

## VIEWPOINT

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## Radiology and Value-Based Health Care

**Because health care usage** and expenditures have continued to increase in most countries, well in excess of cost-of-living inflation, value-based health care has become an increasingly important concept, aimed at improving patient outcomes without increasing costs. The value-based health care model is founded on the effort to encourage adoption of practices that optimize the ratio between health gained and costs incurred and will inevitably lead to greater scrutiny of how resources are deployed and expended.

According to Porter,<sup>1</sup> medical care “involves multiple medical specialties and numerous interventions,” and “[m]uch of the total cost of caring for a patient involves shared resources, such as physicians, staff, facilities, and equipment.” When resources or reward are based on value calculations, conflicts can occur between different groups of contributors to care. “[I]n a well-functioning health care system, the creation of value for patients should determine the rewards for all other actors in the system.”<sup>1</sup>

The specialty of radiology is a good example of a health care resource shared across all levels of health care delivery, virtually all medical specialties, and patient care at all ages. Diagnostic radiology adds value in the clinical evaluation by refining differential diagnoses, decreasing the time required to initiate correct treatment, and ultimately contributing to reducing morbidity and mortality. Short-term expenditures for imaging studies may create long-term and systemwide savings (reducing costs associated with use of ineffective treatments and investigations) and better outcomes.<sup>2</sup> For example, radiologic diagnosis of acute appendicitis or pulmonary embolism can hasten appropriate treatment and obviate the need for further investigation.

However, in some interpretations of value-based health care, radiology is viewed as a “cost,” an adjunct to quality care, but not a primary contributor to value. This ignores much of the value created by the appropriate practice of radiology, and the importance of radiology in clinical care, when radiologic investigations are used justifiably and without inappropriate duplication or excess.<sup>2</sup>

How, then, can radiology avoid being viewed only as a potential source of value loss rather than as a creator of value?

First, the breadth of contributions of radiology to patient care must be understood (**Box**). This encompasses not just traditional disease detection and diagnosis but also contributions to ongoing patient management, population benefits, and communication of key information.

Second, radiology as a specialty must work to quantify its effect on patient outcomes and quality of life. Much diagnostic radiology scientific literature describes image acquisition and diagnostic accuracy rather than the contribution to eventual health outcomes of the patient or ultimate societal benefit. The field of radiology needs to publish research reporting on its effect on these outcomes,<sup>4</sup> using different robust, reproducible, and clinically relevant outcome metrics.<sup>5</sup>

Third, clinicians referring patients for radiologic studies impose costs without incurring them directly (using services that are paid for by patients or third-party payers); they should have accountability for their effect on the cost of medical imaging and for ensuring resource use is optimized.

Fourth, managers who plan and provide resources for health care services must understand the potential costs of undersupplying shared services such as radiology, which can act as bottlenecks in health care. Inadequately equipped hospital-based services can delay patient throughput and discharge. Insufficient primary care and outpatient imaging access limits the capacity of non-hospital-based services to manage patients, increasing reliance on more expensive hospital-based facilities.

Fifth, radiologists must actively ensure that use of radiologic investigations is justified, appropriate, and, ideally, evidence based. Not every imaging test requested is the right one, nor is every test requested actually needed. Radiologists must be ready to actively engage in advising referring clinicians, assessing requests for studies, and educating physicians in other specialties about appropriate radiology use. Decision support software embedded in radiology order-entry systems<sup>6</sup> can be beneficial to reduce overuse<sup>2</sup> but is no substitute for direct radiologist consultation. These activities are better developed in some countries than in others. Remuneration systems that reward physicians on the basis of volume of work done militate against a shift from volume to value as the driver for investigations or interventions.<sup>2</sup>

Ultimately, the patient is the recipient of health care services (and value), but these are often delivered through “intermediate customers,” primarily referring clinicians who seek input from radiologists and directly receive the output (reports). When radiology is optimally used, its value is also delivered to hospitals and health services as a whole. Patients do not necessarily want ultrasonography, CT, or MRI; they want an answer to a clinical question. The primary purpose of diagnostic radiology is to answer clinical questions by using imaging and to help guide patient care in the most effective way possible, including sometimes not performing a test. Some studies have suggested that 20% to 50% of high-technology imaging procedures (CT, MRI, PET, etc) failed to provide information beneficial to patient welfare and may therefore represent overuse (although this suggestion ignores the potential benefit of a negative-result imaging study in guiding patient management).<sup>2</sup> Diagnostic radiology is fundamentally about information acquisition, use, and dissemination. Radiologists have a responsibility to help define and create value and to optimize the yield from their services.

