In the days and weeks following the publication of Röntgen's seminal article and the flurry of news articles about the new discovery, American physicians, like their European counterparts, wondered about medical applications of the new discovery. Once Röntgen had seen and described what other workers with cathode rays had missed, duplication of his result was straightforward for anyone with a basic knowledge of physics and the kinds of apparatus Röntgen used. Arthur W. Goodspeed and his colleagues at the University of Pennsylvania in Philadelphia unknowingly had made X-ray images which had been saved and were identified as such once he read Röntgen's paper.

From wondering to trying was a short step, particularly for any physician who had access to a physicist. Röntgen's biographer, Otto Glasser, lists nineteen candidates for performance of the first medical X ray in the United States. Among the first was physician Gilman B. Frost, who worked at Dartmouth, and his brother, physicist Edwin B. Frost. They made an image of a fractured ulna. Goodspeed also began making exposures of patients for doctors in Philadelphia in the same weeks.

Soon physicians began buying their own equipment. By early 1896 the F. J. Pearson Company of St. Louis offered "A portable X-ray apparatus...for the price of $15 delivered anywhere in the U.S. guaranteed." In that same year, leading hospitals began acquiring X-ray apparatus and entrusting its use to bright young persons with and without medical qualifications.

Most historic accounts of radiology deal with the growth of the science and its applications to medical imaging and treatment. But in the early decades a medical discipline was created as people were attracted to the new science and its exciting applications. These questions, and the answers which came with time, shaped radiology. They included:

- Where would radiology find its place in health care—as a physician service, a technical service, or a separate profession?
- If it was to be a physician service, would every physician use X rays? Would some disciplines use them in limited fashions? If specialists in radiology arose, how would they be qualified? How would they practice? How would they relate to other disciplines?
- Where would X-ray services be furnished—in offices, hospitals, clinics,
or homes? Would others be involved besides the nascent radiologists? If so, whom would they be?

- How would X-ray procedures be paid for? Who should own the equipment? Should the finances of radiology be different from other medical or hospital services?

Struggles by the new specialty to obtain favorable answers to these questions have been a century-long effort. The first radiology societies were intended to be scientific, but they also dealt with practical matters. So a description of how radiologists practice must describe organized efforts to structure and improve the circumstances of practice.

THE SHAPE OF RADIOLOGY

"In the early days, before ours was a specialty, the new discovery of Röntgen was taken up by an extraordinary array of doctors, scientists, and dilettantes," Henry Walton said in his 1941 American College of Radiology (ACR) presidential speech.

"The early records of the [American Roentgen Ray] Society show the names of many applicants, some of whom were accepted, whose only qualification for membership was the ownership of a static machine," wrote Arthur W. Erskine in a 1945 essay in Radiology.

The question of who would be the X-ray doctor was open to any pretender. "No surgical consulting room is fully equipped without an apparatus for X-ray investigation," wrote Harvard surgeon Maurice H. Richardson in 1896. "An X-ray apparatus of his own is as essential to the surgeon as the mirror to the laryngologist or the stethoscope to the GP." In some cities, physicians, photographers, even department stores offered X-ray portraiture. Some of their customers sought X-ray "pictures" to prove to their doctors that they had real problems, previously undiagnosed.

Lowell S. Goin wrote in his 1957 American Roentgen Ray Society (ARRS) Carman Lecture:

Perhaps in 1896 or 1897, a Doctor Fitz, a Boston internist, returned from Europe with some X-ray apparatus. Walter D. Dodd was the hospital pharmacist and, since he was the pharmacist, he had scales suitable for weighing chemicals and hence seemed to be the obvious person to make the developing and fixing solutions. Next, it seemed logical that he should develop and fix the radiographic plates...Presently, staff physicians, realizing that Walter Dodd had the opportunity of seeing many more of these plates than any one of them, began to ask his opinion. Realizing his need for a medical background, Walter Dodd studied medicine and returned to the Massachusetts General Hospital as its first radiologist.

The same transformation occurred for Eugene W. Caldwell of New York City, who had a promising career as an electrical engineer when the new X-rays diverted him. As Preston M. Hickey wrote in his 1928 AARRS Caldwell lecture, Caldwell opened the first X-ray office in New York City in 1897. "Caldwell soon felt the need of medical training in order that he might become a true roentgenologist. He accordingly matriculated at the Bellevue Medical School where he was already teaching the subject of roentgenology."

The same sequence occurred in Chicago. Emil Grubbé, a metallurgist, read of Röntgen's discovery and began making X-ray tubes and using them at the request of physicians. He, too, obtained a medical degree while providing X-ray consultations. Also in 1896 in Chicago, Otto L. Schmidt, a physician at Alexian Brothers Hospital, began offering X-ray services.

Within a year after Röntgen's discovery, a pattern of medical use had begun. What was to become radiology was a medical procedure, requiring a combination of skill and craft to produce X-ray images and a knowledge of physiology to interpret the dim findings.

In all probability, a strong motive for early specialization was the recognition that working with X rays was dangerous. As Percy Brown of the Boston Children's Hospital described in his American Martyrs to Science through the Roentgen Rays, many of the pioneer physicians and other X-ray workers were victims of X-ray exposures, losing
skin, hands, and sometimes their lives to unshielded X-rays.\textsuperscript{12}

A second danger which may have discouraged many physicians was the probability of electrical shock from working with unshielded wires, static machines, interrupters, coils, and jury-rigged circuits. Writing much later, Leo Rigler recalled that a man might not properly consider himself a radiologist until he survived a few electrical shocks from his apparatus.\textsuperscript{15}

\textbf{In his 1908 ARRS presidential address, George C. Johnson wrote:}
The dangers of this branch of medicine braved by the operator have not been exaggerated. The insurance companies are beginning to look upon us as undesirable risks...There is no branch of surgery requiring higher skill or more exacting technique than that necessary for success in roentgenology, and in addition, there is no work which is so dangerous to the operator. Obviously, then, the roentgenologist should be the highest paid man in the profession, but he is not.\textsuperscript{14}

\textbf{Lowell S. Goin, in his 1957 Carman Lecture, wryly commented:}
Our early efforts in the field of diagnosis were largely the recognition of foreign bodies. Our therapeutic field was almost completely limited to the palliation of rather hopeless disease. The hospital basement seemed to be a reasonable location for such relatively unimportant activities and, since the rewards were largely spiritual, the question of fiscal arrangements seemed to deserve little discussion.\textsuperscript{15}

In 1909 Percy Brown, making the ARRS secretary’s report, surveyed the practice status of members.\textsuperscript{16} Most members were young, graduating in medicine between 1895 and 1903. Most took up X-ray work right out of medical school and some even before becoming physicians. At first few (only 27 percent) could specialize in radiology. Most said the demand for X-ray services was increasing steadily. Of their work in radiology, 40 percent did only diagnosis, 19 percent did only therapy, 30 percent did both, and 2 percent reported “neither.”

Also in 1909 Rollin H. Stevens reported on a survey of radiology in fifty-eight hospitals.\textsuperscript{17} The total investment in X-ray equipment in those hospitals was $68,350, with a high of $5,500 and an average of only $1,102 per hospital. Two-thirds of the hospitals owned the equipment; radiologists owned it in sixteen hospitals. The radiologists owning the equipment depended upon patient fees like other staff physicians and received no stipend from the hospital. Seven hospitals paid their radiologist salaries, the largest being $1,000 a year. Fifteen hospitals divided fees, with their radiologists getting from 50 to 80 percent. Forty-one of the hospitals had substantial charity work—more than a thousand free examinations yearly. For those the radiologists received no compensation.

The average yearly cost of operating one of the fifty-eight hospital departments was $1,295, including depreciation, insurance, electricity, tubes, plates, and chemicals. Only twenty-one hospitals provided an assistant for the radiologist.

Forty of the 58 hospitals reported therapeutic X-ray services, averaging 366 patients treated per year. “The treatment is used in various dermatoses, epidermoid tumors of the skin, cancer, sarcoma, leukemia, pseudoleukemia, myositis fungoides and such,” Stevens wrote.

