Original Communication; General surgery at rural hospitals: a national survey of rural hospital administrators; (2008) 143 SURGER 5 599-606

May 2008

Section: Pgs. 599-606 Vol. 143 No. 5 ISSN: 0039-6060

Length: 4031 words

History: Accepted: November 21, 2007

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Body

ABSTRACT

Many rural residents have limited access to surgical care. Rural hospitals frequently struggle to provide surgical services due to workforce shortages and financial constraints. The purpose of this study is to describe rural hospital administrators' perceptions regarding the state of their general surgery programs and the impact that providing surgical services has on their hospitals' financial viability.

A 12-item survey was mailed to a random sample of national rural hospital administrators (n=233). One hundred and eleven surveys were completed, yielding a response rate of 48%. In addition to overall descriptive analyses, comparisons were made between hospitals located in large versus small rural communities.

Eighty-three percent of rural hospital administrators perceived their surgical program to be very important to the financial viability of their hospital and stated that they would reduce services if the hospital were to lose its surgery program. Thirty-four percent of hospitals have a surgeon leaving within the next 2 years and more than one-third of hospital administrators are currently searching for a surgeon.

Surgical care is a vital component of the health care services delivered by rural hospitals. Surveyed administrators' view the ability to provide surgical services as crucial to the financial viability of their rural hospitals. A shortage of general surgeons is a potential major threat to these rural hospitals.

FULL TEXT

Many residents living in rural areas have more difficulty accessing health care than those living in nonrural areas. Despite the fact that 20% of the US population resides in rural communities, just 9% of physicians practice in these areas and general surgeons in particular appear to be in short supply in small rural towns. [123233] Thompson et al [4]

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[1] 1. Agency for Healthcare Research and Quality. Health care disparities in rural areas. Selected findings from the 2004 National Healthcare Disparities Report. AHRQ Publication No. 05-P022, Rockville, MD. 2005. Available at: http://www.ahrq.gov/research/ruraldis/ruraldispar.htm. Accessed on October 13, 2006.

[2] 2. J. van Dis; Where we live: Health care in rural vs urban America; JAMA; Vol. 287, (2002), p. 108.

found that the number of general surgeons per 100,000 in small/isolated rural areas was 4.67 as compared with 7.71 in large rural towns and 6.53 in urban centers. While there is some question as to whether there is a shortage of general surgeons nationally, there are clearly fewer surgeons practicing in small and remote rural areas. [566] This may be in part due to such perceived drawbacks as professional isolation, frequent on-call responsibilities, and inadequate coverage for vacation time. [7] More than 70% of newly graduating general surgeons currently continue on for fellowship training following residency, leaving even fewer surgeons to practice rurally. [899]

Surgeons are in high demand at many rural hospitals as shown in the results of one survey of rural New York State hospital administrators where 42% indicated that they were currently recruiting a surgeon and 64% of those searching had been doing so for more than 1 year. [10] Although the overall number of rural surgeons has remained fairly constant over the past 10 years, the general surgical workforce on the whole is aging and fewer new surgeons are choosing to practice in rural areas. Therefore it appears likely that the supply will not be adequate to replace those surgeons who will be retiring. [4111212]

Poor access to surgical care has a broader impact on rural health care services than is generally acknowledged. Because surgical services are an integral component of comprehensive health care systems, lack of access to surgical services in rural communities can adversely affect overall quality of care for rural residents. For example, in the absence of a surgeon, medical conditions for which "surgical backup" is required can no longer be managed locally. Examples of such conditions are diverticulitis, soft tissue infections, and gastrointestinal bleeding. Also, when patients are forced to travel to regional medical centers for surgical treatment, preparation for surgery and coordination of post-operative care can be difficult.

The absence of surgical services in rural hospitals can also have an important indirect effect on overall access to medical care in rural areas. Insofar as surgical services contribute a disproportionate share of hospital revenues, their presence provides important financial stability for otherwise vulnerable small rural hospitals. [13] Maintaining financial viability is a major concern for rural hospitals, many of which operate from year-to-year hoping that limited

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[3] 3. L.G. Hart, E. Salsberg, D.M. Phillips, D.M. Lishner; Rural health care providers in the United States; J Rural Health; Vol. 18, S; (2002), pp. 211-232.

