

# RUPRI Center for Rural Health Policy Analysis

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### **Surgical Services in Critical Access Hospitals, 2011**

*Paula Weigel, PhD; Fred Ullrich, BA; Marcia M. Ward, PhD; Keith J. Mueller, PhD*

In this policy brief we describe the types and volume of major surgical services provided in the inpatient and outpatient settings of Critical Access Hospitals (CAHs) in 2011. Major surgical services are those procedures that require use of an operating room (OR), regardless of whether the procedure was inpatient or outpatient.

#### **Key Findings**

- CAH discharges of patients having a major surgical procedure that required use of an OR were analyzed from four regionally representative states: Colorado, North Carolina, Vermont, and Wisconsin. The average surgical volume among CAHs who performed any surgery in the sample was 678 procedures per CAH per year, and only 8.5 percent of CAHs performed none.
- The average portion of all surgery volume performed on an outpatient basis in CAHs is 77 percent. Inpatient procedure volume ranged between 20 percent and 25 percent of total surgical volume across the four states. Most of the research literature on surgery in CAHs focus on inpatient procedures only, thus missing a significant portion of the surgery volume that CAHs perform.
- The high correlation (0.85,  $p < 0.0001$ ) indicates that the 3:1 ratio of outpatient-to-inpatient surgical volume was relatively consistent across CAHs.
- Operations on the musculoskeletal system, the eye, and the digestive system accounted for 66 percent on average of all surgical procedures in CAHs. Many surgical procedures are performed on an inpatient and outpatient basis, but some are performed exclusively in one setting.

#### **Background**

Of the nearly 5,000 community hospitals in the United States, 1,326 (27 percent) are certified CAHs.<sup>1,2</sup> Rural CAHs are often the sole provider of acute care in a rural community, offering medical and surgical services to rural residents who otherwise would have to travel significant distances to receive emergent or elective treatments. Like residents of any community, rural residents have surgical needs that range from the predictable (e.g., cataract procedures) to the emergent (e.g., appendectomy). Innovations in surgery over the past several decades have made possible the provision of many surgical procedures on an outpatient basis, reducing inpatient admissions. Having the capacity to offer both inpatient and outpatient surgical procedures enables CAHs to provide access for rural residents to not only *critical* surgical services that may be emergent, but also *convenient* surgical services that are elective, which reduces patient burdens associated with travel and follow-up care. Understanding the range of surgical services that CAHs typically provide lends insight into the breadth and depth of health care service provision that rural residents may expect to obtain in their local community.



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RUPRI Center for Rural Health Policy Analysis,  
University of Iowa College of Public Health,  
Department of Health Management and Policy,  
105 River St., N232A, Iowa City, IA 52242,  
(319) 384-3830  
<http://www.public-health.uiowa.edu/rupri>  
E-mail: [cph-rupri-inquiries@uiowa.edu](mailto:cph-rupri-inquiries@uiowa.edu)

## Methodology

Discharge data from the 2011 State Inpatient Databases (SID) and the State Ambulatory Surgery Databases (SASD) were examined.<sup>3,4</sup> These databases are part of the Healthcare Cost and Utilization Project (HCUP) sponsored by the Agency for Healthcare Research and Quality. Hospital identifiers from the discharge data were linked to the 2010 American Hospital Association Annual Survey<sup>5</sup> to verify hospital characteristics (e.g., general or specialty, CAH or Prospective Payment System hospital). Of the 18 states with both SID and SASD available, only 7 had all needed data. To represent the four U.S. census regions, Colorado, North Carolina, Vermont, and Wisconsin were selected because they had more CAHs than alternative states. Patient data were included in the sample if patients had a valid ZIP code and lived in the same state as the hospital(s), and if the discharge record indicated a major operating room procedure. We identified the CAHs that provided major surgery services, and among those CAHs, we identified the average volume of surgeries that were inpatient versus outpatient in each state. We aggregated surgeries to organ system using the multi-level Clinical Classification System software available from HCUP in order to report the types and numbers of surgical procedures that are commonly provided in CAHs.<sup>6</sup>

## Results

Table 1 shows the total number of CAHs in each state and those that performed major surgical procedures in 2011. Among those CAHs that discharged surgery patients, we show the number of CAHs that performed inpatient surgery only and outpatient surgery only. Of all the CAHs, only 8.5 percent in these states did not perform any major surgical procedures.

**Table 1. Availability of major surgical procedures at CAHs in four states, 2011<sup>7</sup>**

	Colorado	North Carolina	Vermont	Wisconsin	Total
Total number of CAHs	28	23	8	58	117
CAHs with OR discharge records	24	20	7	56	107
- Inpatient surgery only	1	0	0	0	1
- Outpatient surgery only	3	1	0	3	7

Table 2 shows the total procedure volume by inpatient and outpatient surgical setting among CAHs in each of the four states. In these states, 72,551 major surgeries were performed across 107 CAHs for an average of 678 major surgical procedures per year (156 inpatient and 522 outpatient). Outpatient procedures as a portion of all procedures ranged from 75 percent in North Carolina to 80 percent in Vermont. Across hospitals, the correlation between inpatient and outpatient procedure volume is 0.85 ( $p < 0.0001$ ).

