

## Longitudinal trends in the U.S. surgical workforce, 1981–2006

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**Editor’s note:** *The following is the first of a series of columns initiated by the ACS Health Policy Research Institute (HPRI). The mission of the HPRI is to improve the understanding of surgical patient care from a policy perspective in order to educate the public, federal and state governments, health care consumers, and the policy community to enable advocacy for superior, efficient, and compassionate surgical patient care. The goal of the HPRI is to create a data-driven, knowledge-based program for examining issues related to surgical services, the surgical workforce, and public policies affecting surgery.*

*The bimonthly column will feature research data on topics of interest to Fellows and Members of the College.*

Between 1981 and 2006, the U.S. surgical workforce increased by 53 percent—from 87,345 to 133,796 surgeons. During the same time period, the national population grew 31 percent. This raised the per capita surgeon supply from 38.1 to 44.7 surgeons per 100,000 persons. However, most of the gains during the 25-year period were attained by the early 1990s, after which growth tapered, and even reversed, for general surgery. Furthermore, data suggests a worsening problem of geographic distribution of surgeons in future years.

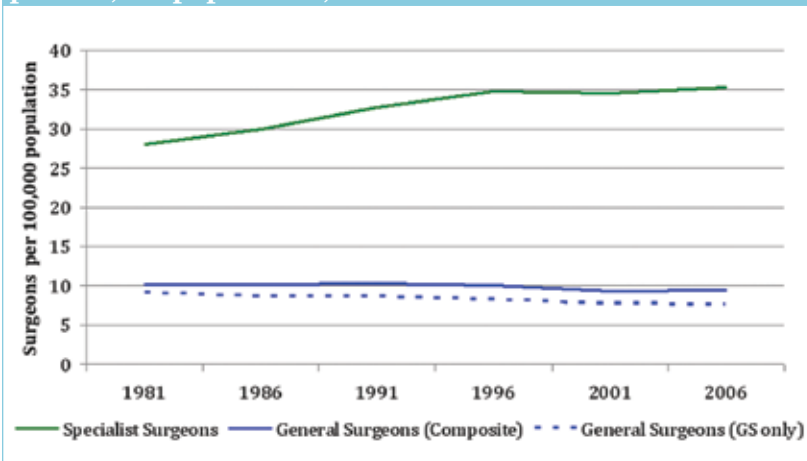
### General surgery

Growth in the surgical workforce during the 25-year period was fueled by an increase in physicians in surgical subspecialty groups at the expense of general surgery. Only 4 percent (1,881) of the 46,451 net gain in surgeons between 1981 and 2006 were general surgeons; an additional 3,349 (7.2 percent) were in specialties requir-