“In forty-two hospitals, roentgenographic diagnosis is a routine procedure in certain special cases such as injuries to bones and joints, foreign bodies, vesical and renal calculi, diseases of the chest, gastro-intestinal diseases, etc...”

Stevens concluded on a brave note:

No hospital aiming at scientific work can afford to be without complete roentgenological equipment. The roentgenologist is entitled to as much consideration in connection with his department as any other member of the hospital staff. The hospital should pay all expenses connected with his equipment, and the roentgenologist should be paid a salary unless he has opportunity to treat private patients who would pay his regular fees. Such fees should not be divided with the hospital.

Thus, Stevens’s survey indicated a long-lived pattern in which hospitals furnished equipment and assistants and sought to control the radiologist’s income from patient services.

Radiologists got little sympathy from other physicians. In his presidential
comments, Johnson observed: "The general practitioner sees the roentgenologist charge $15 or $25 for an examination when he is accustomed to spending a night at a labor case for $10, and he demurs. He fails to see that every man who pays a good fee to a specialist appreciates all the more the value of medical service."  

Practical differences between radiologists and their medical colleagues arose in part from their status as consultants to other physicians and in part from their relationships with hospitals. Surgeons also depended upon referrals and upon hospital support. But surgery had a strong public image as a medical service—taking charge of the patient. The radiologist took charge of only a small number of cancer patients. His image for most diagnostic patients was as dim as his X-ray images of them.

The discipline grew. Improvements in equipment, in contrast, in tubes, in films instead of plates all combined to make radiology safer and more reliable. Radiologists began to acquire helpers or technicians who worked with patients and operated the equipment. Incorporation of shielding into X-ray apparatus reflected an awareness of the dangers of chronic radiation exposures. The hot cathode tube, devised by William Coolidge of General Electric, reduced the challenge and danger to early radiologists from handling cranky gas tubes.

When the United States sent an army to fight in France in 1917, radiology was an accepted part of aid stations and field hospitals. Lewis Gregory Cole, president of the ARRS, worked with the federal authorities to recruit radiologists for the military. Preston M. Hickey noted that the chest radiograph became a standard screening device for recruits. Radiologists made progress clinically, as well. "The average internist, during his military service, became rapidly educated to seek the assistance of the roentgenologist...in a manner to which he was, indeed, before a stranger." Radiology gained significant numbers of new physicians who had worked with X rays in military service and decided to specialize, he observed.

From the beginning, X-ray evidence was used in courts for suits relating to medical problems. By 1918 radiologist Albert Soiland was complaining "It is no uncommon occurrence to have thrust upon us three or four legal summons during the week to appear at court and testify as to certain injuries or to verify the authenticity of our plates."  

Academic medical centers and the radiologists therein led the scientific progress. George Holmes started the first radiology residency at Boston's Massachusetts General Hospital in 1915. But the first hot cathode tube was installed by General Electric in the private office of Lewis Gregory Cole in New York City. Radiologists friendly with manufacturers often tried new products before the large centers.

By the turn of the century, physicians began to set themselves up as radiologists in communities across the country. In Georgia, where private offices had opened in Atlanta, Augusta, and Savannah by 1903, physician radiologists competed with electrotherapists and radiographers. Most X-ray equipment went into hospitals in larger towns. In 1919, James J. Clark was guaranteed a salary of $4,000 a year from Atlanta's Baptist Hospital. Without help, he made exposures, mixed solutions, and developed plates before expressing an opinion about them. In the same years the training of "student interns" began at Henry Grady Hospital in Atlanta. Other aspiring radiologists arranged informal preceptorships in private offices. In 1922 Emory University Hospital spent $10,000 to equip a new X-ray department, claiming it to be the "best in the south." S. H. Weens, the long-time chief of radiology at Emory, became the first resident in the new department.

One indication of the acceptance of radiology was noted in a 1919 paper by Russell D. Carman of the Mayo Clinic in the American Journal of Roentgenology. "During 1919, examinations at the clinic...numbered 50,668 as follows: kidney, ureter, and bladder, 6,088; bone,
12,129; chest, 17,301; gastrointestinal tract, 11,825; and 1,328 pyeograms. 23

If the specialty grew and prospered during the 1920s and early 1930s, the circumstances of individual radiologists were mixed. Both diagnostic and therapeutic radiology were referral practices. By now most physicians practicing radiology devoted their full time to the specialty. Those in private offices set their own fees and collected what they could. Those in hospitals developed contract relationships, with the hospital billing a total charge to patients who could pay. Some radiologists received fixed salaries, others got a percentage of fees billed or collected. Some leased the hospital X-ray department, in effect running private practices in hospital space.

In their relationships with hospitals, radiologists, their colleagues in pathology, and some anesthesiologists differed from other physicians on the same medical staffs. With the advent of the first hospital insurance programs, the status of radiologists in hospitals became an issue. Hospital administrators contended in their literature that radiology was a natural part of hospital service like laboratory or pharmacy or dietary services. Radiologists, writing in their journals, asserted that they were physicians and fully entitled to be treated as such. Radiologists sought and obtained assurances of their status as physicians from the American Medical Association (AMA). Most hospital administrators and their boards were not impressed.

THE INTER-SOCIETY COMMITTEE ON RADIOLoGY

Early in 1937 leaders of the four national societies, the ARRS, the Radiological Society of North America (RSNA), the American Radium Society (ARS), and the ACR decided that a new structure was needed to address the practice and economic problems of radiology. They created the Inter-Society Committee (ISC), composed of three radiologists, Arthur C. Christie of Washington, D.C.; E. H. Skinner of Kansas City; and Lowell S. Goin of Los Angeles. The ISC was given a budget of $15,000 by its sponsoring societies and the task of fighting off hospitals, insurers, and their allies. One of the ISC's first actions was to hire Mac Fullerton Cahal, a Kansas journalist and attorney, as its executive secretary. He received a salary of $4,800 a year, his actual tickets, $10 a day to cover all other travel expenses, a secretary at $125 a month, and an office in Chicago. 24

In 1935 Chamberlain was elected chairman of the ACR Board of Chancellors with the challenge to change the previously honorific group into a broader membership structure, capable of dealing with the nonscientific problems of radiology. The task took five years and required overcoming much resistance. Meanwhile, Cahal and the ISC were busy immediately responding to challenges to radiologists from hospitals and insurers.

"The ISC was created to provide a national headquarters for all American radiology," reported Skinner to the ARRS in 1938. "Its function is to collect facts and information, to make this information available to local groups and members, and to offer advice and counsel when requested." 25

The ISC turned to the AMA, whose House of Delegates and Board of Trustees were supportive of radiologists in a series of reports and resolutions. "It is unethical and therefore contrary to good public policy for hospitals to participate in the practice of medicine in order to obtain an income to finance other hospital activities or to attempt to lower the cost of special medical services by methods that impair the quality of the service or prevent the development of an improved service," the AMA delegates resolved in June 1938. 26

The ISC inveighed against X-ray laboratories owned and operated by nonphysicians. These proliferated principally in New York and California. A physician or other practitioner might refer a patient to a laboratory for X-ray studies, with the films being returned to him for interpretation. Working with state medical societies, the ISC stimulated protests and legislative and regulatory initiatives in both states.

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The Kansas Board of Medical Registration and Examination obtained a legal ruling: "That roentgenology, either diagnostic or therapeutic, constitutes a practice of medicine and surgery as defined by the statutes of Kansas. Such practice, when carried on by one not licensed to practice medicine and surgery, is prohibited and unlawful."27

Cahal and his board were energetic. In a report, he noted other skirmishes: "Repeated attempts have been made in several (Florida) localities to add radiology as a hospital service to group hospitalization plans. Through the efforts of the Florida Radiological Society and with the full support of the county medical societies in the respective communities, these attempts have been defeated."28

The ISC helped in other ways, he continued, "Recently, Georgia radiologists were successful in securing an amendment to the state cancer law which permits private radiologists to treat state-aid patients....Efforts are now being made to correct the state crippled children's law to provide a method for reimbursing radiologists who perform services on these patients. Fees for radiological services are now included in a per diem payment to approved hospitals."