[4] 4. M.J. Thompson, D.C. Lynge, E.H. Larson, P. Tachawachira, L.G. Hart; Characterizing the general surgery workforce in rural America; Arch Surg; Vol. 140, (2005), pp. 74-79.

[5] 5. A.C. Powell, D. McAney, E.F. Hirsch; Trends in general surgery workforce; Am J Surg; Vol. 188, (2004), pp. 1-8.

[6] 6. ACS Health Policy Steering Committee; Statement on the surgical workforce; Bull Am Coll Surg; Vol. 92, (2007), pp. 34-35.

[7] 7. S.J. Heneghan, J. Bordley, P.A. Dietz, M.S. Gold, P.L. Jenkins, R.J. Zuckerman; Comparison of urban and rural general surgeons: Motivations for practice location, practice patterns and education requirements; J Am Coll Surg; Vol. 201, (2005), pp. 732-736.

[8] 8. L. Fernandez-Cruz; General surgery as education, not specialization; Ann Surg; Vol. 240, (2004), pp. 932-938.

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[11] 11. J.J. Stevermer, G.J. Supattanasiri, H. Williamson; A survey of general surgeons in rural Missouri: Potential for rapid decrease in work force; J Rural Health; Vol. 17, (2001), pp. 59-62.

[12] 12. National Resident Matching Program Internet Website. 2006. Available at http://www.nrmp.org/res_match/tables/table5_06.pdf. Accessed on October 13, 2006.

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revenue will cover expenses. [14][15] Furthermore, rural hospitals are crucial to the economic well-being of their communities and the closure of a region's sole hospital can have serious short and long-term negative consequences for the local economy. [16][17][18] The majority of surveyed rural hospital administrators in a 2005 Illinois study strongly agreed with the statement that health care is a major part of local economic development. [17] Regarding local employment, several studies have shown that jobs from local health care organizations may comprise up to 10–20% of total employment in a rural community. [19]

Unfortunately, little attention has been given to the disparity in access to surgical care for rural versus urban Americans, [20] because most resources have been focused on improving access to other health care services such as primary care, mental health, and dental services. [1] In an effort to increase the limited knowledge available on this subject, we surveyed rural hospital administrators to gain an understanding of their views regarding the value of local surgical services and the gravity of the perceived threat of loss of their surgeons. In particular, we tested the hypotheses that hospital administrators value the ability to provide surgical care, view surgical care as important to rural hospitals' financial viability, and perceive workforce shortages as negatively affecting rural hospitals' ability to provide surgical services.

Material and methods

Sample

To create the sampling frame, a list of administrators at rural hospitals in the United States was obtained from the American Hospital Association's Healthcare Database. Rural designation was determined using rural urban commuting area (RUCA) codes. These codes classify US census tracts using measures of population density, urbanization, and daily commuting patterns. The most recent RUCA codes are based on data from the 2000 census and 2004 zip codes. The classification scheme delineates communities into metropolitan, large rural, small rural and isolated small rural commuting areas based on the size and direction of the primary commuting flows. [21]

Rural hospitals identified for inclusion in this study were defined as those located in towns with RUCA codes between 4 and 10 (excluding 4.1, 5.1, 7.1, 8.1 and 10.1 which for research and policy purposes are considered to be urban-focused areas). [21] Communities in these areas have populations ranging from 10,000 to 50,000 in large rural areas, 9,999 to 2,500 in small rural areas and less than 2,500 in isolated small rural areas. Although RUCA codes were used to select the rural hospitals for this survey, in order to maintain confidentiality we did not link

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[14] 14. I. Moscovice, J. Stensland; Rural hospitals: trends, challenges, and a future research and policy analysis agenda; J Rural Health; Vol. 18, S; (2002), pp. 197-210.

[15] 15. S. Dihoff, J.S. Spade; The special role for rural hospitals in meeting the needs of their communities; N C Med J; Vol. 67, (2006), pp. 86-89.

[16] 16. Ormond BA, Wallin, S Goldenson SM. Supporting the rural health care safety net. The Urban Institute, ed. 2000 Occasional Paper No. 36.

[17] 17. G.M. Holmes, R.T. Slifkin, R.K. Randolph, S. Poley; The effect of rural hospital closures on community economic health; Health Serv Res; Vol. 41, (2006), pp. 467-485.