Several steps could help support this endeavor, including the following:

1. Engaging with referring clinicians to better understand their practices and needs (eg, turnaround,

**Box. Contributions of Radiology to Patient Care**

## Disease prevention and detection

## Screening

Identification of abnormalities accounting for clinical presentations

Reassurance (eg, confirmation of the absence of disease)

Radiation protection: optimizing protocols, preventing unnecessary or duplicate studies

## Management contribution

## Diagnosis

Disease staging

High-level subspecialist imaging interpretation

Image-guided biopsy

Clinical decision support: choosing the best investigation to answer a clinical question, indicating situations in which imaging is likely to represent low-value care

Confirmation of disease resolution, facilitating treatment cessation

## Therapy delivery and monitoring

## Interventional radiology

Progress evaluation during treatment

Imaging biomarker development: earlier disease detection, treatment response prediction, invasive testing reduction, improvements in targeted treatments, surrogate end points in clinical trials (faster translation of research to clinical practice)<sup>3</sup>

## Other

Teleradiologic provision of specialist expertise

Teaching, multidisciplinary team activity, research, administrative work

Communication to patients, the public, and the medical community

availability, subspecialty expertise, multidisciplinary input), developing mutual relationships of trust and understanding, and building services to meet these needs without conflict

- Using evidence-based guidelines to assist referring clinicians in requesting appropriate imaging or interventional procedures specific to the patient's clinical history or condition<sup>6</sup>
- Ensuring radiology departments work as a cohesive whole (teamwork, consistent standards, and available cross cover; silos, such as subdepartments that exclude integration with other radiologic subspecialties, should not develop to the detriment of other service areas)

- Using available resources (eg, structured reporting, clinical decision support tools, AI tools) and optimizing workflow to minimize patient waiting times and shorten hospital stays
- Engaging patients directly to answer their questions and offer explanation of their imaging findings
- Optimizing information (reports, images) exchange through appropriate information technology tools (eg, urgent report notifications)
- Maintaining a culture of constant quality monitoring and improvement<sup>7</sup>
- Having a more active role in indicating when a procedure may not be necessary
- Conducting research on higher-level value contributions

Radiology is a deeply embedded and essential part of modern patient care. Rubin<sup>8</sup> suggested that "[f]ew episodes of care occur without medical imaging, and a rational health care system should define the distribution of revenue to radiology based on its value as derived from quality and costs." Having adequate resources for radiology is vital to achieving health care efficiency and maximizing value and must be a component of any formula to assess health care costs against outcomes. Optimization of value creation and resource use demands cooperation among referring clinicians, patients, health care administrators, and radiologists. Patients must understand that their needs are best served by flexible, responsive health care that applies the investigation best suited to answering the relevant clinical question at that particular point in their care, with the greatest safety.

Radiologists must take the principles underpinning value-based health care into account when planning, developing, and delivering services. Clinicians referring patients for radiologic studies must work with radiologists to optimize resource use, justified and tailored according to the patient's circumstance. All parties must become educated about methods used to determine costs and value and must understand that their decisions may have influences that affect far more than the narrow specifics of any one episode of patient care or siloed departmental or hospital budget.

By embracing the principles of value-based health care and striving to create value when possible, radiology can contribute to moving from a volume-driven system to a value-driven one, in which as many investigations or interventions as possible contribute positively to patient outcomes. This will require radiologists to participate in multispecialty clinical decision making, and referring physicians to work with radiologists to ensure the most appropriate use of radiologic resources, services, and personnel.

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