Other ISC assistance went to radiologists in Philadelphia, New York City, Pittsburgh, Boston, Washington, Baltimore, Atlantic City, Denver, Los Angeles, San Diego, San Francisco, Cleveland, and Detroit. Soon Cahal was regarded as the principal authority on the economics of radiology. His articles and letters appeared in medical and hospital journals, as well as newspapers in various communities.

In 1938 the ISC defined the practice of radiology in an extensive survey which ranged over types and content of practice, hospital relations, and incomes.29 Among the findings:

- A third of patients admitted to hospitals covered by survey respondents received some type of X-ray service.
- Only radiologists interpreted examinations in 1,148 of 1,250 hospitals served by respondents.
- Four of five respondents were solo practitioners.
- A fourth of respondents had a formal contract with one or more hospitals.
- A fourth of respondents sent patient bills. The others were compensated through a combined hospital billing mechanism.
- The basis for radiologist compensation in hospitals was a salary for 43.6 percent, a percentage (averaging 50 percent) of the amount billed for 47.3 percent, and a radiologist lease of the hospital department for 9.3 percent.
- All but sixty-one respondents had one or more hospital staff appointments.
- The median gross yearly income for radiologists was $12,900 and the net was $8,500. This compares with an average of $4,143 for all physicians—$3,673 for general practitioners and $6,521 for specialists. Only surgeons did better than radiologists.

In terms of the science of radiology, the 1930s were marked by improve-

In 1938 E. H. Skinner listed six hospital problems which threatened radiology.
1. The attitudes and practices of hospitals and the organized hospital world which tend to place radiology under the domination of a lay board of trustees, establishing it as a technical service to be rendered by hospitals instead of a professional service to be rendered by private physicians.
2. The attempts to define radiology as a hospital service by including it among the hospital benefits offered in group insurance plans.
3. The tendency of some hospitals to look upon the department of radiology as a legitimate source of revenue to pay losses sustained in other departments, thus depriving the radiologic department of a portion of its legitimate income.
4. The attempts to dismember radiology and consequently destroy the specialty by dividing it into technical and professional stages.
5. The increase in group and cooperative laboratories which supplant established and trained radiologists engaging in private practice.
6. The threat of competition by the state through free diagnosis and treatment of cancer, and general diagnostic centers, thereby discouraging private enterprise and individual initiative by radiologists.

Thus were stated the premises on which radiology organizations campaigned for the next sixty years.
ments in techniques and equipment. The growth of the specialty was synergistic with demand. New radiologists could select their own hospitals and communities. Opening a private office involved modest costs for basic equipment and provided an offset to hospital practice. Thus hospitals offered good opportunities and good incomes. But exclusive hospital contracts also involved differences from the practice patterns of most other physicians, a distance from patients (only for fluoroscopy and radiation therapy was there direct contact) and a dependence upon the hospitals and their managers.

Leaders of radiology read the pronouncements of hospital administrators that all of radiology was a hospital service covered by and only through new hospital insurance schemes. The hospital viewpoint was put forcefully in a 1937 statement from the American Hospital Association (AHA) directed at hospital insurance plans.

Certain professional services (such as roentgenology, anesthesia and pathology) have traditionally been provided through salary, commission, and/or rental arrangements between physicians and hospitals. Fees for such services have been charged to patients by and through many of the leading hospitals in America, without loss of professional status of the physicians concerned. The public has come to regard the costs of professional and other services provided through the use of hospital-owned facilities as part of the hospital.30

In response, the ISC waged a vigorous campaign to strengthen the support of the AMA, to get resolutions from state and county medical societies, and to urge the AMA to withdraw its approval for physician training programs from any hospital which refused to concede that radiology was a physician service and to contract accordingly with its radiologist.31

If pronouncements could win the day, the ISC had done well. The AMA House of Delegates in 1936 and 1937 responded to radiologists with resolutions: "The real value of the roentgenologist depends, not upon his ability to produce a set of X-ray films, but upon his ability—which, in turn, is dependent upon his ability as a physician—to know what examination should be made and how, and most particularly upon his ability to interpret its significance which often involves no mean degree of clinical acumen."32

In 1938 the AMA Council on Medical Education and Hospitals revised its "Essentials of a Registered Hospital" to read, in part: "V. Radiology 1. The responsibility for all radiologic examinations must rest on the physician-roentgenologist who is head of the department. His findings and conclusions for all examinations should be placed in the patient’s chart."33

Similarly, the American College of Surgeons, in its Manual of Hospital Standardization, decreed: "The person in charge of the X-ray department must be a graduate of an acceptable medical school, licensed, ethical, in good standing, professionally competent and specially trained in radiology. Such supervision is necessary not only for the administration and management of complicated technique, but especially for the interpretation of findings, which can be done reliably only by a radiologist."34

And to sum up those pronouncements, the ACR in 1938 published a Manual of Desirable Standards for Hospital Radiological Departments which was endorsed by the AMA Council on Medical Education and Hospitals the following year.

By 1940 the ACR had been reorganized and its membership had passed one thousand. The duties and funds of the ISC were transferred to it. Cahal, without changing his chair, became the executive secretary of the ACR.

War Time Changes

As the ACR began its broader mission on the eve of World War II, radiology had become a relatively comfortable and rewarding specialty. Equipment was improved and the dangers of electric shock were gone. Radiation protection was understood better and the ranks of radiologists with missing fingers dwindled with age.
rather than premature deaths. With the supply of radiologists, now about two thousand, still lagging behind demand, the incomes of radiologists compared favorably with those of other physicians, even if the circumstances of hospital compensation were still contentious.

Radiologists were well involved in organized medicine, serving as delegates to the AMA from their states and holding offices in state and county medical societies. They encouraged and participated in efforts of medical societies to explore establishment of medical service insurance plans, roughly parallel to the hospital coverage plans which began in the 1930s. By 1941 the ACR Commission on Legislation reported that eight states already had medical society sponsored medical service plans and twenty-eight others were seeking legal authorization to establish them.

"The point for radiology is in the manner in which X-ray services are provided under these plans," the commission wrote, "will radiology be included as a part of the medical benefits offered, or will these services be regarded as part of hospital care and included in payments made to hospitals?"

The results were mixed. Many hospital plans cited the reality of total billing for radiology by hospitals and included all of radiology as a hospital benefit. The medical service plans were oriented toward payment of physician services for hospitalized patients; any notion of office coverage or payment for preventive services was far in the future. Some declined to cover outpatient radiology, thus contributing to rising hospital costs as patients sought admission for diagnostic workups. In 1939 the New York City area Blue Cross plan reduced payments to hospitals, leading the ACR Commission on Hospitals to observe that the shortfall was "apparently due to the inclusion of medical services such as X-ray and pathology, and to the excessive cost of short term hospitalization occasioned by the inclusion of these services in the contract."

Although the nation was preoccupied with its involvement in World War II and many radiologists saw military service, the hospital wars continued on a diminished scale. In his 1943 report as chairman of the ACR Board of Chancellors, Vincent W. Archer observed: "We are accused (or perhaps complimented) by being called the most militant group in medicine. Due to circumstances, not of our own making, we were forced into this attitude in self-defense."

Archer and his colleagues felt justified in their aggressiveness by the involvement of federal officials in shaping health care. Arthur J. Altmeyer, chairman of the Social Security Board, spoke to the AHA's 1943 meeting:

"We can be confident that in the future, even more than in the past, the hospital will be the center of the coordinated services for the well and for the sick, a community center for prevention as well as for diagnosis and care. Those who would make of the hospital a building in which to furnish bed, board, nursing and only technical services, and who propose to separate professional services from hospital care are flying in the face of experience and progress. They would not merely stop the clock; they would turn it back. Their view cannot and should not prevail."

Despite the demands of the war effort, each session of Congress received another version of bills by Senators James E. Murray of Montana, Robert F. Wagner of New York, and Congressman John Dingell of Michigan advocating expansion of the Social Security system to offer health care coverage to all Americans. Other bills proposed the establishment of special federal hospitals and diagnostic clinics to serve patients with cancer or tuberculosis. The ACR Commission on Hospital Standards observed in its 1944 annual report: "It is sometimes forgotten that complete diagnostic and therapeutic facilities for the care of the sick are available in many medical officer buildings throughout the country—available and with competent radiologists owning or renting space."

