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Research Study

Estimating the Need for a General Surgeon based on the Demand for Primary Care Practitioners in the Medical Service Area

Fred C. Eilrich, Jonathan C. Sprague, Cheryl F. St. Clair, and Gerald A Doeksen, National Center for Rural Health Works

Key Findings

- The relationship between primary care and specialty physician services can be the basis for estimating the need for specialty services.
- The number of visits and type of general surgery procedures can be significantly different from hospital to hospital
- The need for a general surgeon is impacted by the demographics of the population base, the scope of practice for the local general surgeon and the number of primary care practitioners.
- The medical service area, population usage rates of local primary care practitioners and the referral rates for local general surgeons should be determined locally.

Background

Converging forces are contributing to declines in the availability of rural general surgery services. A developing crisis will have profound impacts on many rural residents, hospitals, physicians and communities. While most rural communities' attention is predominantly directed to assuring primary medical care availability, more specific focus must be directed to general surgery as a fundamental building block for rural systems of care, and its interconnectedness with the sustainability of primary care and other rural services. Although many rural hospital service areas may not have sufficient population to support a full-time equivalent (FTE) general surgeon, the demand for a general surgeon is quite often enough to support a part-time surgeon. Specialty physician services such as general surgery can significantly impact the financial stability of the hospital [**1**]. In addition to inpatient visits, general surgeons generate significant outpatient activity that increases hospital net revenue.

Previous research indicates that the scope of urban and rural general surgical procedures is often markedly different [**2**,**3**]. Research in North Carolina found that the scope of practice for rural general surgeons was significantly diverse ranging from less than 30 different procedures to well over 70. The procedure volumes performed by rural general surgeons also varied dramatically. Research findings indicated that one-quarter of the rural general surgeons performed less than 275 annual procedures and one-quarter performed more than 783 procedures per year [**4**]

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Purpose of the Study

The need for surgical services in rural areas seems obvious, but with the variability among surgeons, it can be challenging to estimate the amount of general surgery services that a specific medical service area could support. It is difficult to identify a single definition that would uniquely describe every rural general surgeon or the routine procedures that they perform. There is a strong relationship between primary care and other specialty physician services. Visits to a specialist are typically generated from primary care practitioner referrals. Therefore, the utilization of primary care practitioner services can be the basis for estimating the need for a general surgeon.

Approach

This paper presents a methodology to estimate the need for general surgery based on available primary care practitioner services. This methodology could be used for other specialty services as well. The information included in this report is designed to assist local decision-makers in assessing the need and potential for general surgery services. A case study illustrating the methodology will be presented.

Case Study

Estimating the Need for Primary Care Services

The need for specialty services, in this case specifically general surgery, is affected by the need and availability of primary care practitioner services. For illustration purposes, an example population of a typical rural medical service area (MSA) is presented in **Table 1**. The MSA of XYZ Regional Hospital includes five zip code areas. Local health officials must identify the percent of the population that utilizes the primary health care services in those zip codes. For the purposes of this study, the assumption is that 80 percent of the population utilizes primary health care services in the MSA of XYZ Regional Hospital. The other 20 percent were travelling to physicians outside of the medical service area. **Table 1** presents the estimated population by age and gender for each zip code in the XYZ Regional MSA from the 2009 Community Sourcebook of Zip Code Demographics, 23rd Edition. The total population for the primary service area was 20,396.

Table 2 presents the estimated number of annual physician office visits by age and gender. For instance, for males under age fifteen, the average number of annual physician office visits is 2.5 visits per year. These data were from the National Ambulatory Health Care Survey: 2008 Summary Tables from the U. S. Department of Health and Human Services [**5**].

Table 3 presents the number of annual physician office visits generated in the XYZ MSA. These office visits were estimated by multiplying the estimated population by age and gender groups by the estimated number of annual physician office visits. Of these total office visits, recent data indicate that 60.6 percent of total physician office visits will be made to practitioners active in primary patient care while the remainder will be made to specialists [**5**]

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Table 1
XYZ Regional Hospital Primary Medical Service Area Population by Zip Code

	Zip Code A		Zip Code B		Zip Code C		Zip Code D		Zip Code E		Primary MSA		
Age	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Total
< 15	441	454	NA	NA	960	968	702	708	48	54	2,151	2,184	4,335
15-24	273	280	NA	NA	616	621	347	350	34	39	1,270	1,290	2,560
25-44	518	532	NA	NA	1,256	1,266	841	847	72	80	2,687	2,725	5,412
45-64	567	584	NA	NA	1,237	1,247	807	813	78	87	2,689	2,731	5,420
65-74	122	125	NA	NA	266	268	169	170	17	19	573	582	1,155
75+	159	163	NA	NA	370	373	203	204	20	23	751	763	1,514
Total	2,079	2,138			4,705	4,743	3,068	3,092	269	302	10,121	10,275	20,396

SOURCE: 2009 Community Sourcebook of Zip Code Demographics, 23rd Edition, ESRI.