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[19] 19. G.A. Doekesen, T. Johnson, C. Willoughby; Measuring the economic importance of the health sector on a local economy: A brief literature review and procedures to measure local impacts; Southern Rural Development Center SRDC 202, Mississippi State University (1997), .

[20] 20. S.R.G. Finlayson; Surgery in rural America; Surg Innovation; Vol. 12, (2005), pp. 299-305.

[21] 21. WWAMI Rural Health Research Center. RUCA Data: Using RUCA. University of Washington, Seattle, WA. Available at: http://depts.washington.edu/uwruca/uses.html. Accessed on August 21, 2007.

specific RUCA codes with individual surveys. Therefore community population size as reported by the hospital administrators was used to determine the parameters of the three rural categories.

A total of 2,166 rural hospitals meeting these criteria were identified and 233 were randomly selected for the survey. The sample size of 233 was chosen in order to detect a difference in the proportion of hospitals that would be forced to close as a result of losing their surgical program in small versus large rural areas. Pilot data indicated that this difference was approximately .27 (.44 in small versus .17 in large hospitals). It was estimated that a final sample size of 140 would provide power of .93 in order to detect this difference. An anticipated participation rate of 60% resulted in the estimation of an initial sample size of 233 hospitals.

Survey

After Institutional Review Board approval, a 12-item survey instrument was developed based on one used previously to survey rural hospital administrators in New York State. [12] The research team revised the content and methodology used in the current survey based upon the findings obtained from the earlier one. Additionally, a focus group of rural hospital administrators at a national rural health meeting held in 2005 reviewed the survey and provided feedback that was incorporated into the final version. The survey instrument comprised questions addressing several different topic areas including community and hospital demographics, surgical staffing patterns, types of surgical services offered (inpatient, outpatient, or both) and impact of providing surgical care on the economic health of the hospital. (see Appendix)The survey was mailed to hospital administrators (chief executive officers, presidents, and directors) during the spring of 2005 with a follow-up reminder postcard sent 6 weeks after the first mailing to those not initially responding. In cases where these methods were unsuccessful, telephone calls were made in the fall of 2005 to contact non-responding administrators and they were given the option of completing the survey over the telephone or returning a copy by fax. One hundred and eleven surveys were received, 68 by mail and 42 by telephone, yielding a response rate of 48%.

Data management and analysis

Comparisons were made between hospitals in very small, small, and large rural areas as defined by hospital administrators' self-report of population on the survey. For dichotomous variables, these comparisons were made using the normal approximation to the test of two independent binomial proportions. For the other categorical responses having more than two levels, the comparison was made using the Chi-square test. Comparison of the number of available surgeons between the 3 types of hospitals was made using the Wilcoxon Rank Sum Test. Continuous variables were used to compare hospitals located in larger versus smaller rural areas using the independent samples *t* test. Alternatively, if distributional assumptions were not satisfied, these comparisons were made using the Wilcoxon Rank Sums test.

Results

Demographics

One hundred and eleven surveys from a geographically representative sample of rural hospitals were completed and used in the final analysis yielding a response rate of 48%. Fifty-nine percent of all rural hospitals were designated as critical access hospitals (CAH). Those hospitals located in smaller communities were very different from those in larger communities with regard to numerous factors such as critical access status, number of beds, size of town and service area, and revenue (Table I). Specifically, based upon the administrators' self-reports, hospitals in smaller rural areas were much more likely to have CAH designation (78%), have far fewer staffed beds, and have significantly lower revenues. Hospitals in smaller towns relied more on outpatient services, deriving 60% of their total revenue from outpatient services compared with 54% for larger facilities.

Surgical workforce issues

With regard to surgical workforce issues, Table II shows that many rural hospitals face serious challenges meeting their current needs. While there are significant differences in the number of surgeons practicing at hospitals in smaller versus larger rural communities, in both cases a large percentage of surgeons are older than 50 years and one third of all rural hospitals have surgeons that are planning to leave in the next two years. Consequently, the same number of rural hospitals are currently recruiting a surgeon, and more than half report that it is more difficult to recruit a surgeon than a primary care physician. The median length of time it has taken to recruit a surgeon at rural hospitals is 12 months, with some facilities reporting searching for 2, 3, and even up to 4 years to fill a position.