**Radiology in the Time of Plenty**

The end of World War II and the advent of an age of plenty in the United States brought a rush of physi-
cians into radiology, many after military service as radiologists without prior training. Residency programs were expanded and the American Board of Radiology (ABR) gave partial credit for military experience in qualifying returned physicians for examination. Still, the supply of radiologists lagged behind demand.

Radiology organizations were only dimly aware that the benign fallout of usable isotopes developed with the atomic bomb would shortly expand radiology's scope. Radiologists were involved in the bomb development project. Robert S. Stone of San Francisco, and Stafford Warren of Rochester, New York, Hymer Friedell of Cleveland are credited with starting the bioeffects programs which expanded knowledge of radiation effects and encouraged development of medical uses of isotopes.39

New practices for growing numbers of radiologists appeared as communities claimed federal subsidies for hospital construction under a series of Hill-Burton bills, named for their chief sponsors, Senators J. Lister Hill of Alabama and Harold H. Burton of Ohio. For the most part, radiologists joining new hospitals did so on the same terms as their seniors in older institutions. An AMA survey in 1947 showed 92 percent of radiologists practicing in hospitals on salaries, down 5 percent from the 1938 survey. Another 14 percent were independent, mostly on leases, up 5 percent from the earlier survey, and the rest held percentage contracts. Almost all of the billing to patients or carriers was done by hospitals.40

Of eighty-one Blue Cross plans operating in 1946, fifty covered radiology as a hospital benefit. Most of those with coverage provided a flat $15, with $35 as the largest amount. Some thirty-five medical society-sponsored Blue Shield plans were operating in twenty-four states.41

In 1947 Medical Economics published its sixth survey of physicians' incomes and expenses.42 The magazine reported that all categories of independent physicians had an average gross income of $18,500 and net earnings of $11,300. General practitioners grossed $15,953 and netted $9,541. Internists grossed $20,690 and netted $12,813. Surgeons had a gross of $24,338 and a net of $16,011. Radiologists were the highest paid specialists with a gross of $34,693 and a net of $20,519.

In his 1947 ACR report, Cahal raised the issue of radiologists sending their own bills, rather than relying upon hospitals. He admitted that the idea was radical, urging as an alternative a demand that hospital billing forms reflect a statement such as: "the X-ray charge includes the professional service of staff radiologists."

By 1948 the ACR "recommended as the most satisfactory type of fiscal arrangement between a radiologist and the average private hospital, a contract under which the radiologist leases the department at a fixed monthly rate."43 Cahal left the ACR in 1948, and William C. Stroman became executive director, keeping the position for thirty-three years. The ACR's principal activity was supporting radiologists in problems with hospitals and insurers. The ACR and the AMA and various state societies lobbied resolutions from fixed positions asserting that radiology (and usually pathology) was medical practice, not to be subverted into hospital or other corporate practice. The hospitals voiced back, asserting that their institutional whole was greater than the sum of its parts, specifically including contract physicians.

At its 1949 meeting, the AMA adopted a resolution directing that its Council on Medical Education and Hospitals withdraw accreditation from any hospital found to be engaging in "the corporate practice of medicine."44 In December the AHA, in a statement by its board of trustees, responded that "specialized and diagnostic services such as radiology, pathology, anesthesiaology and physical therapy are vital to a high quality of patient care and are properly and customarily provided in a day of inpatient care."45 An AHA resolution urged hospitals to provide the services of those groups of physicians as a hospital cost. AMA legal counsel objected to using the force of accreditation to settle staff disputes in hospitals.

In 1953 the AMA and the AHA issued a joint statement on physician-
hospital relations which stated, in part: "The medical profession and the hospitals recognize that certain special services, such as anesthesiology, pathology, radiology, and physical medicine are integral parts of the practice of medicine and of the services necessary for hospital patients. Physicians in these fields should have the professional status of other members of the medical staff." None of this significantly changed patterns of radiologist-hospital relationships and contracts. Joshua C. Dickinson, an ACR chancellor, asked in the August 1955 ACR Bulletin: "Radiologists have insisted that they want the same relationship as other members of the (hospital) staff, but when the chips are down, do they?"

As the decade progressed, health care insurers gradually expanded coverage of X-ray diagnosis and treatment, primarily in hospitals. A 1955 Massachusetts Blue Shield proposal would have covered office radiology, but not by a general practitioner "unless he can produce evidence of adequate formal training in radiology." The numbers of radiologists continued to grow, although the presumption of their scarcity continued. Competition from other physicians remained a concern. Hubert J. Pritchard told the Los Angeles Radiological Society in January 1952 that 116 of the 350 physicians in his community of Long Beach had their own X-ray equipment.

In 1956 a national health plan worked out by the United Steel Workers of America with manufacturers provided a maximum of $75 a year for "diagnostic X-ray examinations (either in or out of the hospital) required in the diagnosis of any condition due to disease or injury..." To get the $75, the physicians had to agree to waive any added amounts otherwise claimed. This was among the first major plans to cover office radiology. Most radiologists thought it a considerable gain despite the initial limits.

**LEGAL RULINGS**

Beginning in the 1930s and continuing into the 1960s, rulings by state attorneys general in Illinois, Iowa, Colorado, Idaho, Florida, Virginia, Texas, and Connecticut all held that legal proscriptions on the corporate practice of medicine included hospitals seeking to profit from the services of physicians. The issue was joined most emphatically in Iowa, where a 1954 suit was filed by the Iowa Hospital Association and thirty-four hospitals against the Iowa State Board of Medical Examiners, the attorney general, the Iowa State Medial Society, and several individual pathologists. The basic issue was the right of hospitals to employ physicians. A lower court ruled against the hospitals, and they appealed. The appellate court directed the state medical and hospital associations to develop a joint policy statement which would respect the status of physicians.

The statement stipulated that hospitals could own and operate X-ray and laboratory facilities and should appoint physicians to head them, though not necessarily certified specialists.
nical personnel were hospital employees, except where the services were leased to physicians.

Pathology and radiology services performed in hospitals are the product of the joint contribution of hospitals, doctors and technicians but these services constitute medical services which must be performed by or under the direction and supervision of a doctor, and no hospital shall have the right, directly or indirectly, to direct, control, or interfere with the professional medical acts and duties of the doctor in charge of the pathology or radiology facilities.

The contract between the hospital and doctor in charge of the laboratory or X-ray facilities may contain any provision for compensation of each upon which they mutually agree, provided, however, that no contract shall be entered into which in any way creates the relationship of employer and employee between the doctor and the hospital, and a percentage arrangement is not and shall not be construed to be unprofessional conduct on the part of the physician or in violation of the statutes of Iowa upon the part of the hospitals.

The Iowa agreement also stated that admission forms should state the professional involvement of physicians and noted that fees were collected by the hospital for the physicians by agreement between them. Coverage for radiology and pathology would come from Blue Shield rather than Blue Cross. So, in one state, principle was upheld but hospital contracts remained the universal practice.

New diagnostic applications of radioisotopes posed turf problems as pathologists and internists took up their use. While radiologists dominated imaging procedures, radioimmunoassays and other chemical tests usually fell to pathologists and clinicians. Some argued that nuclear medicine should be a separate specialty. The ABR in 1957 began to give a special examination on isotope uses and granted a medallion to its diplomates who passed the test.

Area Blue Cross and Blue Shield plans, with their separation of physician and hospital benefits were joined by a growing number of commercial health insurers. These commercial plans could be national in scope, appealing to large companies with multiple locations. They made no arbitrary division of benefits between doctors and hospitals. In 1957 the Health Insurance Council announced that its member companies would follow community practice in paying for physician services in hospitals. The ACR Bulletin regularly listed health plans which added ambulatory radiology coverage.

