Radiology in 2022: Challenges and Opportunities in the Coming Decade—Proceedings of the 12th Annual ACR Forum

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The 2012 ACR Forum focused on the anticipated challenges and opportunities facing radiology in the next 10 years, centered on the themes of health care reform, future payment models, research and innovation, patient-centered radiology, and information management. The recommendations generated from the forum seek to inform ACR leadership on the best strategies to pursue to ensure the continued success of the profession in the coming decade.

Key Words: ACR Forum, future payment models, research, innovation, precision medicine, patient-centered radiology, information management


Each year, the ACR assembles a diverse group of experts and thought leaders both within and outside the specialty to discuss a specific topic of long-range importance to the practice of radiology. This initiative, known as the ACR Forum, began in 2001 and has included topics ranging from molecular imaging (2001) and future practice models for radiology (2008) to the impact of generational differences on the future of radiology (2011). This year, the organizing committee chose to focus on the future of radiology 10 years hence (2022), the same topic the forum addressed in its second iteration in 2002 [1].

Participants invited to this year’s forum included physician and nonphysician leaders in health policy and health services research, academic and community radiologists and other physicians, medical journalists, health informatics specialists, representatives of imaging companies, and senior leaders from the ACR. Some of the attendees at this year’s meeting were also present during the 2002 forum, lending their perspectives on the evolution of the field over the past 10 years and reflecting on prior predictions. Through a 2-day program that included both formal presentations and breakout group discussions, forum participants developed a list of consensus recommendations to be presented to the ACR Board of Chancellors on how best to grow and maintain the strength of the specialty as well as meet the anticipated challenges to the profession over the next decade.

This article summarizes and synthesizes the proceedings and recommendations of the 2012 ACR Forum and is organized around central themes that arose from the discussions: (1) health care reform and future payment models, (2) research and innovation, (3) patient-centered radiology, and (4) information management.

HEALTH CARE REFORM AND FUTURE PAYMENT MODELS

The forum began with a provocative keynote speech by renowned Princeton University professor of sociology and public affairs Paul Starr. Best known for his Pulitzer Prize-winning book The Social Transformation of American Medicine, Starr chronicled the history and evolution of health care in the United States. He addressed the future of health care reform and focused on why the United States has not managed to achieve universal health insurance.

All efforts at health care reform in the latter half of the 20th century and early part of the 21st century have focused on some type of cost containment. The percentage of the US gross domestic product spent on health care...
continues to soar. Thus, any effort at broadening coverage must also rein in costs. Although the fee-for-service model that has dominated health care up to this point may continue to exist in some locales and in some form, it is likely that one or more new payment models will be explored in the coming decade.

The various proposed payment reform models fall on a spectrum ranging from full budget-based capitation to traditional fee-for-service payment [2]. Many physicians, including radiologists, embrace the fee-for-service model that currently exists, in part because it is familiar, reflects the work actually done by physicians, and carries with it low financial risk. Any restrictions on the type of care that can be provided are either evident in payers’ rules or negotiated between providers and payers. However, most fee-for-service models outside radiology are inherently inflationary and incentivize providers who control utilization to deliver more care with less regard to whether all of the care is appropriate. Payment reform models that focus on global capitation reduce costs but shift the majority of risk to providers. Such models proffer incentives for providers to deliver less care to reap the greatest monetary benefit. Both provider and patients are wary of such models because prior attempts at managed care through capitation have limited health care consumers choice and used poor risk adjustment methods for patient populations, leaving providers exposed to financial losses.

An ideal payment model would contain costs, improve access, provide a framework for better care coordination, incentivize quality, and be embraced by both patients and providers. The latest proposed payment model, included in the Patient Protection and Affordable Care Act, which seeks to achieve these goals, is based on the development of accountable care organizations. A full description of the structure of an accountable care organization and strategies that radiologists can pursue to best prepare themselves for these entities is beyond the scope of this summary but has been compiled and published by the ACR’s Future Trends Committee [3].

No one knows which of the prevailing payment models will prove to be most successful. Active experimentation with emerging forms of care organization and payment will be required for radiology to extend and strengthen its professional franchise in the coming decade [4].