With respect to anesthesia services, all hospitals located in large rural areas that have surgeons report having full-time anesthesia coverage while only 78% of hospitals in small rural areas provide this service. Additionally, 78% of hospitals that offer surgical care in small rural communities rely on certified registered nurse anesthetists (CRNAs) alone to provide anesthesia services as compared with 24% of hospitals located in large rural areas.

Financial value of surgical services

All administrators at hospitals in large rural areas and 75% of administrators at hospitals in small rural areas perceive the ability to provide surgical services as vital to the financial viability of their hospitals (Figure). Eighty-three percent of all the hospital administrators stated that the surgery program was very important to their hospital's financial viability. More than 80% believed that if the hospital lost its surgical program they would have to reduce services, and 12% stated that they would be forced to close the hospital if this were to occur.

Figure. Rural hospital administrators' responses to questions regarding financial importance of providing surgical service.

Discussion

Our findings show that surgery programs are a vital component of the health care services offered by rural hospitals. Most hospital administrators view the ability to provide surgical services as crucial to the financial viability of their rural hospital. Their ability to do so, however, is limited because of current and projected shortages of surgeons.

It appears that a significant number of hospitals are having difficulty recruiting and/or retaining a surgeon to practice in their rural community and this threatens their ability to offer surgical care. In terms of the rural surgical workforce, the increasing age of surgeons combined with the fact that fewer general surgery residents are choosing to practice in rural areas suggests that the shortage will only worsen in coming years. [4] Given that rural residents are also aging and that the rate and severity of trauma in rural settings is higher than in urban areas, the need for rural general surgeons will likely increase while the supply decreases. [222323]

One of the main reasons why there are fewer surgeons practicing in rural hospitals is that the workforce is aging and more surgeons are retiring without someone to replace them. Some future surgeons may chose not to practice rurally in part because they feel inadequately prepared to take on the diverse caseload that many rural surgeons encounter in their practice. [242525] A general surgeon is often the endoscopist, trauma surgeon, and critical care provider in a small rural hospital. Surgical residency training, however, is becoming more specialized as Residency

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[22] 22. F. Kwakwa, O. Jonasson; The general surgery workforce; Am J Surgery; Vol. 173, (1997), pp. 59-62.

[23] 23. O. Jonasson, F. Kwakwa, G.F. Sheldon; Calculating the workforce in general surgery; JAMA; Vol. 274, (1995), pp. 731-734.

[24] 24. W.P. Ritchie, R.S. Rhodes, T.W. Biester; Workloads and practice patterns of general surgeons in the United States, 1995-1997: A report from the American Board of Surgery; Ann Surg; Vol. 230, (1999), pp. 533-543.

[25] 25. J. Landercasper, M. Bintz, T.H. Cogbil, S.L. Bierman, R.R. Buan, J.P. Callaghan, et al.; Spectrum of general surgery in rural America; Arch Surg; Vol. 132, (1997), pp. 494-497.

Review Committee for Surgery resident case log data show that the number of GYN, orthopedic, and urological procedures performed by general surgical residents declined sharply between 1999 and 2005. [26]

Additionally, there are very few training programs that are either located in rural areas or offer a rural training track. [27] Programs that train residents in rural settings have been shown to produce primary care physicians who are more likely to practice in rural areas. [28] This likely is because they provide exposure to and experience in managing typical cases seen in rural practice and allow them to develop of a sense of what it is like to practice and live in a rural community. Increasing the number of general surgery residency programs that offer rural training experience is one means for addressing the rural surgery workforce shortage; however, more action is needed to develop other innovative ways to address this increasing problem.

The vast majority of rural hospitals surveyed rely heavily on the ability to provide surgical services as 83% of administrators in this study stated they would be forced to reduce services if they lost their surgical program. While a portion of the reduction in services forecasted by administrators in the current survey would be a direct result of not performing surgical cases, even more deleterious would be the loss of downstream revenue from associated services such as radiology and pharmacy. Additionally, patients who leave their local area to seek care at a larger distant hospital may obtain other health care services there as well, contributing to further losses for the smaller local rural hospital.