Table 2
Annual Physician Office Visits by Age Group

Age Group	Male Visit Rate [1]	Female Visit Rate [1]
< 15	2.5	2.3
15-24	1.1	2.5
25-44	1.5	3.3
45-64	3.1	4.2
65-74	6.0	6.7
75+	7.9	7.3

[1] Source: U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center of Health Statistics, National Ambulatory Medical Care Survey: 2008 Summary Tables.

Using the office visit data presented in **Table 2**, the MSA will generate 66,693 total annual physician office visits. The local primary care physician office visits were calculated based on the 60.6 percent of total office visits to primary care physicians for a total of 40,416 annual primary care office visits (66,693 x 0.606 = 40,416).

The total number of primary care office visits given various usage rates is presented in **Table 4** for the MSA. If 80 percent of the residents in the MSA use primary care practitioners in the MSA, the estimated annual primary care office visits would be 32,333. The national average for the number of annual office visits to each primary

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Table 3

Annual Primary Care Physician Office Visits Generated in

Physician Medical Service Areas of XYZ Regional Hospital

(Based on 100 Percent Utilization)

	Male			Female			
Age	2009 Population [1]	Visit Rate [2]	Visits	2009 Population [1]	Visit Rate [2]	Visits	Total Visits
< 15	2,151	2.5	5,378	2,184	2.3	5,023	10,401
15-24	1,270	1.1	1,397	1,290	2.5	3,225	4,622
25-44	2,687	1.5	4,031	2,725	3.3	8,993	13,024
45-64	2,689	3.1	8,336	2,731	4.2	11,470	19,806
65-74	573	6.0	3,438	582	6.7	3,899	7,337
75+	751	7.9	5,933	763	7.3	5,570	11,503
Total	10,121		28,513	10,275		38,180	66,693
Local Primary Care Office Visits Per Year *(60.6 percent of 66,693)*							**40,416**

[1] SOURCE: ESRI Press, Community Sourcebook of Zip Code Demographics, ESRI.
[2] SOURCE: U. S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center of Health Statistics, National Ambulatory Medical Care Survey: 2008 Summary Tables.

Table 4

Primary Care Physician Office Visits Given Usage

by Local Residents in the Medical Service Area of XYZ Regional Hospital

	Usage Levels						
	70%	75%	**80%**	85%	90%	95%	100%
Medical Service Area Office Visits by Usage Level	28,291	30,312	**32,333**	34,354	36,374	38,395	40,416

For example, a 80% usage level in the primary MSA results in **32,333** total primary care physician office visits for an estimated 6.5 **Total Primary Care Physicians***

* Based on 5,000 average annual primary care office visits per primary care physician practice.

care physician is 5,000 [**5**]. Utilizing this average, the MSA can support 6.5 primary care physicians based on 80 percent of the residents receiving primary care in the MSA. Again, primary care practitioners include family medicine and general practice physicians, internal medicine physicians, OB/GYN, pediatricians and mid-level primary care practitioners.

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Estimating Need for Specialty Physicians

A previous study introduced the challenges with defining rural surgery and presented a need-based methodology by compiling a list of procedures collected from ten sampled hospitals [**6**]. The goal was to compile a condensed list of procedures that were routinely performed by rural general surgeons. Only those procedures that were performed more than one time during the year were included. The list of procedures is presented in **Table 5**. In addition to facilities and staffing, experience, personal preference and/or subspecialty training will impact the types of procedures that general surgeons will perform on a routine basis. Some general surgeons will perform gynecological procedures or diagnostic colonoscopies while others will not. Many rural hospitals do not deliver babies and therefore procedures on infants would be limited to only unique emergencies. The variability of general surgeon performed C-sections are also significant. A hospital's proximity relative to a nearby surgical center or alternative specialist will also impact the type of surgery procedures performed. General surgeons in some communities perform orthopedic procedures such as knee arthroscopy, although such care is increasingly an outlier. It is impossible to create a list of procedures that represents the practice patterns of all general surgeons or every rural general surgeon. Thus, we must look with caution to averages of typical procedures to create tools that provide estimates that support more detailed local discussions.