**Table 2. Surgical procedure volume at CAHs in four states by setting, 2011**

	Colorado	North Carolina	Vermont	Wisconsin	Total
Inpatient	1,915 (23%)	2,790 (25%)	2,033 (20%)	9,944 (23%)	16,682 (23%)
Outpatient	6,421 (77%)	8,578 (75%)	7,972 (80%)	32,898 (77%)	55,869 (77%)
Total volume	8,336	11,368	10,005	42,842	72,551

We aggregated the procedure type to the level of operation on organ system. Table 3 shows the volume of operations in each major organ system category and the procedure types within those categories that accounted for the majority of surgery volume. The categories of procedures are ordered by volume, showing operations on the musculoskeletal system, the eye, and the digestive system as the top three, accounting for 66 percent on average of all surgical procedures in CAHs. Furthermore, Table 3 indicates the volume and percentage of these procedures that are performed in an inpatient setting versus on a same-day surgery basis in an outpatient setting.

While the 28 procedures listed in Table 3 are not comprehensive, they do represent a significant portion of the types and volumes of surgical procedures offered by CAHs. The surgical procedures with the highest volume are performed by orthopedists, ophthalmologists, and general surgeons. However, all CAHs in each state do not offer all procedures, and the volume of procedures in each hospital is driven by both the *types* of procedures offered (e.g., lens/cataract) and the *number* of procedure types that can be provided (e.g., multiple procedures performed by general surgeons).

**Table 3. Major surgical procedures performed at CAHs in four states\* by organ system, 2011**

Surgical Procedures	Number of Procedures (N=72,551)	% of All	Inpatient (N=16,682)		Outpatient (N=55,869)	
			N	Row %	N	Row %
<b>Operations on the Musculoskeletal System</b>	<b>20,099</b>	<b>27.7%</b>	<b>5,391</b>	<b>26.8%</b>	<b>14,708</b>	<b>73.2%</b>
Arthroplasty	5,535		3,911	70.7%	1,624	29.3%
Treatment of fracture or dislocation	3,185		967	30.4%	2,218	69.6%
Other therap. proc.on muscles and tendons	3,284		121	3.7%	3,163	96.3%
Excision of semilunar cartilage of knee	2,507		‡	0.0%	‡	100.0%
Arthroscopy	710		‡	0.0%	‡	100.0%
Other OR therapeutic procedures on joints	1,644		105	6.4%	1,539	93.6%
Bunionectomy or repair of toe deformities	1,233		‡	0.0%	‡	100.0%
<b>Operations on the Eye</b>	<b>15,159</b>	<b>20.9%</b>	<b>‡</b>	<b>0.0%</b>	<b>‡</b>	<b>100.0%</b>
Lens and Cataract procedures	14,584		‡	0.0%	‡	100.0%
<b>Operations on the Digestive System</b>	<b>12,859</b>	<b>17.7%</b>	<b>3,221</b>	<b>25.0%</b>	<b>9,638</b>	<b>75.0%</b>
Cholecystectomy and common duct exploration	3,825		796	20.8%	3,029	79.2%
Inguinal and femoral hernia repair	2,403		70	2.9%	2,333	97.1%
Other hernia repair	1,745		190	10.9%	1,555	89.1%
Appendectomy	1,571		731	46.5%	840	53.5%
Colorectal resection	600		‡	100.0%	‡	0.0%
<b>Operations on the Female Genital Organs</b>	<b>5,038</b>	<b>6.9%</b>	<b>1,195</b>	<b>23.7%</b>	<b>3,843</b>	<b>76.3%</b>
Hysterectomy	1,131		728	64.4%	403	35.6%
Other excision of cervix and uterus	729		21	2.9%	708	97.1%
Dilatation & curettage (diagnostic & other)	728		64	8.8%	664	91.2%
Other diagnostic procedures; female organs	799		‡	0.0%	‡	100.0%
Ligation of fallopian tubes	593		127	21.4%	466	78.6%
<b>Operations on the Male Genital Organs</b>	<b>3,977</b>	<b>5.5%</b>	<b>3,187</b>	<b>80.1%</b>	<b>790</b>	<b>19.9%</b>
Circumcision	3,303		3,059	92.6%	244	7.4%
Transurethral resection of prostate (TURP)	323		101	31.3%	222	68.7%
<b>Operations on the Integumentary System</b>	<b>2,815</b>	<b>3.9%</b>	<b>348</b>	<b>12.4%</b>	<b>2,467</b>	<b>87.6%</b>
Procedures on the breast	971		77	7.9%	894	92.1%
Debridement of wound, infection, or burn	881		209	23.7%	672	76.3%
<b>Operations on the Nervous System</b>	<b>2,870</b>	<b>4.0%</b>	<b>116</b>	<b>4.0%</b>	<b>2,754</b>	<b>96.0%</b>
Decompression of peripheral nerve	2,348		‡	0.0%	‡	100.0%
Laminectomy	151		98	64.9%	53	35.1%
<b>Obstetrical Procedures</b>	<b>2,686</b>	<b>3.7%</b>	<b>2,635</b>	<b>98.1%</b>	<b>51</b>	<b>1.9%</b>
Cesarean section	2,474		‡	100.0%	‡	0.0%
<b>Operations on the Nose; Mouth; Pharynx</b>	<b>2,417</b>	<b>3.3%</b>	<b>44</b>	<b>1.8%</b>	<b>2,373</b>	<b>98.2%</b>
Tonsillectomy and/or adenoidectomy	1,618		‡	0.0%	‡	100.0%
<b>Operations on the Urinary System</b>	<b>1,320</b>	<b>1.8%</b>	<b>106</b>	<b>8.0%</b>	<b>1,214</b>	<b>92.0%</b>
Transurethral procedures	559		43	7.7%	516	92.3%
<b>Operations on the Ear</b>	<b>1,063</b>	<b>1.5%</b>	<b>‡</b>	<b>0.0%</b>	<b>‡</b>	<b>100.0%</b>
Myringotomy	968		‡	0.0%	‡	100.0%
<b>Other Operations</b>	<b>2,248</b>	<b>3.1%</b>	<b>436</b>	<b>19.4%</b>	<b>1,812</b>	<b>80.6%</b>

