Radiology Practice Environment: Options, Variations, and Differences—A Report of the ACR Commission on Human Resources

Sharon C. Dutton, MD, MPH\textsuperscript{a}, Gordon K. Sze, MD\textsuperscript{b}, Philip L. Lund, MD\textsuperscript{c}, Edward I. Bluth, MD\textsuperscript{d}

Radiologists today practice in diverse environments in addition to the traditional private practice model. Practice environments are evolving at a rapid rate, and the ACR Commission on Human Resources previously detailed the distribution of radiologists in practice in its workforce survey. Here, the commission describes the key practice options available and illustrates important differences in physician autonomy, efficiency, productivity, and subspecialty versus general practice among the practice environments. These attributes can in turn be useful to radiologists in deciding what type of work environment to seek.

Key Words: Radiology practice environment, physician autonomy, subspecialty radiology


INTRODUCTION

The past 10 years have seen dramatic shifts in the practice environment of radiologists. In the past, the vast majority of radiologists were in private practice. Now there are a considerable number of practice options. In 2012 and 2013, the ACR Commission on Human Resources Workforce Survey reported the distribution of radiologists in practice, and 41% to 54% of radiologists responded that they were in private practice, 19% to 21% were in academic or university practice, 10% were hospital employees, and <10% were employed by corporations or the federal government in US Department of Veterans Affairs (VA) or military medicine\textsuperscript{[1,2]}. The rise in imaging volume in the early part of the past decade, the shift of care delivery from the inpatient to the outpatient setting, the importance of subspecialization within imaging, the delayed retirement of radiologists, and the paucity of jobs have all driven changes in practice environment. Advances in digital imaging and information technology have facilitated the proliferation of teleradiology services to provide 24/7/365 interpretations to hospital systems around the country. National radiology groups have emerged, providing an extensive network of subspecialists for hospitals. The dramatic increase in imaging volume seen in the early 2000s, coupled with insufficient funding for research, has led to a deficit of academic radiologists\textsuperscript{[3]}. Hospital systems are also seeking to control imaging costs and are buying traditional private practice radiology groups to create large hospital systems with employed physicians to manage care in an accountable care organization environment\textsuperscript{[4]}. Consolidation is occurring even within private practice; radiology practices grew in size from 1990 to 2007 to provide the subspecialty expertise and leverage to work with larger health systems in a shared risk environment.

Within these diverse practice environments, core issues for radiologists such as autonomy, productivity, efficiency, and subspecialty expertise remain important. This article describes the different types of practice options available to radiologists, examines many of the issues related to radiology practice, and may provide guidance to radiologists choosing a preferred work environment.

HISTORICAL PERSPECTIVE

Historically, radiologists were hospital-based physicians providing direct patient care and departmental administrative oversight as salaried employees or as members of unincorporated entities paid by the hospital. In the 1960s
and 1970s, radiologists transitioned into an independent practice model facilitated by legislation that allowed licensed professionals to incorporate. In addition, the Health Care Financing Administration allowed the separation of technical and professional fees as components of radiology practice. These two factors encouraged radiologists to become more independent of hospitals, with separate compensation and benefit structures [5]. A fee-for-service system emerged with separate billing by radiologists in corporate entities, and this remains the prevailing mechanism for physician reimbursement throughout most of the United States today.

Because of the rising cost of health care, federal program changes have been enacted to cut costs, one of the first being to base payments to hospital systems on diagnosis-related groups. As a result, both managed care programs and large-scale outpatient imaging centers have proliferated in an effort to shift inpatient services to the less costly outpatient setting. In parallel with this shift from an inpatient to an outpatient focus in the delivery of high-technology health care, increased efficiency in workflow has allowed radiologists to perform and interpret complex examinations at a greater rate than ever before. The result was a double-digit increase in Medicare Part B physician payments for imaging services from 2000 to 2006 [6]. The rising cost of health care has prompted the federal government and payers to examine the traditional fee-for-service payment model and seek alternatives that reduce cost while preserving outcomes. Radiologists today practice in an environment of increasing scrutiny of medical imaging utilization, declining reimbursement, and increasing demands from multiple stakeholders in health care for greater efficiency, quality, and accountability as radiology providers.