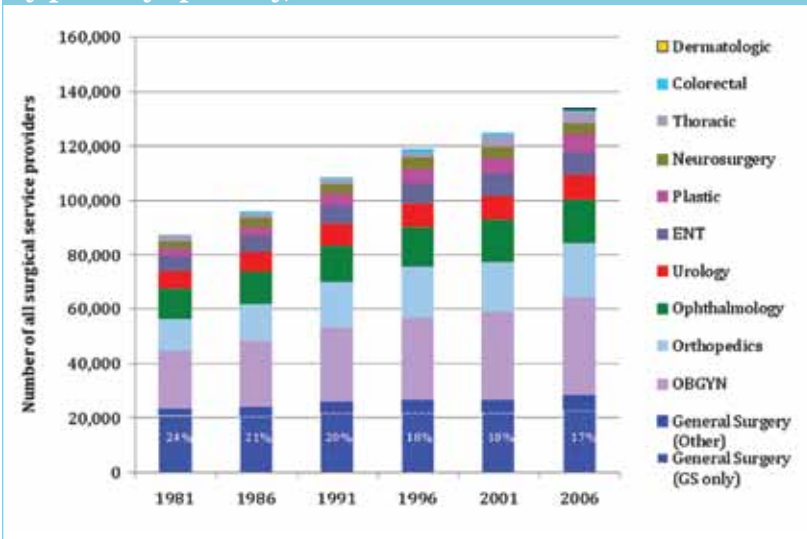
**Table. Surgery specialty categories**

Specialty category	Included specialties
General surgery	General surgery, abdominal surgery, hand surgery, oral and maxillofacial surgery, pediatric surgery, trauma surgery, transplant surgery, cardiovascular surgery, vascular surgery, surgical critical care, surgical oncology
Colorectal surgery	Colorectal surgery, proctology
Dermatologic surgery	Dermatologic surgery, procedural dermatology
Neurosurgery	Neurological surgery, pediatric neurological surgery, endovascular surgical neuroradiology
Obstetrical & gynecological surgery	Gynecology oncology, gynecology, obstetrics & gynecology, obstetrics, critical care medicine OB/GYN
Orthopaedic surgery	Hand surgery—orthopaedics, adult reconstructive orthopaedics, foot and ankle surgery, musculoskeletal medicine, pediatric orthopaedics, orthopaedic surgery, sports medicine, orthopaedic spine surgery, orthopaedic trauma
Ophthalmic surgery	Ophthalmology, pediatric ophthalmology
ENT surgery	Head and neck surgery, otology/neurotology, otology, otolaryngology, pediatric otolaryngology
Plastic surgery	Craniofacial surgery, cosmetic surgery, facial plastic surgery, hand surgery plastics, plastic surgery, plastic surgery within the head and neck
Thoracic surgery	Thoracic surgery, pediatric cardiothoracic surgery
Urologic surgery	Urology, pediatric urology

**Figure 1. U.S. specialist and general surgeons per 100,000 population, 1981–2006**



**Figure 2. Growth in the U.S. surgical workforce by primary specialty, 1981–2006**



Source: AMA Physician Masterfile 1981–2006 and U.S. Census Bureau population data for corresponding years.

ing prior certification in general surgery. (We group these surgeons with general surgeons in the general surgery “composite” classification; see Table, page 27).

General surgery decreased as a proportion of the total surgical workforce from 24 percent in

1981 to 18 percent by 2006, reflecting both the slow growth in the number of general surgeons and the expansion of several specialty groups such as obstetrics and gynecology (OBGYN), orthopaedic, plastic, and thoracic surgery.