\*Colorado, North Carolina, Vermont, Wisconsin

‡Cells with 10 cases or fewer have been suppressed. Resulting percentages of 0% and 100% are approximate.

## Discussion

Research on the volume and types of surgery in CAHs is limited.<sup>8,9</sup> In this brief we show that 91.5 percent of CAHs across the four states performed major surgical procedures in 2011 (inpatient, outpatient, or both). The only other estimate we found reported 85 percent in 2008 (or, 15 percent of CAHs performed no surgeries).<sup>8</sup> We found that on average, CAHs in these four states performed 678 major surgical procedures in 2011, of which 156 were inpatient and 522 were outpatient. Importantly, we show that a high proportion of surgical volume in CAHs is performed in the outpatient setting on a same-day surgery basis. The high correlation between outpatient and inpatient surgery volume indicates that CAHs are performing surgical services in both settings, and not specializing in one or the other. This 3:1 ratio of outpatient-to-inpatient procedure volume is not reported in most of the literature on surgery in rural hospitals, leading to conclusions drawn from inpatient surgery misrepresenting the volume and variety of procedures performed. The types of procedures that were routinely performed in the outpatient setting and which account for a significant proportion of all surgeries are operations on the eye, operations on the musculoskeletal system, and operations on the digestive system. These three types of operations consistently accounted for the majority of all surgery volume in CAHs among the four states analyzed. Our results indicate that those CAHs that have ambulatory surgery capacity in place are able to extend their service provision beyond inpatient procedures and offer an array of elective surgeries performed on a same-day basis, mitigating a portion of the financial burden associated with providing 24/7 inpatient care. CAHs offering outpatient procedures that complement inpatient surgical capacity are providing the communities they serve significant and valuable services through access to both convenient and emergent surgical care services that lessen many of the health care burdens associated with travel for surgery and follow-up care.

## Notes

1. Fast Facts on US Hospitals. American Hospital Association. <http://www.aha.org/research/rc/stat-studies/fast-facts.shtml>.
2. Rural Assistance Center, Health and Human Services Information for Rural America. Critical Access Hospitals FAQ. <http://www.raconline.org/topics/critical-access-hospitals/faqs#howmany>.
3. Healthcare Cost and Utilization Project State Inpatient Databases. 1990-2012. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/sidoverview.jsp>.
4. Healthcare Cost and Utilization Project State Ambulatory Surgery Databases. 1997-2012. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/sasoverview.jsp>.
5. American Hospital Association Annual Survey. <http://www.aha.org/research/rc/stat-studies/data-and-directories.shtml>.
6. Healthcare Cost and Utilization Project Clinical Classifications Software 2014 Users Guide. July 2014. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/CCSUsersGuide.pdf>.
7. Of the CAHs with OR discharge records, there are three states where a number of CAHs had fewer than 10 discharges total in 2011. In NC, there were three CAHs that performed fewer than 10 surgery procedures; in CO, two; in WI, one.
8. Holmes GM, Karim SA, Pink GH. Trends in the provision of surgery in rural hospitals. North Carolina Rural Health Research & Policy Analysis Center, Findings Brief, July 2011. [http://www.shepscenter.unc.edu/rural/pub\\_findings.html](http://www.shepscenter.unc.edu/rural/pub_findings.html).
9. Flex Monitoring Team. Scope of services offered by Critical Access Hospitals: Results of the 2004 national CAH survey. Flex Monitoring Team Briefing Paper No. 5, March 2005. <http://www.flexmonitoring.org/publications/bp5/>.