A need-based approach estimates the number of potential procedures performed by a general surgeon by constructing coefficients and applying them to the population. To construct the coefficients, public use data files were obtained from two National surveys, the National Hospital Discharge Survey (NHDS) and the National Survey of Ambulatory Surgery (NSAS). Both surveys are conducted periodically by the National Center for Health Statistics.

The NHDS is conducted annually and covers discharges from non-institutional hospitals, excluding Federal, military and Veterans Administration hospitals, located in the 50 States and the District of Columbia [**7**]. Only short-stay hospitals (hospitals with an average length of stay for all patients of less than 30 days) or those whose specialty is general (medical or surgical) or children's general are included in the survey. In 2006, 501 hospitals were surveyed and 438 hospitals responded.

The NSAS covers ambulatory surgery procedures performed in hospitals and freestanding ambulatory surgery centers in the United States [**8**]. NSAS uses the same hospital selection criteria used by the NHDS. In 2006, 224 hospitals were surveyed with 142 hospitals responding. The data have several variables detailing each recorded event including age and gender of patient and procedure identification using the International Statistical Classification of Disease (ICD-9) coding system along with other variables such as symptoms, diagnoses, length of stay, provider type, etc. [**9**]. Both data sets were edited to correct and/or account for sampling errors and each record was weighted to project national or regional estimates.

This methodology can be applied to estimate the need for a general surgeon based on the demographics of the medical service area. **Table 6** summarizes the results for the example XYZ Regional Hospital MSA. This need reflects patient visits only and does not account for issues associated with call coverage. The list of procedures can be adapted to represent a particular general surgeon or hospital scenario. From these estimates, a hospital administrator can assess the need for a general surgeon and estimate the required FTEs necessary to meet the

Table 5
Potential List of General Surgery Procedures Performed by Rural General Surgeons[1]

04.43	CARPAL TUNNEL RELEASE	45.73	RIGHT HEMICOLECTOMY	68.12	HYSTEROSCOPY
08.20	REMOVE EYELID LESION	47.01	LAP APPENDECTOMY	68.23	ENDOMETRIAL ABLATION
08.87	UPPER LID RHYTIDECTOMY	47.09	OTHER APPENDECTOMY	68.49	OTHER TOTAL HYSTERECTOMY
20.09	OTHER MYRINGOTOMY	48.36	POLYPECTOMY OF RECTUM	69.09	DIAGNOSTIC D & C
28.3	TONSILLECTOMY/ADENOIDECTOMY	49.46	HEMORRHOIDECTOMY	83.31	TENDON LESION EXCISION
34.91	THORACENTESIS	51.23	LAP CHOLECYSTECTOMY	85.21	BREAST LESION EXCISION
37.83	INSERT DUAL-CHAMBER PACE MAKER	53.00	UNILATERAL INGUINAL HERNIA REP	85.43	UNILATERAL SIMPLE MASTECTOMY
42.92	ESOPHAGEAL DILATION	53.41	UMBILICAL HERNIA REP	86.04	OTHER SKIN DRAINAGE
43.11	PERCUTANEOUS ENDOSC GASTROSTOMY	53.61	ABDOMINAL HERNIA REP	86.07	INSERTION VAD
45.13	OTHER SMALL INT. ENDOSCOPY (EGD)	53.69	OTHER ABDOMINAL HERNIA REP	86.21	EXCISION PILONIDAL LESION
45.16	EGD WITH CLOSED BIOPSY	54.21	LAPAROSCOPY	86.3	OTHER EXCISION OF SKIN LESION
45.23	COLONOSCOPY	57.32	OTHER CYSTOSCOPY	86.4	RADICAL EXCISION SKIN LESION
45.24	FLEXIBLE SIGMOIDOSCOPY	57.33	TRANSURETHAL BLADDER BX	98.51	ESWL KIDNEY/URETER/BLADDER
45.25	ENDOSCOPIC LARGE INT. BIOPSY	59.71	LEVATOR MUSCLE SUSPENSION		
45.42	ENDOSCOPIC POLPECTOMY LARGE INT	66.29	ENDOSCOPIC FALLOPIAN TUBE NEC		

1Based on procedures sampled from general rural hospital general surgery programs

need. For example, given the procedures from the list (**Table 5**), an estimated 65.3 procedures were performed per 1,000 population in 2006. The 2008 Medical Group Management Association (MGMA) Physician Compensation and Production Survey reported an estimated 809 annual procedures were performed per rural general surgeon [**10**]. This would result in a population-to-general surgeon ratio of 12,389 (809/.0653).