Some common themes with regard to potential changes in reimbursement for radiologists in the coming decade arose from the discussion. These included continued increase in bundling to reflect “episodes of care,” greater focus on coding precision and granularity, reimbursement tied more closely to care resulting in improved outcomes (“value-based purchasing”), more emphasis on provider and facility accreditation, and incorporation of patient satisfaction scores in the amounts radiologists are paid. For radiologists to continue to succeed in this evolving reimbursement environment, it is imperative that imaging professionals demonstrate the value they add to improving the quality of patient care. In addition, greater emphasis will be placed on transparent public reporting of quality data at both the institution and provider levels. Radiologists must work to define and document quality metrics specific to imaging that will lead to improved patient outcomes and satisfaction or be forced to adhere to metrics created by nonimaging professionals. To shape future reimbursement for imaging services, radiologists must be actively engaged in advocating and crafting policy that ensures safe, effective, and appropriate utilization of imaging services and continue to strive to be acknowledged as central “players” on any health care team.

Although it is necessary for radiologists to be at the center of new payment system development, there is an additional threat that radiologists will have to address to successfully achieve that role. That threat is an anti-imaging bias. The adoption of newer imaging techniques has led to the obsolescence of many procedures performed by other specialists, challenging their incomes. In addition, policymakers have looked to redistribute reimbursement to support primary care and have targeted imaging as a primary source of that redistribution.

On the basis of the above discussions, forum participants developed the following consensus recommendations to strategically position the profession in the coming decade with regard to potential payment models. The ACR should

1. Create a relative value system for all noninterpretative and nonprocedural work not already included in the current Resource-Based Relative Value Scale using existing literature on value added as primary source material for this project.
2. Create a registry that members can use to track daily performance of value-added work.
3. Continue to prepare and educate membership on current and potential future payment models.
4. Continue to more accurately track and database the characteristics of ACR members’ practices, including information about the payment models extant in different geographic locales.
5. Consult with established integrated practices to learn their processes for determining the relative value of compensation for their physicians.
6. Work to develop robust management tools for its members that include utilization management.
7. Develop programs for its members to increase involvement and participation in the political and regulatory processes affecting imaging.
8. Conduct a comprehensive national study every 3 years to define and measure the value of radiology services to patients, referring physicians, and health systems.
9. Continue to put full-force efforts into coding and nomenclature, coverage decisions, and appropriate valuation of radiology services.
RESEARCH AND INNOVATION
Over the past 40 years, medical imaging has experienced a golden age because of a continuous stream of new diagnostic modalities (ultrasound, CT, PET, and MRI), continuing innovation within these technologies, as well as numerous advances in image-guided therapeutic intervention. Moreover, medical imaging has benefited from the concomitant explosion in computing power and connectivity. These advances have led to a reduction in the number of invasive procedures such as exploratory surgery and contributed to the rapid growth of imaging. However, a confluence of factors since 2007, including reductions in reimbursement for advanced imaging modalities, concern over diagnostic radiation, lack of data demonstrating that imaging improves health outcomes, and a greater focus on the appropriate use of high-cost imaging, have led to an arrest in imaging growth in the United States.

The rapid growth and sudden decline in imaging in the United States is reflective of a paradox in thinking about imaging. While recognizing the immense potential for advanced imaging to accurately diagnose and provide guidance for therapeutic intervention, there is also mounting concern that imaging is being overutilized because of favorable reimbursement practices, defensive medicine, and uncritical use. Additionally, society desires the benefits of imaging but fears the burgeoning waste of downstream false-positive diagnoses, pseudodisease, and incidentalomas and related costs and harm to patients.

More recently, imaging research and innovation has shifted toward quantitative imaging. New radiotracers and imaging devices incorporate functional information and can be performed at the molecular level as opposed to the traditional gross anatomic level. This shift in focus is being driven by a general trend in all of health care toward precision medicine and the creation of a new taxonomy of disease. The goals of precision medicine are to “couple established clinical-pathological indexes with state-of-the-art molecular profiling to create diagnostic, prognostic, and therapeutic strategies precisely tailored to each patient’s requirements” [5]. For innovation in the imaging sciences to continue to succeed, investigators will need to pursue research that follows the theme of “P4 medicine” [6] and be predictive (based on individual risks), preemptive (detect diseases in an earlier state), personalized (based on personal history and genome), and participatory (incorporating patient preferences). In the near future, there will be greater emphasis on using advanced imaging tools to facilitate more tailored therapeutics for patients.