In 1956 the California Medical Association devised a relative value scale (RVS) to rank and categorize medical procedures, mostly for the benefit of health insurers who needed more details than the traditional phrase “professional services” followed by an amount on a bill. Shortly, the Civilian Health and Medical Plan for the Uniformed Services (CHAMPUS) asked the ACR and other specialty societies to devise detailed RVGs for specialties. The ACR delivered its first version to CHAMPUS and to other health insurers early in 1958.

In 1960 the ACR surveyed 4,876 radiologists and received 2,900 responses. Of those responding, 73 percent worked part or full time in voluntary hospitals. Within that group, 69 percent reported that their names were listed on the hospital bill for their services. Another 16 percent worked in hospitals where patients did not pay for services, and 14 percent worked in clinics, groups, and private offices. Some 56 percent of the total said they had one or more private offices. In a separate study the ACR had estimated that a reasonable workload for a primarily diagnostic radiologist was 10,000 patients a year. This was based upon a mixture of fluoroscopy and film studies.

**MEDICARE**

A decade earlier, radiologists had been relieved when Congress declined to adopt any type of federal health insurance plan, despite the urging of President Harry S. Truman. By 1960, when the next Democratic president, John F. Kennedy, was about to take office, stronger pressures seemed likely to cause legislative action. The first bill was a limited hos-
hospital coverage package to be managed by the states. Many radiologists found their services included in state interpretations of the federal intent. Benefits were severely limited.\textsuperscript{56}

In 1961 California Representative Cecil King and New Mexico Senator Clinton Anderson introduced the first of a series of bills to provide federal hospital coverage for Social Security beneficiaries. Draft bills defined radiology, along with anesthesiology, pathology, and physiatry, as hospital services to be covered only by and through hospitals. The ACR protested in testimony before congressional committees and in a meeting with Wilbur J. Cohen, under-secretary of Health Education and Welfare (HEW) and the man recognized as the principal architect of the proposal. The AMA was "unalterably opposed" to both bills.\textsuperscript{57}

Although the King-Anderson bills did not pass for four years, they alarmed radiology leaders. Their terms indicated that society resolutions and attorney general rulings notwithstanding, the federal lawmakers had agreed with the AHA that, for payment purposes, radiology in hospitals was a hospital service.

In his 1962 ACR presidential address, L. Henry Garland raised the question of whether a division of the technical charges and professional incomes of radiologists in hospital practice might be a way of escaping hospital coverage.\textsuperscript{58} ACR chancellor, J. Maxey Dell, Jr., suggested that with such a separation, radiologists should send their own bills, as they did for office practice. A few radiologists, most notably Neal Yeomans of Waycross, Georgia, broke from hospital contracts, began direct billing, and survived financially to tell their stories.

When Lyndon B. Johnson became president at Kennedy's death in November 1963, the push for social legislation seemed certain to include medical care coverage. The day before Kennedy's death, ACR chairman David S. Carroll testified against the 1963 version of the King-Anderson bill: "Enactment of HR 3920 would, in our opinion, do irreparable damage to the medical specialty of radiology. The services rendered by radiologists in hospitals—to both inpatients and outpatients—are specifically included in the bill. The services of other physicians are specifically excluded. In the bill only a 'hospital' can be designated as a 'provider of services,' in this instance, a physician radiologist's services."\textsuperscript{59}

He noted that hospital employment of radiologists had declined to 11 percent. The 60 percent of radiologists with private offices would suffer if the elderly could get X-ray services as a benefit only in hospitals. His successor, Wallace D. Buchman, summed up the dilemma: "As long as our relationship with other patients and with the hospital is different from that of other physicians, we will continue to have trouble."\textsuperscript{60}

The ACR and the AMA continued discussions with the AHA, but neither side budged. At the 1964 meeting of the AHA, George W. Graham, chairman of the AHA Council on Professional Practice, sharpened the issue saying: "Hospitals and the community have an obligation to control the incomes of hospital based physicians."\textsuperscript{61} That same June, the AMA House of Delegates had reaffirmed its 1951 and 1952 policy statements against hospital resale of physician services. But now the battle was shifting to Congress.

When the new Congress assembled in January 1965, the portentous designations HR 1 and S 1 were given to the King-Anderson bills to establish a hospital care coverage bill for Social Security beneficiaries. Again, radiology, anesthesiology, pathology, and physiatry were to be covered as hospital services. President Johnson pushed the bills, and Wilbur Mills, the influential chairman of the House Ways and Means Committee, agreed to support them.

Late in January, the ACR Board of Chancellors held an emergency session in Washington. South Dakota Senator Karl Mundt, a conservative opponent of the bills, predicted passage and urged the radiologists to try for an amendment to get radiology out. He pointed out that the AMA could not seek the amendment for radiology and the other specialties because it was committed to oppose the entire bill. He recom
mended that the ACR hire its own lobbyist. A month later, ACR did, as did the American College of Pathology.

In February Buchanan wrote: "ACR leaders will need the help of every member during the next few weeks if we are to extricate our specialty from a federal hospital care measure. The time is short and the odds are long. But the future of radiology may well depend upon our success." A month later, he wrote, "It has been recommended that all members and fellows be strongly urged to strive for practice arrangements in hospitals under which the charge for radiological services would be separated into a hospital cost factor and into a professional fee."

Also in February the executive director of the AHA, Edwin Crosby wrote, "If this method (of separating professional fees from technical charges) is adopted, the hospital board of trustees has a responsibility to review and approve the radiologist's schedule of fees because of the monopoly situation inherent in hospital radiology."

Throughout the spring of 1965, ACR members learned to lobby with the guidance of their new legislative counsel, J. T. Rutherford, a former Texas congressman. On 23 March a version of the King-Anderson bill emerged from the Ways and Means Committee with radiology and other hospital-based specialties defined as medical service. What became Part A of Medicare was compulsory hospital cost coverage. Chairman Mills added a new Part B for voluntary medical coverage, including radiology. A third element, dubbed Medicaid, was a federal-state program providing federal and state subsidies for health care costs for indigents. The Medicare program covered Social Security beneficiaries and would be administered by private health insurance underwriters, mostly Blue Cross and Blue Shield plans and some commercial companies.

But the battle was only half over. The lead in the Senate Finance Committee was taken by Illinois Senator Paul Douglas, a firm believer in the hospital position. Exclusion of the hospital-based physicians was "mistaken," said HEW Secretary Anthony Celebrezze, reflecting an opinion held by President Johnson. The intent should be to cover services as they exist, paying those doctors on hospital contracts through the hospital. Physicians should be paid separately only when their billing is separate, he continued. The Senate version restored radiology as a hospital benefit when performed under contract.

Differences between House and Senate versions of legislation must be resolved in a conference between the two chambers before an agreed bill can be enacted by both and sent for presidential signature or veto. The intensity of lobbying on Medicare by both physicians and hospitals rose. With equal numbers of congressmen from each chamber, at least one member of one delegation had to break from his chamber's position to get a majority agreement on any point. Physicians supported the House version and sought a senator who could be persuaded to their viewpoint. That turned out to be Senator Russell Long of Louisiana, whose mother was being treated for cancer by a Shreveport radiologist, Winton Carroll.

"Radiologists were granted the right to have their services to patients classified by the government as medical service for beneficiaries of the new Medicare program in the final bill signed into law July 31 by President Johnson" was the lead sentence in the August 1965 Bulletin story about enactment of Medicare. "We were extremely disappointed in the specialist compensation provision," said HEW Undersecretary Cohen. When ACR leaders visited Representative Mills, who had been their champion, he accepted their thanks but reminded them that the ACR would have to do something to get radiologists out of their hospital compensation contracts or risk losing the congressional mandate. He noted that President Johnson had signed the bill despite "defects, which he would hope to have remedied." Senator Douglas reintroduced his version for future consideration.

In September Cohen lunched with the ACR Board of Chancellors meeting in Washington. He brought along the team who would administer the new
Medicare program. Admitting his disappointment in some elements of the bill, he promised to implement it as written. ACR President Wallace Buchanan responded with a promise of ACR cooperation.

