The Scope and Distribution of Imaging Services at Critical Access Hospitals

Amir A. Khaliq, PhD[a], Eugene Nsiah, MSc[b], Nadia H. Bilal, ScM[b], Danny R. Hughes, PhD[b,d], Richard Duszak Jr, MD[b,c]

Purpose: The purpose of this study was to better understand the availability and scope of imaging services at critical access hospitals (CAHs) throughout the United States.

Methods: Recent American Hospital Association (AHA) annual survey data (containing 1,063 variables providing comprehensive information on organizational characteristics and availability of various services at 6,317 hospitals nationwide) and US census data were merged. Imaging survey data included mammography, ultrasound, CT, MRI, single photon emission CT, and combined PET/CT. Availability and characteristics of imaging services at the 1,060 CAHs in 45 states for which sufficient data were available were studied.

Results: Mammography, ultrasound, and some form of CT were the most widely available of all imaging services, but were available in all CAHs in only 13%, 33%, and 56% of all states, respectively. In no states were ≥64-slice CT, MRI, single photon emission CT, and combined PET/CT available in all CAHs.

Conclusions: An overall scarcity of access to imaging services exists at CAHs throughout the United States. With 19.3% of the US population residing in rural areas and almost entirely dependent on CAHs for health services, the policy implications for imaging access could be profound. Further research is necessary to investigate the effect of imaging access on CAH patient outcomes.

Key Words: Medical imaging, critical access hospitals, rural health, patient access

J Am Coll Radiol 2014;■:■-■.

INTRODUCTION

The Medicare Rural Hospital Flexibility Program allows a hospital to receive the critical access hospital (CAH) designation if it: (1) is located in a rural area of a state that has established a State Medicare Rural Hospital Flexibility Program; (2) provides 24-hour emergency care services using onsite or on-call staff; (3) has no more than 25 inpatient beds; (4) has an average annual length of stay of ≤96 hours; and (4) is located either >35 miles (or, in mountainous terrain, >15 miles) from the nearest hospital or is state certified as a "necessary provider" [1-5]. The United States had 41 CAHs at the beginning of the program in 1999. By March 2011, the number had increased to 1,327 [3], and to 1,332 as of June 2013 [6]. As an incentive to provide care, CAHs are paid by Medicare on the basis of 101% of allowable and reasonable costs [1,2,5,7]. Private payers, however, are not required to reimburse at this rate, which may serve to limit the growth of CAHs in rural areas with relatively younger, healthier, non-Medicare populations.

Imaging services are an integral component of essential services that rural and remote populations need on a regular basis. By definition, CAH designation is an important mechanism to enhance access to services for populations that would otherwise not have access to any other source of care in a specified geographic area [8,9]. CAH funding mechanisms have not only improved access to imaging services for many patients but also seem to have resulted in shifting Medicare costs from larger inpatient hospitals to smaller ones, including CAHs [9,10]. Despite such initiatives, access to advanced imaging at CAHs remains a challenge. Joynt et al, for example, reported that in 2009, only 2.4% of CAHs had PET scanners, as opposed to 21.4% of non-CAH hospitals [7].

In expanding services, some CAHs may appear to focus first on services that have greater revenue potential and only secondarily consider services that target community needs [10,11]. However, financial viability and

[a]Department of Health Administration and Policy, University of Oklahoma Health Sciences Center, College of Public Health, Oklahoma City, Oklahoma.

[b]Harvey L. Neiman Health Policy Institute, Reston, Virginia.

[c]Department of Radiology and Imaging Sciences, Emory University School of Medicine, Atlanta, Georgia.

[d]Department of Health Administration and Policy, George Mason University, Fairfax, Virginia.

Corresponding author and reprints: Amir A. Khaliq, PhD, Department of Health Administration and Policy, University of Oklahoma Health Sciences Center, College of Public Health, 801 NE 13th Street, Oklahoma City, OK 73104-5072; e-mail: amir-khaliq@ouhsc.edu.

Dr. Khaliq's research was supported by a research grant from the Harvey L. Neiman Health Policy Institute.