**PRACTICE OPTIONS**

**Private Practice**

Private practice has been the prevailing practice model for radiologists, representing 41% of radiology practice environments in the 2012 ACR Commission on Human Resources Workforce Survey and 54% in the 2013 survey [1,2]. Private practice radiologists may own their own imaging equipment and collect both the technical and professional fees for radiology practice, or an independent group of radiologists may provide the professional component of radiology practice to a hospital that provides the imaging equipment. The private practice model allows physicians the greatest degree of autonomy to determine their own work schedules, benefit and compensation structures, and group governance. However, with the trend toward consolidation of small private practice groups to larger megagroups, the independence of individual physicians in decision making may be reduced and approach that of radiologists working in multispecialty groups. Private practice radiologists have also historically enjoyed the highest compensation rates in radiology practice. However, with greater income potential and autonomy comes greater financial risk and administrative burden. Radiologists in private practice must concern themselves with the management of a business that requires administrative duties in addition to routine clinical work. They do not have guaranteed levels of compensation but are dependent on the effective management of the practice, adequate imaging volume, and high productivity to maintain their salaries. Job security for radiologists in private practice is lower than historical norms as radiology becomes more embedded within health care systems. Private practice radiology groups are under threat of replacement by hospital-based radiologists in shared risk models and face competition for imaging with corporate radiology groups that provide teleradiology and subspecialty services. Private practice radiology flourished in the era of fee-for-service medicine but is less well poised for the transition to a more capitated form of health care reimbursement with bundled payments and decreased reimbursement.

**Hospital-based Practice**

Although only 10% of radiologists are currently hospital employees in the 2013 workforce survey, this trend is gaining momentum. Radiologists are becoming increasingly linked to hospitals in the delivery of health care. The most direct linkage occurs when a physician is directly employed by a hospital system or, in states where direct employment is not permitted, a physician is employed by a hospital medical foundation. A prominent example is the health care company Kaiser Permanente, which is an integrated managed care consortium providing care to its member patients through hospital-based employed physicians. Determinations of salary, benefits, and hiring and firing are generally centralized, as in large multispecialty practices. There is a corresponding loss of individual autonomy and a gain in security, as the patient population is guaranteed and competition is eliminated. Managed care organizations are well poised for the transition to a bundled-payment form of health care reimbursement. However, specialty physician compensation in this model may suffer as primary care physicians outnumber specialists within large organizations and costs are allocated over the entire spectrum of care.

**Academic or Medical School**

Academic radiology is characterized by the combined missions of patient care, teaching, and research. In academic or medical school practice, radiologists, particularly in larger hospitals, tend to be highly subspecialized and organized into sections based either on organ system (eg, neuroradiology) or on technology (eg, MRI). The department is headed by a chair, often with the help of vice chairs in charge of broad areas, such as clinical practice. The chair of an academic department is responsible for the “vision” and “mission” of the department. The chair thus has a very powerful role that
encompasses the daily operations of the department, resource allocation for salaries and staffing, and supervision of section chiefs. Section chiefs are responsible for running the individual sections, including research activities, clinical practice, and education in the respective subspecialties. Responsibilities for recruiting new faculty members are generally given to each section, with final approval and arrangements regarding compensation and benefits dependent on the chair. Radiologists in academic medicine are typically promoted on the basis of research and clinical activities and share a responsibility to educate residents and medical students. Opportunities for leadership are available to radiologists who serve in departmental administrative roles.

**Multispecialty or Academic Clinic**
In a multispecialty practice, radiologists are members of the whole large group, not simply the radiology department. Although in the past, many of these were partnerships, most of these groups are now foundation models with all physicians as employees. Determinations of salary, benefits, and hiring and firing are generally centralized. There is therefore a loss of autonomy but a gain in security because most are elected to senior membership status within the whole group, not simply the department. However, decisions regarding expansion and equipment purchases usually involve a more central authority and committee structure. Opportunities for more global leadership are available to radiologists who can serve in central governance roles. Depending on the institution, there can be considerable emphasis on academics. However, promotions and salaries are most commonly based on clinical productivity. Many of these multispecialty practices also have residency programs and may even have medical schools associated with their institutions, illustrating the considerable overlap among different radiology practice environments.