Despite the legislative language, the AHA advised its members against changes. "From the association's discussions with agencies concerned with administration of the Medicare law and with its own legal counsel, it believes that the legislation permits the continuation of present arrangements with hospital based specialists. To restate this for emphasis, PL 89-97 does not require a change in existing contracts or other arrangements." The ACR chairman Jackson E. Livesay countered, "Radiologists wish to practice medicine as do their conference in medicine. Whatever pattern may evolve for other doctors, we wish to fit ourselves into the same pattern. We do not wish to be people apart practicing a specialty alien to the remainder of medicine." The ACR Board of Chancellors formally adopted a policy of separate billing of professional fees in hospitals in September 1965, to support its lobbying position. The AMA concurred in a called meeting of its House of Delegates in October. State medical and radiological societies adopted parallel resolutions.

But there were major problems. All but a few radiologists practicing in hospitals still worked under contracts wherein the hospital sent a combined bill and divided the return, most commonly on a percentage basis. Those without private offices had no experience in setting, billing, or collecting fees. For many, a monthly hospital stipend appeared in their checking accounts. The balance was resolved at the end of the quarter or year, using the hospital's numbers. Pathologists had the same problem. The ACR and the College of American Pathologists organized joint efforts to teach their members basic business methods.

In December 1965 the ACR tagged a billing workshop onto the annual meeting of the RSNA. It drew nearly one thousand radiologists, some with their newly employed business managers.

In February 1966 the Medicare administrators issued a statement of principles on hospital-based physician reimbursement which essentially agreed with the AHA that existing contracts could continue. It attributed a significant portion of radiologist income under hospital contracts to management services which the radiologist furnished as departmental director. These alleged radiologist services would need to be separated from income attributed to patient services in determining what would be paid by the Part A hospital service fund and what might be charged to the Part B medical service fund. The allowed level of fees would be projected from the part B portion of the radiologist's previous income. Medicare decreed. The ACR objected to the Medicare presumptions, noting in particular that they did not apply to other physicians, such as orthopedists, who performed radiologic procedures in hospitals.

By the hundreds, radiologists began to amend or terminate their contracts for combined billing with hospitals. By April 1966 forty-four state radiology societies had resolved to help their members make the change. The Wisconsin society reported that radiologists in fifty-five hospitals would be sending their own bills for professional fees by July. Not all changes went smoothly. In his July 1966 "Chairman's Memo," J. E. Miller reported losing his appointment at Baylor University hospital in Dallas, Texas, because of his insistence on separate billing.

Some administrators realized that independent billing by radiologists relieved them of a financial burden for bad debts and administrative costs. Some medical school deans recognized that billing by their radiologists was a new source of revenue. But other administrators and radiologists felt that the status quo ante bellum had served them well and fairly and that change was not required. The AHA continued to preach about the hospital's responsibility to protect its patients against radiologists. A few hospitals announced to their communities that the radiologists' proposed charge was a new cost, over
and above the hospital charge, rather than being a portion of the previous amount. Administrators at Chicago's Cook County Hospital began billing for radiology to Medicare patients on behalf of their salaried radiologists and amassed several million dollars, which was not shared with the radiologists.

In 1967 Congress made changes in the massive Medicare program, most of which were technical. But the issue of hospital-based physicians reimbursement boiled up again. The AHA and its champion, Senator Paul Douglas, returned to the fray. Nelson Cruikshank, an official of the American Federation of Labor, wrote, "Nowhere in Medicare was the consumer interest more disregarded. It represents the desire of one group of specialists to have their cake and eat it too."71

However, a survey by the AHA in the spring of 1967 showed that more than two thousand hospitals reported a change in their relationships to radiologists and pathologists in the year following enactment of Medicare.72 An ACR survey, published in the April Bulletin, indicated optimistically that two-thirds of radiologists in hospitals where patients paid for services had begun to bill professional fees separately from hospital charges.

The congressional response was a technical solution. It ruled that all of outpatient radiology would be regarded as a Part B service, subject to deductibles and co-insurance and billed to the Part B carrier. All of inpatient service would be a Part A service, with 100 percent coverage, billed to the Part A intermediary. The two insurance plans could resolve the separation of professional and technical elements.

The 1967 congressional debates marked the last significant effort by the AHA to recapture radiology fees. However, the AHA Council on Professional Service asserted: "X-ray and laboratory services are fundamental to proper diagnosis and treatment of hospitalized patients. It is the responsibility of the hospital to make these services available, and therefore these services, including the professional components thereof, are indeed hospital services; they can be provided with proper excellence only when the hospital and specialists involved work together in amicable and productive cooperation."73

An ACR survey in the spring of 1968 indicated nearly 70 percent of respondents said they were billing some professional fees. Of the respondents, 48.3 percent billed all patients in patient-paying hospitals, 20.5 percent did partial billing, 10 percent were negotiating to bill, and 19.2 percent had no intention to seek their own billing. Only a few reported trying to bill and failing.74

A 1966 survey by ACR had indicated a 1 percent rise in radiology fees yearly since the end of World War II. A 1968 ACR survey indicated a 5 percent increase from 1966 to 1968. Hospital charges for radiology, mostly reflecting the separation of professional fees, rose by 50 percent in the same time period. Salaries for technologists rose by 20 percent, as well. Fees for a sample of procedures increased by 6 to 8 percent.75

These magnitudes of increase were prevalent across all of medicine, along with a marked increase in the volume of physician and hospital services. Early Medicare statistics quickly demonstrated that the elderly consumed three times the level of medical services needed by younger Americans. Medicare and Medicaid soon accounted for a third of national spending on health services for a tenth of the population. National health spending increased on average 10 percent each year from 1960 to 1990.76

Health insurers and Medicare administrators began to believe that radiologists had broken away from hospital joint billing. In October 1969 Medicare Administrator Thomas Tierney wrote the ACR to advise that where radiologists received no money from a hospital for administrative, research or teaching, the Medicare medical insurance carriers would be instructed to recognize the entire fee as a Part B service charge.77 This change eliminated previous arbitrary reductions in fee determinations for most radiologists.

**THE NEW SHAPE OF RADIOLOGY**

Amid the ongoing struggles toward independent practice in hospitals, other
significant changes began to affect radiology late in the 1960s. One was the advent of new technologies: the gamma camera for nuclear imaging, an array of ultrasound techniques, a few years later computed tomography (CT) and magnetic resonance (MR) imaging. Other computer applications were in image analysis, storage, retrieval, and transmission.

Hospitals also were changing. Health planning requirements enacted in the mid-1970s imposed limits on hospitals but usually not on private facilities. A new player, the for-profit proprietary hospital chain, began to gobble up community hospitals and a few academic centers.

With radiologists now separate from hospitals, X-ray departmental administrators began to appear, responsible to the institution and making many decisions previously made by the chief radiologist. Radiologists lost the final say over purchases of equipment and supplies to a purchasing agent, who looked at costs rather than at the radiologist’s preferences.

By 1970 a new structure, the health maintenance organization (HMO), began to offer managed care to patient groups. HEW Secretary Elliot Richardson proposed that Medicare recognize HMOs as an alternative to fee-for-service plans.

The advent of new imaging technologies and the abundance of young physicians brought a further challenge—the desire of other specialists to do their own imaging procedures. Struggles with cardiologists, neurologists, internists, urologists, and obstetricians supplanted hospital relations as the specialty’s most pressing problem. The Joint Commission on Accreditation of Hospitals altered its earlier principles that all radiologic procedures were to be performed and interpreted by radiologists.

Earlier, cardiologists had pioneered applications of catheter techniques with fluoroscopy for studies of the coronary arteries. Cardiology training programs began to teach catheter techniques, and their graduates demanded their own laboratories, separate from vascular labs in radiology suites. Insurers paid any physician who billed for a service, regardless of specialty or demonstrable qualifications.

Radiologists had always accepted that their relatively scarce numbers and lack of total geographic distribution would require other physicians to perform some radiologic procedures. But with the specialty doubling its numbers between 1960 and 1970, some radiology leaders began to assert that all radiology should be done by radiologists. For example, in a 1973 “Chairman’s Memo” Robert E. Wise wrote:

It has taken us a decade to build our specialty up to the point where we can contemplate providing the radiologic services needed by the American people. This puts us in a position to assert that radiology should be done by radiologists where we are available to do it. And now we can say that most American communities can have access to a radiologist’s services on some reasonably convenient basis.