These results confirm earlier research demonstrating the financial importance of surgery programs to rural hospitals. [13] In the previously cited study of rural hospital administrators in New York State, 87% stated that they perceived the ability to provide surgical services as critical to the financial viability of their hospital and 40% asserted that their hospital would close if they were unable to offer surgical care. [10]

Many rural hospitals have been struggling financially over the past decade, during which time 186 rural hospitals closed and 34% had negative total financial margins. [29] When hospitals struggle financially or close, the community suffers since many rural towns rely on their local hospital economically. In addition to providing a large source of employment, financially stable and sound hospitals tend to attract new residents or businesses and the jobs that they bring with them. [16] In smaller rural areas where the population base and/or resources to support a comprehensive surgery program may not exist, limited surgical services (eg, outpatient surgery) may still provide significant benefit. More research is needed to examine the range of surgical services currently offered at hospitals in various rural settings to help determine what delivery models might be most appropriate.

Our survey results should be interpreted with caution given the relatively low response rate. The hospital administrators who responded to the survey may have been more concerned about the provision of surgical care at their rural hospital than those who did not respond. In addition, the hospital administrators' perceptions regarding the effect that their surgical program has on their hospital's financial health may be different than the actual situation.

It is clear from the results of this survey that a significant number of rural hospitals rely on surgical services to provide a substantial portion of their hospital's revenue. Presently, many rural hospitals also appear to have difficulty providing surgical services and the situation could easily worsen in the future. Recruiting and retaining

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[26] 26. Accreditation Council for Graduate Medical Education. Residency Review Committee for Surgery Case Log Statistical Reports. Available at: http://www.acgme.org/residentdatacollection/documentation/statistical_reports.asp. Accessed on August 20, 2007.

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[28] 28. R.G. Brooks, M. Walsh, R.E. Mardon, M. Lewis, A. Clawson; The roles of nature and nurture in the recruitment and retention of primary care physicians in rural areas: A review of the literature; Acad Med; Vol. 77, (2002), pp. 790-798.

[29] 29. American Hospital Association and The Lewin Group; Challenges facing rural hospitals; TrendWatch; Vol. 4, (2002), p. 1.

appropriately trained surgeons to practice in rural areas is an ongoing problem, yet it must be addressed in order to assure that rural residents have access to high quality surgical care.

There are several potential solutions to the problem of surgical staffing in small rural hospitals including changes in public policy, surgical training, and the structure of surgical practice. Given that free market principles operate in our health care system, financial incentives would likely help. Strengthening the fiscal condition of small hospitals would allow them to provide more financial incentives to surgeons. In addition, payer reimbursement disparities could be adjusted to provide better compensation for surgical services in rural areas. With regard to surgical training, the methods by which surgeons are currently trained could be adjusted to prevent the demise of general surgery. This could include developing a general surgery "sub-specialty" encompassing broader training in the varied surgical procedures that small rural hospitals need their surgeons to provide. Finally, rural hospitals could develop innovative collaborative relationships between their surgeons and tertiary care centers to help ameliorate the problem of professional isolation.

Appendix Mithoefer Center for Rural Surgery National Hospital Administrators' Survey

First we would like to know about your hospital

1.Can you tell us the **total number of beds** in your hospital?

Licensed_____Staffed_____

2.Please tell us the **size of the community** where your hospital is located.

Population of town_____Population of service area_____

3.Please tell us the **Critical Access** status of your hospital.

Next please tell us about your staff

4a.For each of the following, can you tell us the total number of surgeons (including sub-specialists) that practice at your hospital?

4b.Of the surgeons listed above, are any **employed by your hospital**? If so, which one(s)?

5a.Please tell us if you have any **surgeons planning to leave or retire** in the next two years? If so, when will they be leaving?

Yes, number of months_____No

5b.How many **surgeons have left or retired** in the past two years?_____

6a.Please tell us if your hospital has been **recruiting a general surgeon and how long** it has taken.

Yes, number of months_____No

6b.How difficult has it been for your hospital to **recruit a surgeon versus a family or internal medicine physician?**

More difficult to recruit a surgeonEasier to recruit a surgeon

About the same difficulty

7a.Do **physicians other than surgeons** who have completed surgical residencies **perform any surgical procedures** (in an operating room under general anesthesia) at your hospital?

YesNo

7b.If yes, please **list the physician specialty** (i.e. family practice or internal medicine), the **type of procedure**, and **how the physician would feel about a general surgeon performing the procedure** instead of them.

Now please tell us about your surgical services

8.Can you tell us which of the following **types of surgical services** your hospital offers?

Inpatient surgery onlyOutpatient surgery only

Both inpatient and outpatient surgery

9a.Do you have **24-hour, 7 days per week anesthesia coverage** at your hospital?