**Corporate Employees**
Corporate radiology groups have developed to provide hospitals with specialty radiology services and 24/7/365 radiology interpretation via teleradiology even in remote areas where access to radiologists is limited. Physicians are in salaried employment relationships with corporations, and generally the corporations set the standards of performance and efficiency and maintain control over scheduling, coverage, and income. Individual radiologists may also have little or no say over the type of imaging equipment used. Many of these corporate radiology groups take over existing hospital contracts that were previously serviced by local private practice radiology groups. In some cases, employment with the corporation is offered to the displaced radiologists. Working for a radiology corporation may afford specialty radiologists greater opportunity to work primarily in their areas of interest as opposed to private practice. How these large radiology corporations will work with hospital systems in the new health care reimbursement environment is still evolving.

**Government**
Government radiology practice represents a range of employment relationships, from active military service and civilian employment within the VA to county, state, and other federal agencies. In government medicine, physicians generally have salaried employment relationships that can insulate them from the realities of competition and practice management. Government radiologists work in diverse health care environments, ranging from large teaching hospitals to small outpatient clinics. VA radiologists have opportunities for teaching and research activities at large medical centers, similar to academic radiology. Compensation is based on rank, seniority, specialty, and reenlistment. Employment within the military or VA generally provides less autonomy for individual physicians compared with private practice but can offer more advanced leadership opportunities at an early stage than many civilian practice environments. Government radiologists should be well positioned to maintain job security in health care reform, as they are relatively protected from the business side of radiology practice and may be more accustomed to the realities of future medicine.

**AUTONOMY**
Physician autonomy is a core issue within the different radiology practice environments. To many, physician autonomy means that physicians have the freedom to provide treatments for patients according to their best judgment. However, this characterization is inadequate for radiology practice. Radiologists increasingly provide direct care to patients via rapid advancements in minimally invasive image guided interventions. In addition, radiologists provide consultative services to their physician peers and increasingly have a role in determining the appropriateness, quality, and safety of imaging services. Physician autonomy in the greater context extends beyond treatment decisions to include the broader control of the terms, conditions, and content of work and to organize the way care will be provided [7].

Radiologists in private practice historically have had a great deal of autonomy. They manage their own practices, dictate their own standards of performance and efficiency, and typically maintain control over scheduling and coverage. Radiologists have traditionally performed clinical services judged to be in the best interest of patients’ health, largely unrestricted by cost. The traditional fee-for-service payment mechanism compensates radiologists on the basis of the number of procedures performed [8]. However, because of the rising cost of health care, alternatives to the traditional fee-for-service payment system are looming. Given the attention by payers and the federal government to the economic impact of rising imaging costs, responses from
Payers include standardizing radiology protocols and interpretation and restricting medically unnecessary imaging volume [6]. As a result, even radiologists in private practice will be subject to restrictions of autonomy in terms of what procedures will be reimbursed by payers in the future. Furthermore, as the size of a private practice increases from a few doctors to a megapractice, individual physician autonomy decreases as the governance structure moves toward smaller boards with centralized decision making.

Radiologists who practice at academic universities and those in a multispecialty clinic, hospital, or corporate environment generally have less autonomy compared with those in private practice. There usually is a well-defined chain of command because they are part of a larger organization, typically with a hierarchical governance structure. Radiologists employed by hospitals, or those in accountable care organization environments with bundled payments across a continuum of care, will need to balance professional autonomy with the goals of the host institution. Risk sharing drives greater levels of cooperation between physicians and hospitals. Proponents of the accountable care organization model argue that physicians can enhance autonomy by taking an active role in designing new models of care with cost and quality metrics they are willing to be accountable for. Radiologists need to ensure adequate physician representation in governance to foster collaborative decision making in these new shared risk relationships. Part of the mission of care networks is to deliver quality care for patients. Radiologists have a unique role in providing direct care to patients, as well as recommending the appropriate use of imaging studies to their physician peers to enhance efficient and high-quality patient care. Radiologists need to ensure that they have a seat at the table as decisions are made regarding the optimal use of imaging across the continuum of care.

**EFFICIENCY AND PRODUCTIVITY**

Radiologists in all practice environments are faced with increasing demands from many stakeholders in the health system for better quality, service, and more accountability as providers of radiology services. Government and other payers are requiring hospitals to provide outcome measures that justify the cost of health care. The host institutions pass this expectation on to physicians, whether they are employees or independent physician groups. In the case of radiology, hospitals now seek to incorporate rigorous service standards into contracts with radiology groups. Important issues include report turnaround time, time between the request for and the completion of examinations, measures of patient and staff satisfaction, and resource use and efficiency [9]. Radiologists need to evaluate proposed standards to determine if they are reasonable and if there are adequate resources in terms of infrastructure, information technology, and staffing to support them. Optimal efficiency in radiology is not entirely physician controlled. High-quality PACS with voice recognition are critical to improving efficiency and are typically capital investments made by the host institution or network. Collaboration between radiologists and hospitals is therefore key to achieving optimal quality and efficiency.