Definitions of radiology began to take on a new importance. When Medicare agreed in 1973 to cover ultrasound as a radiology service, the decision meant that inpatient procedures would be paid at 100 percent of allowable fees, rather than the 80 percent paid to other physicians. Some cardiologists objected to heart ultrasound procedures being defined as radiology, even for 20 percent more. A year later, Medicare reversed its position, ruling that no ultrasound procedures were radiology. Finally, in the 1983 regulations to implement the Medicare changes of 1982 and in the 1987 Medicare changes, Medicare and Congress used statutory language to define ultrasound as radiology.

CT posed a different kind of problem. Even so, their cost of $1 million or more made CT scanners a target for a whole set of new challenges from public agencies. The Food and Drug Administration (FDA) had to attest to the “safety and efficacy” of CT. Medicare and private health insurance carriers had to agree to pay for CT examinations. Hospital-based units required a certificate of need from local and state health planning agencies.

The FDA approved the early CT units fairly quickly. As it happened, Medicare approved coverage for head
Robert W. McConnell set the scene: "Ponder the significance of an efficacy study. Efficacy, let us say, is the assessment of the clinical significance of our examinations on the medical care of the patient. How did our findings contribute to his care? Were they the crucial factor, a significant factor, a marginal factor, or a waste of our time and the patient's money? The answer, obviously, must depend upon each patient, each study."

A year later, ACR began a series of contracts with the Public Health Service to develop efficacy algorithms. The emergency room skull series for head trauma was the examination chosen. Clinicians were asked to rate their expectation of useful information from the X-ray study before and after receiving findings. The study served as a prototype for others and produced significant papers. Ultimately it foundered on statistical disputes, decision theory quarrels, and waning clinician cooperation.

### Radiologists in Court

A major challenge to radiologists, their organizations, and all of medicine flowed from a 1967 Supreme Court decision about legal fees set by a state bar association. The upshot of that decision was to extend anti-trust law to cover the activities of all professionals and their societies.

For radiology, this problem first surfaced in a notice from the Federal Trade Commission (FTC) advising ACR and several other specialty groups that their relative value scales were anti-competitive and constituted a form of price fixing. In the years since the ACR responded to the CHAMPUS program with its first RVS, subsequent versions had been adopted widely by health insurers, including Medicare, and by health regulatory bodies. The ACR had avoided suggesting a specific dollar conversion factor or multiplier to convert the relative value into a fee. Even so, the FTC was unpersuaded. Faced with the unhappy prospect that an adverse FTC finding might be used by others to sue for anti-trust damages, the ACR Board
of Chancellors decided in 1976 to accept a consent order agreeing to withdraw its RVs.\textsuperscript{86}

In the fall of that same year, the ACR and several other medical societies, including the AMA and the AHA, were named as defendants in a suit by five chiropractors alleging that the thrust of medical ethics prohibiting professional consultations between physicians and chiropractors was an anti-trust violation and a restraint of trade. Several other chiropractic suits with similar charges followed.

The initial suit, \textit{Wilk v. AMA}, cited a series of ACR resolutions expressing its opinion that patients would not benefit from chiropractic use of X rays. The suit alleged:

That the ACR and others are refusing to permit radiologists to take, process or produce X rays ordered by chiropractors and to make previously taken X rays available to chiropractors even upon request of the patient involved. It is alleged that the ACR has refused to permit radiologists to associate with chiropractors in group practice, teach at chiropractic schools or programs, to permit chiropractors to lecture at medical establishments or meetings and has influenced insurance companies to refuse to write private insurance policies covering chiropractic.\textsuperscript{87}

The trials and appeals extended more than a decade. Most defendants settled even before trial. In the face of a verdict against the ACR in a federal court, it accepted a settlement, leaving the AMA as the only defendant. The ACR settlement included publishing a statement that it would have "no ethical or collective impediments to interprofessional association and cooperation."\textsuperscript{88}

The verdicts and settlements had the effects of opening hospitals to chiropractic referrals and of persuading many physicians to accept consultations lest they be sued as individuals. In New Jersey a combined board of medical licensure ruled that radiologists could not refuse to accept referrals from chiropractors.\textsuperscript{89}

The professional well-being of radiologists was affected by two other types of legal actions in the same time period. In a series of decisions, federal courts held that hospitals and medical groups were entitled to enter exclusive contracts, even though the results of such contracts were the exclusion of other physicians from practice in that hospital.\textsuperscript{90} In one case, a neurologist was denied the right to interpret CT scans in a hospital because of an exclusive agreement that radiologists would interpret all medical imaging procedures.

In a suit which lasted several years, the ACR and its Maryland chapter joined Edward Soma and his radiology and pathology colleagues at Holy Cross Hospital in Silver Spring, Maryland, in resisting the assertion of the Maryland Health Services Cost Review Commission (HSCRC) that its mandate to regulate hospital costs extended to the professional fees of radiologists and pathologists billed independently. In the final decision on the case after appeals and a remand, Montgomery County Judge Philip Fairbanks wrote:

Accordingly, hospital-based radiologists and pathologists and presumably all other hospital-oriented physicians have a choice. If they wish to escape state regulation of their fees, they can bill patients directly, deal with third-party payers themselves, accept a lesser percentage of payment from these agencies and assume bad debt risks. On the other hand, they can allow hospitals to include their professional fees as costs of the hospital with the economic and administrative advantages to them attendant on such an arrangement. If they choose the latter alternative, their fees then become subject to the HSCRC jurisdiction because they are included within the "total costs of the hospital" as that term was understood in the health care field in 1971 when the (Maryland) law was enacted.\textsuperscript{91}

\textbf{Enough Radiologists}

The growth of radiology into the 1980s appeared likely to invert the historic presumption of a radiologist shortage. The federal Graduate Medical Education National Advisory Committee (GMENAC) studying health manpower noted that the number of radiologists increased from 8,768 in 1965 to 16,709 in 1976—nearly 5 percent of all physicians. GMENAC predicted a supply of 27,050 radiologists by 1990, a further 40
percent increase. GMENAC estimated the national need for radiologists as 15,500 to 17,100 by 1990. The GMENA-
C study failed to reduce the growth of radiologist numbers.92

FDA official John C. Villforth charged in the winter of 1980 that 30 percent of 278 million annual medical imaging procedures were "medically unnecessary.93 He claimed the charge for those procedures wasted $2 billion of the total national spending of more than $6 billion yearly on diagnostic imaging. The basis for his charge was a mixture of repeat rates, "unneeded lateral chest" X rays, and papers challenging the volume of specific procedures. Though the ACR protested, some radiologists agreed that many referrals were inappropriate.

Several indicators of the successes of radiology included:

An FDA report predicted that a fourth of all new medical technologies to be reviewed by the agency in the next five to fifteen years would involve radiology diagnosis or treatment.94

Vanderbilt University economist Bruce Steinwald told a conference sponsored by the Health Care Financing Administration (HCFA) that "the trend for fee-for-service...is certainly there." According to his 1978 study, 73 percent of hospital-based radiologists were billing their own fees, 12 percent were still paid on percentage basis and 15 percent were on salary. The average net income for radiologists in 1977 was $69,000—20 percent more than the average for all office-based physicians.95

With more than 1,300 CT scanners installed by 1981, a District of Columbia court held that a hospital lacking a CT scanner should have referred a patient to a facility with one and was legally liable for failing to do so.96 That same year, a more scientific endorsement of CT scanning came from a National Institutes of Health conference, which pronounced it "safe, powerful and cost-effective.97

One result of the impact of federal and state health planning on hospitals late in the 1970s was a renaissance of free-standing facilities not covered by planning requirements. Ambulatory surgery centers, emergency clinics, radia-

ation therapy centers, and costly imaging facilities began to proliferate and to influence the way radiologists practiced and were paid.