Moreover, federal funding bodies will continue to place greater emphasis on outcomes-based research and comparative effectiveness. In the coming decade, radiologists will need to establish direct links between imaging and improved outcomes rather than diagnostic imaging accuracy to continue to be successful investigators. The continued tightening of device regulation by the FDA will create greater barriers for imaging vendors to bring new devices to market. The success of any new future imaging technology is contingent on 3 factors: (1) benefits to providers and patients; (2) proven value, as defined by a favorable cost/benefit ratio in the context of existing options; and (3) the total cost that society is willing to pay and can afford.

On the basis of the above discussions, forum participants developed the following consensus recommendations to strategically position the profession in the coming decade with regard to research and innovation. The ACR should

1. Promulgate the importance of comparative effectiveness research and radiologists’ participation in comparative effectiveness research (including a relationship with the Patient-Centered Outcomes Research Institute).
2. Promote the value of research and innovation to academic and community practices.
3. Promote and publicize through multiple pathways, including the ACR Bulletin, the results of research and innovation that improve patient care and expansion of radiology practice.
4. Develop a research “backbone” that would facilitate the participation of academic and community practices in grant-funded and industry trials.
5. Explore the concept of precision medicine relative to radiology practice by establishing a task force to write a white paper addressing the Institute of Medicine document on precision medicine.
6. Explore the opportunity to use the principles of precision medicine to reduce waste in the care of well individuals (ie, screening) and patients.
7. Establish a program for the standardization of academic and community practices’ facilities and physicians participating in quantitative imaging and imaging biomarker investigation as a way of increasing radiologists’ participation in research.

PATIENT-CENTERED RADIOLOGY
The clinical services of the future will be more patient-centric and improve patient interaction with the health care system. Radiology departments and community practices will need to alter their structures and business models to best position themselves in this new environment. Although historically radiologists have focused on technology-based product service leadership, in the coming decade, many radiology practices must focus more on
customer intimacy to better adapt to a more patient-centered approach to care.

What is patient-centered radiology? One definition is that patient-centered radiology is an approach to providing care that focuses on the perspective of the patient rather than the provider or institution [7]. In a patient-centered approach, patients would be provided with 5 “wishes”: (1) the information to choose, (2) the right examination, (3) a safe examination, (4) effective communication of correctly interpreted results, and (5) a fair price. To grant all of these wishes, radiologists will need to be more transparent in their work and be more accessible to patients.

A patient-centered radiology service will make information regarding the experience and qualifications of its physicians readily available and will distribute imaging reports in a format that is comprehensible and accessible to patients. In addition, patient-centered radiologists will be better stewards of imaging, designing and deploying decision support tools to assist referring providers in selecting the appropriate imaging studies. In this new paradigm, radiologists will cease to perform their jobs in silos. Rather, they will be integrated into multidisciplinary teams focused on a medical condition, thereby delivering greater value to patients.

In the past, the field of radiology has not always embraced a culture of safety as actively as other specialties in medicine, despite evidence that many safety incidents occur within radiology departments [8]. This has already begun to change, and there is increasing focus on identifying and correcting safety issues, such as ionizing radiation exposure. It is likely that a national imaging incident reporting system or registry will be developed to track system errors and drive improvement in the delivery of imaging services [9].

As medical imaging evolves, leveraging the discoveries of molecular medicine and ubiquitous connectivity, the field will migrate from technology-based radiology to information-based radiology, making use of local and global databases. Aggregated imaging databases will help transform personal knowledge into population knowledge. Moreover, imaging databases will be integrated with other digitized databases of health information, allowing radiologists’ work to play a greater role in inter-disciplinary teams creating imaging phenotypes for biologic states. Using this new knowledge, some institutions may create integrated diagnostic centers, incorporating radiology with other specialists such as pathologists, to better facilitate patient-centered care.

Underlying all these changes will be a greater emphasis on measuring performance. To gain and maintain market share in an increasingly competitive environment, it will be imperative for radiology practices to track, measure, and highlight their process measures and link this information to outcome data. It will also be critical to establish a culture in which patients’ concerns and operational defects are continually identified and addressed. All of these strategies will need to be used as public reporting of quality data becomes commonplace.