The complexity of radiology productivity has also grown apace with the increasing demand for imaging services. Historically, radiologists have referred to the “number of procedures” to quantify the levels of activity in their practices. As radiology practice has become more specialized and diverse, the reliability of comparing numbers of procedures as an indicator of output has been diminished. Most radiologists are familiar with the Resource-Based Relative Value Scale adapted by the Health Care Financing Administration in the 1990s to scale reimbursement under the Medicare program to reflect the relative amount of work input for each type of imaging examination. Relative value units (RVUs) allow year-over-year comparisons of resources expended per RVU and allow benchmarking for certain productivity measures. But as a comprehensive metric for physician productivity, physician work RVUs fall short. First, RVUs decrease when imposed bundling occurs; therefore, decreasing RVUs may not represent a true decrease in an individual radiologist’s workload. Second, they do not account for important nonclinical work, nor do they assess the quality of the services they quantify or the professionalism of the physician providing them [10]. However, a new methodology has been proposed to value these radiology citizenship activities. Groups can individually decide the value for these activities and assign a citizenship equivalent unit for each activity on the basis of group preferences as described by Lee et al [11]. In addition, it is uncertain whether efficiency can continuously lead to increased productivity without sacrificing quality. This is of concern to the ACR Commission on Human Resources.

Today’s radiologist is responsible for multiple functions in addition to reading images. Administrative duties, preparing for and attending tumor boards and specialty conferences, consulting with other physicians, teaching, and developing new modalities to move the field forward are not captured in traditional measures of productivity. When productivity metrics are used to seek to motivate or reward physicians, it is important to understand the contributions of clinical and nonclinical work to the efficient running of a radiology practice. Some complex models of physician productivity have taken into account these diverse clinical and nonclinical activities. Duszak and Muroff [12] introduced the idea of a “nonclinical RVU” to recognize the importance of nonclinical endeavors fundamental to the missions of private and academic radiology practices. These valuable activities include administration, leadership, hospital and community service, professionalism, and quality and safety in radiology practice. Similarly, Lee et al [11]...
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<td>Private practice</td>
<td>Maximize autonomy (dependent on group size), maximize income/time off, physician-centered governance</td>
<td>Higher economic risk, higher administrative burden, less subspecialty work if small</td>
<td>High productivity and efficiency, management more responsive</td>
<td>Lower access to capital and resources, no guaranteed source of patient referrals</td>
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<td>Academic university</td>
<td>Opportunity for teaching and research, increased subspecialty work, collegiality, job security (tenure)</td>
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<td>Hospital employee</td>
<td>Lower administrative burden, increased subspecialty work (size dependent)</td>
<td>Less autonomy, employment could lower income potential</td>
<td>Access to patient referrals, access to capital and clinical resources, alignment of physicians and hospital, shared information system</td>
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<td>Corporate</td>
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<td>Multispecialty clinic</td>
<td>Increased subspecialty opportunities, job security, collegiality</td>
<td>May not be able to buy equipment (institutional priorities), group decision making (less autonomy)</td>
<td>Access to patient referrals</td>
<td>No direct control over equipment and staffing</td>
<td>Pressure to align with network in ACO environment</td>
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<td>VA/military</td>
<td>Reduced stress, enhanced job security, guaranteed benefits</td>
<td>Lower income potential, less autonomy</td>
<td>Patient referrals guaranteed</td>
<td>Highly regulated, less flexibility</td>
<td>More insulated from change in reimbursement, less choice of deployment</td>
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Note: ACO = accountable care organization; VA = US Department of Veterans Affairs.
proposed the relative citizenship unit and total citizenship productivity as measures of citizenship that add value to a radiology practice.

Although tools exist to measure physician work productivity, the use and implementation of such data for decision-making purposes are controversial. Opponents of productivity measurements, particularly when used as the basis for compensation, will cite the potential for harm to group culture and the unintended consequence of “cherry picking” the most productive work available [13]. Slightly more than 40% of radiology practices have elected to measure productivity and distribute the data for informational purposes only, to take advantage of the phenomenon by which individuals improve job productivity simply by being aware of supervision [12]. Groups considering incentive models should solicit fundamental buy-in from group members on the appropriateness of the metrics and their intended use to improve the chances of successful implementation. In some practice models, such as in for-profit corporations, productivity measurement may be even more greatly emphasized.