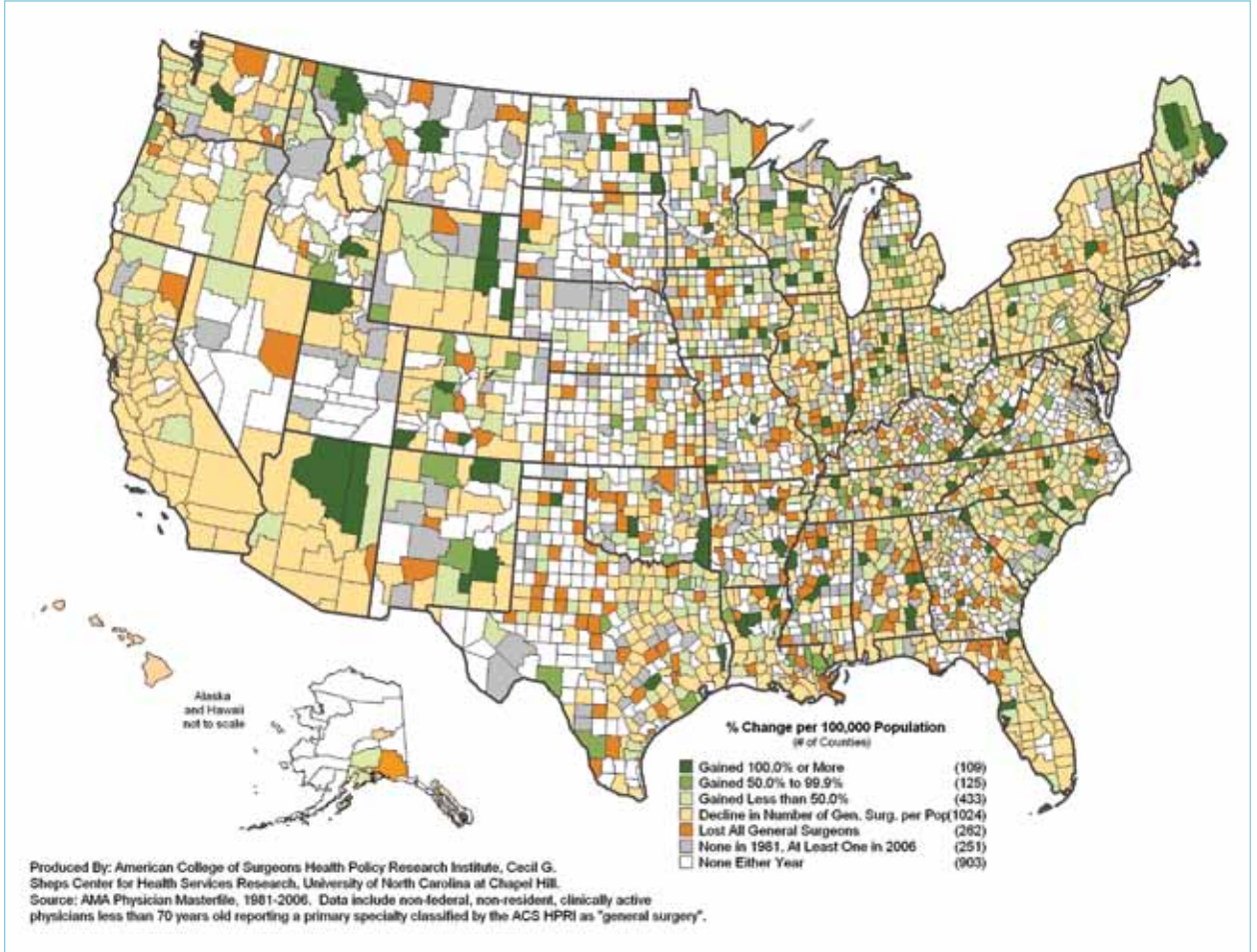
### *Workforce growth slowdown*

Analysis also shows unsteady growth in the surgical workforce, particularly for general surgery, between 1981 and 2006 (Figures 1 and 2, this page). The net change in surgeon supply varied considerably for both general surgery and surgical specialties during each five-year interval of the study period, and growth for all surgeons has slowed considerably since 1996. Surgical specialties had double-digit growth in each period until 1996, when growth slowed to approximately 7 percent in each of the two subsequent periods. General surgery growth was up and down, peaking in 1991 and again in 2006, but with nominal or negative growth in the other periods. Meanwhile, population growth was fairly consistent, hovering around 5 percent during each five-year interval, with the exception of 1996–2001, when it increased by 7.5 percent. Amid these inconsistent trends, what appears consistent is a sudden slowdown in the surgery workforce growth beginning sometime after 1991.

### *Geographic maldistribution*

To examine geographic variation in the surgical workforce supply, we analyzed physician and population data for all U.S. counties over