On the basis of the above discussions, forum participants developed the following consensus recommendations to strategically position the profession in the coming decade with regard to patient centered radiology. The ACR should

1. Develop support tools for better communicating directly with patients.
2. Develop and promote new practice guidelines for patient communications.
3. Develop materials to aid practices’ transition to team-based operational models.
4. Continue to help practices develop practice models with formal executive leadership structures.
5. Continue to teach improved business analytics (eg, explore the development of a model for applying balanced scorecards to radiology practices).
7. Increase integration with patient advocacy groups.
8. Develop templates for making reports accessible and understandable to patients.
9. Advise practices how to reorganize and provide same-day service.
10. Develop models for broadening interventional services.
11. Encourage practices to continue to develop processes for efficient and effective patient care, including optimizing professional resources (radiologists and physician extenders).
12. Encourage practices with a general practice model to establish consultative relationships with subspecialized practices.

INFORMATION MANAGEMENT

Spurred on by initiatives such as the government’s meaningful use program, which incentivizes the adoption of electronic medical records, IT and information management will play an increasing role in health care. Once nearly all health care data are digitized, interconnecting and mining the data for useful information will become paramount. Until recently, the ability to leverage IT in health care has lagged behind other industries, such as finance and retail. These other industries have been able to use IT tools to analyze their data to cut costs, a process that has just begun in health care as information tools are increasingly incorporated into the workflow of all physicians.

In the coming decade, advanced electronic health records tools will be used by radiologists to incorporate information contained in nonimaging databases to improve individual diagnosis. Radiologists will integrate greater amounts of contextual data, contained in electronic
health records, into their reports, allowing greater specificity. Moreover, radiology reports of the future will electronically interconnect with all other existing databases of information, providing point-of-care physicians with a complete picture of individual patients’ medical conditions and a reference to population data on patients with the same medical conditions. Informatics tools will allow radiologists to make better use of local and global databases, mining these warehouses of data for patterns. Moreover, natural language processing and computer-aided detection tools will be used to analyze large databases of radiology reports and images to “see the forest for the trees.” To ensure that radiologists of the future will be able to leverage IT to accomplish the tasks noted above will require greater incorporation of these skills in radiology training programs.

Imaging utilization will continue to be scrutinized in the future, and advanced informatics will be increasingly applied to curb inappropriate imaging growth. Decision support tools for both referring providers as well as radiologists will become the norm. Appropriateness criteria, such as those produced by the ACR, will be implemented into all imaging order entry decision support systems and will be continuously refined to ensure medically necessary imaging. Moreover, radiologists will use decision support tools to reduce variability in reports and, in particular, radiologists’ recommendations for additional imaging.

In addition to the clinical use of advanced IT tools, informatics will be used by administrative leadership to track performance data using real-time dashboards. By measuring metrics in real time, practices will be able to identify lapses in quality and safety and correct those defects more rapidly than has been done in the past. Using information gleaned from real-time and post hoc analysis will allow radiology practices to track and improve their outcomes.

On the basis of the above discussion, forum participants developed the following consensus recommendations to strategically position the profession in the coming decade with regard to information management. The ACR should

1. Establish infrastructure to develop integrated databases and encourage data mining to generate new knowledge.
2. Support training programs in informatics.
3. Aggressively align the ACR Appropriateness Criteria® with national efforts using decision support systems.
4. Extend its appropriateness criteria program to encompass radiologists’ recommendations for follow-up imaging.
5. Develop a central repository for radiology practices showing national key performance metrics and benchmarks for clinical practice.

CONCLUSIONS
Attendees at the 2012 ACR Forum acknowledged that many challenges face the profession in the coming decade, but despite these challenges, many opportunities exist. During the discussions, forum participants identified several interrelated themes that the College should focus on to ensure the continued success of the profession in the coming decade. The themes included the impact of health care reform and future payment models, barriers and opportunities for research and innovation, the transition to patient-centered radiology, and the influence of information management. By pursuing a strategy that best aligns the strengths of the field with the anticipated changes occurring in the environment, radiology can continue to thrive.

TAKE-HOME POINTS
- The common themes that arose from the 2012 ACR Forum included
  - the impact of health care reform in shaping future payment models,
  - barriers and opportunities for research and innovation in the era of precision medicine,
  - transition to patient-centered radiology, and
  - the influence of information management.
- By pursuing a strategy that best aligns the strengths of the field with the anticipated changes occurring in the environment, radiology can continue to thrive.

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