating provider?
- ☐ Yes (Please skip to Question 33)
- ☐ No

32) When did you become a non-participant?
- ☐ During the past 2 years
- ☐ During the past 5 years
- ☐ More than 5 years ago
- ☐ Never participated

33) Will you elect non-participation should Medicare reimbursements continue to be reduced, as projected?
- ☐ Yes
- ☐ No, cannot afford to be a non-participant
- ☐ No, unprofessional not to participate
- ☐ No, other (Please specify) _____
- ☐ Not sure

34) How many years has it been since your practice last hired a new surgeon? _____

35) Does your practice plan to hire new surgeons in the next 2 years?
- ☐ No
- ☐ Yes – One new surgeon
- ☐ Yes – Two new surgeons
- ☐ Yes – Three or more new surgeons

36) What do/would you look for when recruiting a new surgeon to your practice?
- ☐ Recent graduate
- ☐ Experienced surgeon
- ☐ Surgeon with special skills
  (e.g., endovascular skills, atrial fibrillation, VAD, etc.)
- ☐ Other (Please specify) _____

37) Overall, how would you rate your current career satisfaction?
- ☐ Extremely satisfied
- ☐ Very satisfied
- ☐ Satisfied
- ☐ Somewhat satisfied
- ☐ Not at all satisfied

38) Please indicate the state and zip code of the hospital where you perform most of your cardiothoracic procedures.
State: _____ Zip Code: _____ I practice outside the United States: _____

39) Please indicate the setting of your practice.
- ☐ Rural
- ☐ Small or medium sized community
- ☐ Suburban
- ☐ Urban

40) Are you board certified in critical care?
☐ Yes ☐ No

2009 STS/AATS Practice Survey

41) Does the institution where you primarily practice have a dedicated Cardiac Surgery ICU?

- ☐ Yes, the director is a cardiothoracic surgeon board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but not board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but unsure if board certified in critical care
- ☐ Yes, the director is not a cardiothoracic surgeon
- ☐ No

42) Does the institution where you primarily practice have a dedicated Thoracic Surgery ICU?

- ☐ Yes, the director is a cardiothoracic surgeon board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but not board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but unsure if board certified in critical care
- ☐ Yes, the director is not a cardiothoracic surgeon
- ☐ No

43) Does the institution where you primarily practice have a dedicated Pediatric Cardiac Surgery ICU?

- ☐ Yes, the director is a cardiothoracic surgeon board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but not board certified in critical care
- ☐ Yes, the director is a cardiothoracic surgeon, but unsure if board certified in critical care
- ☐ Yes, the director is not a cardiothoracic surgeon
- ☐ No

44) Please indicate who is primarily responsible for post-operative patient care for the procedures listed below.

	CT Surgeon	Cardiologist	Pulmonologist	Intensivist	CT surgeon and other physician	Other
Routine ICU patient	☐	☐	☐	☐	☐	☐
Heart transplant patient	☐	☐	☐	☐	☐	☐
Lung transplant patient	☐	☐	☐	☐	☐	☐
Assist Device patient (ECMO, VAD, etc.)	☐	☐	☐	☐	☐	☐

45) Do you participate in The Society of Thoracic Surgeons National Database?

☐ Yes ☐ No

46) Do you participate in a regional or state outcomes database?

- ☐ Yes (Please specify the name of the database.) _____
- ☐ No

47) If you are NOT an STS National Database participant, please indicate the best reason why not.

- ☐ Cost
- ☐ Question value
- ☐ Other (Please specify) _____

48) If you are NOT an STS National Database participant, given PQRI reimbursement incentives and the ABTS requirements for maintenance of certification requiring participation in an outcomes database, do you plan to participate in the STS National Database in the next 2 years?

☐ Yes ☐ No

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2009 STS/AATS Practice Survey

49) If you ARE a database participant, what are your approximate costs?

	Participation (Round expense to the nearest $100)	Percentage of the costs covered by: Hospital	Other
STS National Database participation fee (if applicable)	US$ _____	_____ %	_____ %
Regional or state database participation fee (if applicable)	US$ _____	_____ %	_____ %
Software costs	US$ _____	_____ %	_____ %
Salary and benefits for data coordinator and other personnel who maintain database	US$ _____	_____ %	_____ %

50) Do you participate in CMS's PQRI?
(Please select only one reason why not.)
- ☐ Yes
- ☐ No – Inadequate financial incentive
- ☐ No – Administrative difficulties
- ☐ Other (Please specify) _____

51) At what point did you choose a career in cardiothoracic surgery?
- ☐ Prior to medical school
- ☐ During medical school
- ☐ General surgery residency years 1-2
- ☐ General surgery residency years 3-4
- ☐ Other (Please specify) _____

52) Please indicate the year of your birth: _____

53) Please indicate your gender:
☐ Female ☐ Male

54) Would you encourage your children or grandchildren to go into medicine today?
☐ Yes ☐ No ☐ Not applicable

55) Would you encourage your children or grandchildren to go into cardiothoracic surgery today?
☐ Yes ☐ No ☐ Not applicable

56) Please provide your full name so that STS/AATS may conduct longitudinal studies in the future. Please be assured that results will be reported only in the aggregate, and that individual responses will not be reported. If you are unwilling to provide your name, please return the completed survey regardless.

Print Full Name: _____

On behalf of the STS/AATS Task Force on Thoracic Surgery Practice and Access, thank you for your participation in this important survey.

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