Figure 3. Percent change in general surgeons per 100,000 population, 1981–2006

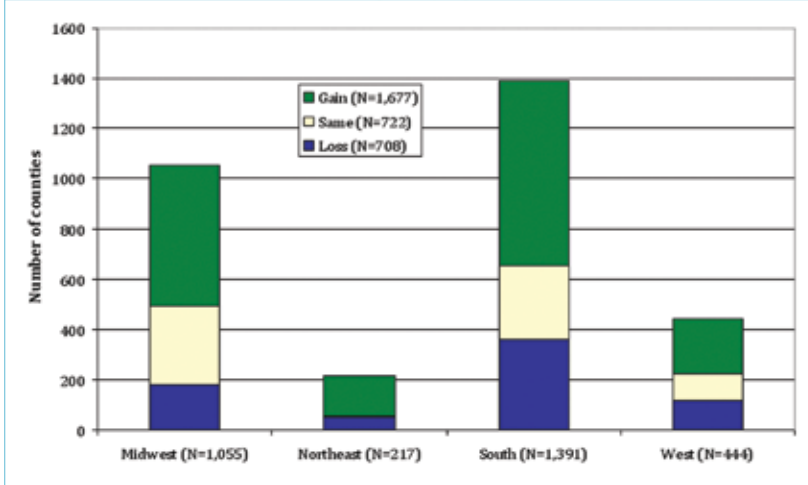


the 25-year period. Overall, we found that the average surgeon-to-population ratios held steady or improved in more than three-quarters of U.S. counties for all surgeons, but the general surgery-to-population ratio declined in 41 percent of counties between 1981 and 2006 (Figure 3, this page). More than half of all counties experienced an increase in surgeon-to-population ratios between 1981 and 2006, while a smaller

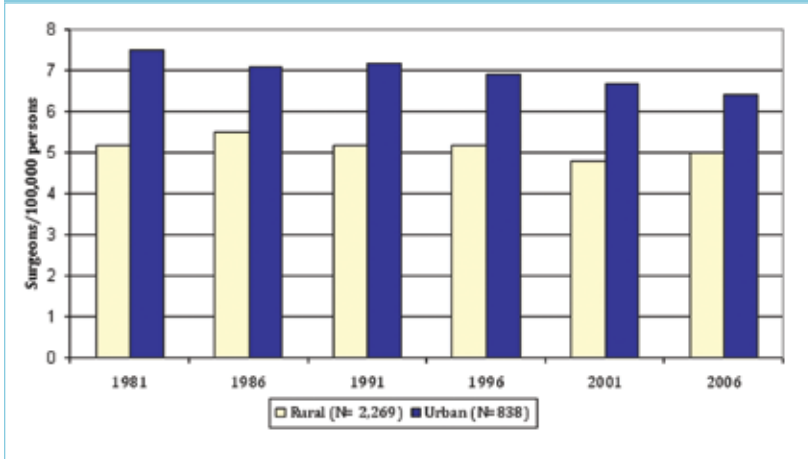
percentage (30 percent) of counties gained general surgeons. The number of counties with no surgeons declined steadily over the 25-year period, such that 925 counties (30 percent) had no surgeons by 2006, a slight improvement from 1981 when 1,025 (33 percent) had none. As expected, more counties had no general surgeons throughout the 25-year period; however, in contrast with the improvements observed, with the ratio of all surgeons to population, we found that the number of counties with an inadequate supply of general surgeons (fewer than 4.7 per 100,000 population as recommended by the Graduate Medical Education National Advisory Committee (GMENAC\*))

\*Graduate Medical Education National Advisory Committee (1980). *Report to the Secretary, Department of Health and Human Services, Geographic Distribution Technical Panel*. Vol III. (DHHS Publication No. HRA 81-653). Washington, DC; 1980.

**Figure 4. County change in surgeon-to-population ratio, 1981–2006; all surgeons by region**



**Figure 5. County ratio of general surgeons per 100,000 persons, 1981–2006**



Source: AMA Physician Masterfile 1981–2006 and U.S. Census Bureau population data for corresponding years.

increased in every time period since 1986.

Just under one-quarter (709) of all counties had fewer surgeons per 100,000 residents in 2006 than in 1981. Approximately 82.2 million people (27.4 percent of the U.S. population) resided in these counties, which experienced a decline in surgeon-to-population