SUBSPECIALTY VERSUS GENERAL PRACTICE

There has been a trend toward subspecialization in radiology practice for many years. An article in the JACR in 2009 reported that 91.5% of residents and fellows surveyed intended to pursue subspecialties [14]. As technology and the complexity of specialty procedures increase, hospitals are increasingly demanding subspecialist services [15]. Some evidence also points to increased clinical quality and accuracy when subspecialists interpret examinations [16]. For example, there is markedly high demand for subspecialists in breast imaging and in interventional radiology, with the trend stemming largely from technological advances in image quality that demand interpretation or procedural expertise [15]. However, many smaller or midsize radiology departments do not have the resources to support a full subspecialist model. Even within a large practice environment, subspecialists may be required to perform a greater breadth of practice to support the general radiology demands of a busy practice. A recent study demonstrated that <50% of interventional radiologists spend ≥70% of their clinical work time performing interventional procedures [17]. The majority of specialists perform procedures among the broad categories of general radiology, much the same breadth of practice as other nonspecialists. As groups continue to enlarge and “supergroups” emerge, subspecialty interpretation may be emphasized as a competitive advantage.

Maintaining a subspecialty model poses scheduling challenges as radiologists balance the opposing demands of minimum procedure requirements for skill maintenance and credentialing, and the larger pool of specialists needed to provide 24-hour coverage. The more a practice raises the subspecialty bar by adding staff members with different areas of expertise, the greater the pressure becomes to ensure coverage in all subspecialties. This is a particular challenge for smaller radiology groups, and teleradiology organizations have stepped in to fill the gap. National teleradiology companies have emerged to support hospitals and private practice groups to ensure adequate subspecialty coverage around the clock. Some large practices are able to offer their own teleradiology services for night coverage operating on many hospital contracts simultaneously.

Currently, subspecialization in the field of radiology is increasing, but generalists remain a substantial portion of practitioners at approximately 35% of the workforce. [1]. The ACR Commission on Human Resources will continue to monitor the percentages of general and subspecialty radiologists in its annual survey and will continue to report on its results. Practice size seems to be a critical determinant, with larger practices better equipped to accommodate the demands of subspecialization [14]. A fully subspecialized model would drive the mean number of radiologists in practice up and might challenge the close relationship between on-site radiologists and physician peers and hospital administrators. The federal government has encouraged the advancement of primary care physicians as part of health care reform. These physicians may be best served by the generalist model, whereby they can interact with a smaller cadre of radiologists on a wide array of patient problems [18,19]. The ACR task force has addressed this issue and suggested a focus on multispecialty radiologists who would receive training in 3 or 4 specialty areas and could be supported by traditional subspecialty radiologists when necessary for complex cases. The various practice environments described above differ in the degree of subspecialty work available to practicing radiologists and must be factored into decisions about employment options.

Table 1 represents an attempt to summarize the nature of the various practice environments in terms of advantages and disadvantages for individual physicians and groups as a whole. No attempt was made to rate the benefit of each practice component, as the value placed on each measure is highly subjective for individual physicians. In addition, there can be considerable overlap among the different practice categories on the basis of practice size, governance structure, and other factors. However, this table can be useful to all those considering different practice options either before or after residency.

CONCLUSIONS

The multiplicity of practice options available to radiologists makes it incumbent on physicians to understand the nature of each practice environment. There are important differences in autonomy and requirements for efficiency and productivity among the various practice options. Additionally, a discriminating factor among the
work environments is the emphasis on the split between general and subspecialty practice. The relative value of physician autonomy, entrepreneurial adventure, leadership opportunity, subspecialty practice, and job security is a matter of personal choice. Physicians should seek the work environment that has the balance of attributes that best meets their needs. Understanding these variables is important for radiologists when choosing employment options.

TAKE-HOME POINTS

- Radiologists practice in diverse environments today in addition to private practice, including hospital employment, academic practice, multispecialty groups, and corporate and government employment.
- There are important differences in autonomy, requirements for efficiency and productivity, and proportion of subspecialty and general practice among the various practice options.
- Trade-offs among job security, individual physician autonomy, compensation, productivity, and opportunity for subspecialty practice should be considered for those physicians considering different practice options after residency.

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