1546-1440/14/$36.00 • http://dx.doi.org/10.1016/j.jacr.2014.02.013

meeting community needs are not necessarily competing strategies. In a 2004 survey of 474 CAHs, Hartley and Loux of the Flex Monitoring Team found that 100% of the respondents offered radiology services, and 189 had added or expanded radiology services since 2002 [10]. The most common reason cited for adding or expanding radiology services was the desire to meet community needs (26%), followed by the availability of staff (23%) and quality of care (16%). The potential for increasing revenue was the least commonly cited reason (8%).

Other than reports from the same group, information is limited regarding the availability and spectrum of imaging services at CAHs. More importantly, almost no information is available on the characteristics of CAHs that offer various kinds of imaging services as opposed to those that do not, creating an important information gap that is relevant to both state and federal policymakers. The current study was conducted to help fill that gap by providing information about the proportion and characteristics of CAHs in various states that offer a range of imaging services. Further, the study was intended to shed light on how the scope and spectrum of imaging services offered at CAHs differ among states with varying proportions of rural populations. We also sought to compare the characteristics and imaging services offered by CAHs that are standalone compared to those in multi-organization systems or networks. To our knowledge, such a comparison has not been previously examined in the literature.

Specifically, the study was designed to test the following two general hypotheses:

- Hospitals that are participants in a multi-organization system or network are more likely than standalone CAHs to offer imaging services such as mammography, CT, and MRI.
- Hospitals with greater resources, such as more licensed beds, more full-time equivalent (FTE) physicians, more FTE personnel, and greater total facility expenses are more likely to offer imaging services such as mammography, CT, and MRI than CAHs with fewer resources.

The first hypothesis is based on the rationale that CAHs affiliated with a larger system attain the ability to compensate for fewer resources by gaining access to the resources of a larger entity. The rationale for the second hypothesis lies in the argument that hospitals with more resources have greater ability to take risks, afford more expensive technologies, and offer more prestigious services than smaller facilities with fewer resources.

As the issue of compromised or reduced access to health services in underserved communities has increasingly been a part of healthcare reform discussions, identification of gaps in the availability of imaging services at CAHs across the country can make an important contribution to our understanding of the magnitude of this problem. Given the scant attention given to this issue for underserved populations, we believe the current findings will help pave the way for future research. This information can also guide policymakers in allocating key resources.

METHODS

We acquired the most recent (2011) American Hospital Association (AHA) Annual Survey Database and used this as the basis for the current study. The database contains information obtained directly from 6,317 US hospitals on nearly 1,063 data elements including facility characteristics, service lines, staffing resources, expenses, and organizational structure [12]. The dataset not only covers detailed information on the spectrum of imaging services available, but specifically allows identification of CAHs. Of all 6,317 hospitals in the AHA database, 1,319 hospitals (20.9%) were designated as CAHs. We linked the availability of imaging services with the demographic characteristics and socioeconomic conditions of each CAH using the most recent complete (2010) US census data [13].

The AHA survey contained two "yes/no" questions inquiring whether hospitals were: (1) members of a multi-hospital system; or (2) affiliated with a health care network. Because we were interested in comparing standalone CAHs with those that were part of a larger or multi-unit entity, we classified CAHs answering "no" to both of these questions as "standalone hospitals." We further created a category titled "network participating CAH," which included all CAHs answering affirmatively to either of the two questions. Of the 1,319 CAHs in the database, 173 did not respond to either of these questions and were removed from the analysis. Of the remaining 1,146 CAHs, 86 did not answer any of the survey questions related to imaging services and were also removed. The resulting final sample of 1,060 CAHs was comprised of 386 standalone facilities and 674 network-participating CAHs.

Imaging services identifiable in the AHA database included mammography, ultrasound, CT, MRI, single photon emission CT (SPECT) and combined PET/CT. Specifically, identifiable service subtypes included endoscopic ultrasound and $<$64- versus $\geq$64-slice CT, but many other service subtypes (eg, contrast versus noncontrast, magnet strength) were not included in this database.

Using the final sample, we examined the distribution of CAHs across all states and the availability of imaging services in CAHs in each state. Student's t tests were performed to investigate whether there were significant differences between the means of imaging services offered at standalone versus network-participating hospitals. Similarly, t tests for differences in population means were performed to examine whether there are significant differences in hospital characteristics of CAHs that offer specific imaging services and those that do not. All P values were 2-sided, and statistical significance was defined as $P < .05$. The analyses were