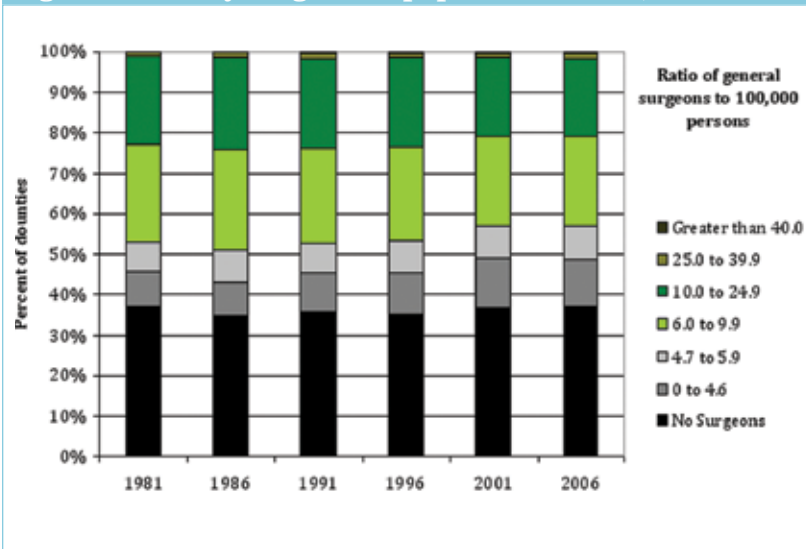
ratios in 2006. Regional variations in the gain or loss of surgeons show that counties (see Figure 4, this page) in the Northeast experienced significant gains, while losses were more common in the South.

*Geography, trends in supply*

Change in the geographic distribution of general surgeons was slightly worse than for all surgeons between 1981 and 2006. Approximately 41 percent of all counties experienced a declining ratio of general surgeons per 100,000 people, and a disproportionate number of those counties were urban. Whereas 34 percent (781) of rural counties had declining general surgeon-to-population ratios during the 25-year period, 60 percent (506) of all urban counties experienced declining ratios (see Figure 5, this page). Regional patterns of change in surgeon-to-population ratios for general surgeons did not mirror those for all surgeons. In every region of the country (and particularly in the Northeast), more counties experienced declines in general surgeon-to-population ratios than increases. Consistent with other findings, this data suggest that there has been a substantial loss of general surgeons across the nation, and that this loss has been greatest in urban areas, where surgical specialists have grown more rapidly.

In 1981, one-third (1,025) of all U.S. counties had no practicing surgeons (see Figure 6, page 31). By 2006, 303 of those counties gained a surgeon, but 203 other counties had lost all their surgeons. These 925 counties without a surgeon had a collective population of 14.7 million people in 2006.

**Figure 6. County surgeon-to-population ratios, 1981–2006**



Source: AMA Physician Masterfile 1981–2006 and U.S. Census Bureau population data for corresponding years.

### Data and methodology

American Medical Association Masterfile data representing all licensed physicians were analyzed in six consecutive periods, separated by five years each. Census Bureau population data for corresponding years was used to calculate provider-to-population ratios at the county, state, and regional levels of analysis. Providers with a self-reported primary specialty of surgery, as identified in the Table on page 27, were included in the analysis. Only providers who identified their practice type as “direct patient care,” were 69-years old or younger, and who reported a practice location within a U.S. county or county-equivalent (according to Federal Information Processing Standard [FIPS] codes)

### Implications

Although the overall surgical workforce experienced considerable growth during the 25-year period between 1981 and 2006, the supply of general surgeons has not kept pace with population growth or the expansion of other surgical specialties. Many U.S. counties have no practicing surgeons and even more continue to lose surgeons, particularly generalists. These trends have implications for access to care, as the competencies of general surgeons are broadest and include emergency and trauma care. Further, the failure of general surgery to keep pace with population growth has resulted in a significant number of areas that do not meet the minimum standard of geographic access to surgical care, as defined by the GMENAC. These findings are important from the perspective of medical training and workforce planning, in that new policies may be necessary to increase the number of general surgeons through a program similar to the National Health Service Corps’ loan repayment program or focused support for residency training.

were included in the analysis. Physicians were excluded from the analysis in a given year if they reported being in residency training, semi-retired, or if they reported their primary present employer was the U.S. government, locum tenens, medical school, or other nonpatient care employment. For the purpose of this analysis, counties were defined by FIPS codes, regions by the U.S. Census Bureau, and rural–urban was defined using the U.S. Office of Management and Budget’s core-based statistical area definitions for metro and micropolitan areas. [Q]