Table 6
Estimating the Number of General Surgeons for Example Medical Service Area

National Averages Approach	
Procedure Rate/1000 Population[1]	65.3
Average Annual Procedures per General Surgeon[2]	809
Population/General Surgeon Ratio	12,389
Estimated Population in Medical Service Area Using Primary Care Providers (80%)	16,317
Estimated Number of General Surgeons for Example Medical Service Area	1.3

[1] Data based on procedures sampled from rural hospitals, 2006 National Hospital Discharge Survey and National Survey of Ambulatory Surgery.
[2] 2007 median annual number of surgery cases per non-metro single specialty general surgery office, 2008 Medical Group Management Association Physician Compensation and Production Survey

It is important to note that this population-to-general surgeon ratio only applies to the set of procedures listed in Table 5 and the average number of annual procedures performed. Any change in scope of practice or total annual volume will change the ratio. Based on the assumption that the utilization rates would be the same for both specialists and primary care practitioners, the surgical needs in the XYZ Regional Hospital MSA would support approximately 1.3 general surgeons (16,317/12,389) which is equivalent to 6.5 workdays per week. However, if the current number of primary care physicians were less than needed to support 80 percent, the surgical needs would need to be adjusted. For example, **Table 4** presented that an 80 percent usage level would be 32,333 visits and support 6.5 primary care physicians. If the medical service area currently had 5 FTE primary care physicians, the usage rate would be closer to 60 percent and the surgical need should be based on that usage rate until additional primary care physicians/practitioners established in the medical service area.

Likewise, the local referral rate by primary care physicians is influenced by the availability of local specialists such as general surgeons and the relationship between physician and specialist. The local general surgeon may not perform the necessary procedures and therefore the primary care practitioners would have to refer their patients to other specialists. ***The actual referral rates could be significantly different than the usage rates for primary care practitioners and should be determined locally if possible.***

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Some rural populations can only support a fraction of a specialty care physician's FTE. Hospitals or other entities can host specialty clinics that have a rotation of specialty care physicians practicing there. Often a group of surgeons will set up a private surgical office and provide surgical services to a number of smaller hospitals.

The supporting hospital usually provides the facility and maybe an office person to help with scheduling and the specialty physician brings clinical staff and completes the billing. In this way, the specialty care physician needs of the community can be met without a specialty care physician actually residing in the community.

Unique economic impacts are gained through a community utilizing specialty physician clinics; the impacts on the local community are difficult to ascertain. Different diagnoses and specialists will bring differing revenues. Notably, research has shown that by providing specialty clinics in communities, fewer dollars are out-migrated to other communities for laboratory and pharmacy services. A 2006 survey in Louisiana found that over 90 percent of the patients who went out-of-town to visit a specialist also received their laboratory work and pharmacy services there [**11**].

Summary

The analysis above presents the methodology and results for estimating the need for primary care practitioners and specialty physicians in the service area of an example XYZ Regional Hospital. An 80 percent usage rate from the MSA for local primary care practitioners suggests that an estimated 6.5 primary care physicians can be supported. The actual number of physicians that the MSA of XYZ Regional Hospital can support will vary based on the locally-determined usage rates. Estimates of these usage rates should be used in conjunction with the current status of the primary care physicians and mid-level practitioners in the MSA to determine the next steps for the community.

The relationship between primary care and other specialty physician services can be the basis for estimating the need for specialty services. Visits to a specialist are typically generated from primary care physician referrals. This paper presents a methodology to estimate the need for general surgery based on demographics of the MSA and available primary care physician services. An 80 percent usage rate by the population of the MSA could support 1.3 general surgeons which is the equivalent of 6.5 days per week. Locally-determined referral rates should be used when available.

Many assumptions have been made in this analysis. Local decision makers should exercise caution when estimating local visits to a general surgeon particularly when utilizing national coefficients that are implemented in this study. As discussed earlier, the number and type of visits to a general surgeon can be significantly different from hospital to hospital depending on scope of a general surgeon's practice, the demographics of the population base, the number of available primary care practitioners, the available ancillary support and the referral rates from the practitioners. If additional local data are available, these data should be utilized to derive the most realistic conclusion possible for the local community. However, in the absence of local data, these national coefficients serve as valuable estimators of potential general surgery procedures and anticipated utilization.

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