YesNo

9b.Please tell us **who provides** your **anesthesia services**.

AnesthesiologistNurse AnesthetistBoth

Please give us the following financial information about your hospital

10.How would you **rate the importance of a surgical program to the financial viability** of your hospital?

Very ImportantSomewhat ImportantUnimportant

11.If your hospital **lost its surgical program,** which of the following **changes** would result?

Reduce servicesClose hospitalNo changes

12.Please tell us your hospital's **total gross revenue (hospital charges) for the fiscal year 2004.**

Total $_____Inpatient $_____Outpatient $ _____

If you have any comments, please share them on the back of this page. Thank you very much for your help!

TABLES

Table I

Question	Hospitals in small rural areas†‡ (n = 77)	Hospitals in large rural areas†‡ (n = 34)	Hospitals in all rural areas†‡ (n = 111)
Critical Access Hospital*	78%	15%	59%
Number of beds*			
Licensed (median)	25	105	25
Staffed (median)	12	75	25
Population*			
Town (median)	3,800	17,376	6,000
Service area (median)	16,000	55,000	25,000
Revenue*			
Inpatient - median (%)	$5,877,370 (40%)	$23,585,514 (46%)	$10,000,000 (41%)
Outpatient -	$10,686,656 (60%)	$34,032,861 (54%)	$14,000,000 (59%)

Question	Hospitals in small rural areas†‡ (n = 77)	Hospitals in large rural areas†‡ (n = 34)	Hospitals in all rural areas†‡ (n = 111)
median (%)			
Total (median)	$16,854,337	$60,828,483	$23,751,697

Rural hospital demographics

*Statistically significant difference <.05 between hospitals located in small versus large rural areas.

†Population based on hospital administrators' self-report on survey.

‡Hospitals in small rural areas ≤ 9,999 population, hospitals in large rural areas = 10,000–50,000 population.

Table II

Question	Hospitals in small rural areas†‡ (n = 77)	Hospitals in large rural areas†‡ (n = 34)	Hospitals in all rural areas†‡ (n = 111)
Number of full-time surgeons (median)*	1	9	2
Number of full-time board certified general surgeons (median)*	1	3	1
Number of surgeons older than 50 years (median)*	1	4	2
Hospitals having a surgeon leaving in next two years*	27%	48%	34%
Hospitals recruiting a surgeon*	28%	53%	36%
Length of time to recruit a surgeon (median months)	9	12	12
Hospitals with surgeons having full-time anesthesia coverage*	78%	100%	86%
CRNA only anesthesia service provider in hospitals with surgeons*	78%	24%	59%

Surgical workforce at rural hospitals

CRNA, certified registered nurse anesthetist.

*Statistically significant difference <.05 between hospitals located in small versus large rural areas.

†Population based on hospital administrators' self-report on survey.

‡Hospitals in small rural areas ≤ 9,999 population, hospitals in large rural areas = 10,000–50,000.

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Classification

Language: ENGLISH

Document Type: Full-length article

Publication Type: Other (Journal)

Journal Code: YMSY

Subject: RURAL COMMUNITIES (95%); HEALTH CARE ACCESS (90%); RURAL HEALTH (90%); VULNERABLE HEALTH POPULATIONS (90%); PHYSICIANS & SURGEONS (90%); POPULATION SIZE (90%); HEALTH CARE POLICY (89%); PROFESSIONAL WORKERS (89%); PHYSICIAN FELLOWSHIPS & RESIDENCIES (78%); HEALTH CARE PROFESSIONALS (78%); TRENDS (75%); HEALTH CARE INDUSTRY TRENDS (73%); OUTPUT & DEMAND (71%); LABOR SHORTAGES (71%); EMPLOYMENT TRENDS (63%)

Industry: HEALTH CARE ACCESS (90%); (90%); HEALTH CARE (90%); PHYSICIANS & SURGEONS (90%); HEALTH CARE POLICY (89%); PHYSICIAN FELLOWSHIPS & RESIDENCIES (78%); HEALTH CARE PROFESSIONALS (78%); HOSPITALS (78%); PHYSICIAN PRACTICES (77%); HEALTH CARE INDUSTRY TRENDS (73%)

Geographic: NEW YORK, USA (79%); MARYLAND, USA (79%); UNITED STATES (94%)

Load-Date: May 28, 2008

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