In 1982 Congress made a significant change in Medicare as part of the Tax Equity and Fiscal Responsibility Act (TEFRA) of that year.98 In regulations stemming from the legislation, HCFA (Medicare) recognized the separation of radiologists from financial dependence upon hospitals by decreeing that Medicare would no longer accept billing, which combined the professional and technical components. HCFA proposed to disallow any community hospital markup on billing for the services of salaried physicians, though the exemption for academic centers remained. The regulations also directed that Medicare medical insurance carriers apply the "40 percent rule" to professional fees in hospital departments. This was a determination that Medicare would pay no more for a radiologist's professional service in a hospital than it would for the same service in a local office, where Medicare imputed 60 percent of the charge for technical costs and 40 percent as a return on the radiologist's time. That provision applied only to those services also available outside a hospital setting in that community.99

The 1982 legislation created a Medicare prepayment system for hospital inpatient services based upon classification of every patient into one of 470 diagnosis related groups (DRG). Physician fees were not involved with the new hospital payment method. Radiologists recognized that the hospital's incentive to expand radiology services would be diminished if the Medicare pay was fixed, regardless of how much service an individual patient with a specific DRG classification might require.

Three years later, the idea of developing a doctor DRG to pay all physicians participating in the care of a hospitalized Medicare patient emerged. In 1986 a draft Medicare amendment from the House Ways and Means Committee proposed a combined payment for the hospital based groups (radiologists, anesthesiologists and pathologists, or RAPs). Later that year,
President Ronald Reagan proposed a doctor DRG to make one payment for all medical service during a Medicare patient's hospitalization.

The dispute over this proposal combined with a quarrel within medicine to create a crisis for radiology. The other dispute was based on the conviction of family physicians and internists, in particular, that the historic basis of health insurance unfairly favored the “procedural services” of surgeons and radiologists over the “cognitive services” of primary physicians. Any survey of physicians’ incomes gave some credence to that complaint. In 1985 Congress responded by authorizing a study of physician reimbursement. The contract for the study was awarded to investigators at the Harvard School of Public Health led by an economist, William Hsiao. HCFA had felt that medical societies should not make the study. However, Hsiao’s previous studies, concluding that all physicians were overpaid and that procedural doctors were more overpaid than others, were not considered a basis for his disqualification.100

By the beginning of 1987 virtually all national physician groups were organizing campaigns to ward off enactment of a doctor DRG proposal. The Republican Reagan administration announced that it would start by applying the concept to the three hospital-based groups (RAPs). The AMA announced that it would organize the defense for all of medicine.

In the absence of a specific legislative proposal, the ACR attempted to convince the Democrat-controlled Congress to ignore the RAPs proposal, as it customarily did most proposals from a Republican president. The AMA took a different tactic toward the same end. With much help from other specialty societies and state medical associations, it sought a concurrent resolution, a congressional device stating the “sense of Congress” that the introduction or consideration of a RAPs proposal should not be supported.101

By April 1987 tensions had developed between ACR and AMA, with the bulk of other medical societies criticizing ACR for failing to follow the AMA lead. ACR leaders by then were convinced that Congress would not adopt the RAPs proposal, but that the furor created by the concurrent resolution effort was generating a broader interest in physician payment reform.

Although every medical organization had opposed the RAPs proposal, most had publicly asserted that the existing Medicare payment system needed significant change. The primary care physicians believed that the needed change should equalize their compensation with their “procedural” colleagues, even though they had been admonished that any added compensation for them would mean a reduction for some other physicians.

In testimony to the Health Subcommittee of the House Ways and Means Committee on 13 May 1987, ACR President Joseph A. Marasco, Jr. urged a Medicare change to physician fees based upon a relative value schedule. Such a change would require Congress to exempt medical societies from anti-trust stricutures on developing such schedules, he said. A schedule based upon actual billing experience would be much superior to the theoretical “resource based relative value schedule” being explored by the Hsiao group at Harvard, he added. Subcommittee chairman Fortney H. Stark of California asked if radiologists would take the lead, even if other physicians did not agree. Marasco’s answer was affirmative.

When Stark’s subcommittee began to draft Medicare amendments in June, most other medical groups lobbied against an experience-based relative value schedule. The subcommittee considered and rejected the RAPs proposal. The House Commerce Committee Health Subcommittee then inserted language authorizing HCFA to develop an experience-based relative value schedule for radiology with the help of the ACR and other interested organizations. It limited its applicability to radiologists and other physicians billing primarily for imaging procedures. It stipulated further that the radiology schedule would be integrated with any subsequent resource-based system.102 The radiology relative value authority survived congressional debate and
medical lobbying and was incorporated in the final bill passed in November.

It was a difficult year for radiologists. AMA Executive Vice President James H. Sammons demanded that ACR leaders resign. Joseph A. Boyle, executive vice president of the American Society of Internal Medicine, in a letter to ACR, accused it of seeking "radical separation" from the rest of medicine. But when the combination of resource-based relative value methodology and federal cost cutting failed to produce notable increases in pay for cognitive services, many physicians began to concede that the ACR might have acted prudently in taking a proactive stance.

Pressures to reduce increases in Medicare costs resumed in 1988 and subsequently brought repeated congressional cuts. Medical groups including the ACR complained that federal programs could not be trusted to keep agreements. Congress had mandated that the trade-off for radiology relative values was to be a 3 percent reduction in radiology payments. But many practice groups encountered much greater reductions. In general, Medicare reductions amounted to some 21 percent of 1987 fee levels for radiology services by 1991. Practices with fees above community averages in 1987 lost larger amounts.

OTHER CHALLENGES, OPPORTUNITIES

While the specialty was concentrating on reimbursement difficulties with the Medicare program and the medical squabbles they engendered, other developments in medical policy and economics began to change the lives of radiologists. One was the acceptance of screening mammography. This was dramatic, because it brought radiologists into direct patient contacts without physician referrals. A second was the rise of joint venture ownership of imaging centers and other medical facilities by physician owners and other investors. A third was a renewed hospital effort to overcome payment squeezes from health insurance carriers by tapping into physician billings. The fourth was the need for radiologists to fit their practices into a growing array of managed care health providers. By 1993 some form of managed care was local to health reforms proposed by President Bill Clinton and seemed likely to succeed fee-for-service as the dominant payment mechanism for health services.

The mammography saga reflected the ability of radiology to capitalize on a scientific development. Clinical acceptance of mammography was stimulated strongly by the American Cancer Society and the National Cancer Institute programs for education of physicians and technologists. Support for mammographic screening for women beyond a set age became an emotional issue. Women's organizations, television personalities, magazine columnists, and women legislators took the lead in pushing mandatory health insurance coverage of screening mammography. The resulting legislation and regulations established a precedent by setting national requirements for a single diagnostic procedure and extending those requirements to all facilities which performed mammograms for any patient, not just those covered by federal programs. The federal regulations for mammography facilities closely paralleled the voluntary standards developed by the ACR and had the effect of defining mammography as a procedure to be supervised and interpreted only by qualified radiologists.

How this would loom as a precedent for other physician groups and other procedures as a basis for government definition and control of radical practice concerned only a few radiology leaders.

The waxing and waning of the medical joint venture movement proved to be vexatious to radiologists for a decade and more. A key to the conservative Reagan administration health policy during the 1980s was emphasis on competition, rather than regulation, as a primary mechanism for balancing health spending. The rise of for-profit enterprises which bought or built hundreds of community hospitals was one manifestation. Some of the entrepreneurs also invested in outpatient facilities, managed care schemes, and health insurance companies. For the most part in the 1980s, these chains brought better management and cost controls to their
hospitals and left the staffs alone on fee-for-service arrangements.

But the hospital chains were not the only venture capitalists to seize a health opportunity. With national health spending reaching 11 to 12 percent of the gross domestic product and increasing by 10 percent yearly, many physicians saw an opportunity to make money on health ventures beyond their fees for patient services. \(^{108}\) Hospital planning requirements and reduced federal guarantees for hospital expansion, dating from the late 1970s, had spurred the placement of expensive, high-technology facilities outside acute care institutions. Insurance programs, seeking lower costs, generally allowed reimbursement for ambulatory surgery, radiation therapy, and sophisticated imaging.

Thus the number of imaging centers became significant in the early 1980s. In some communities, a radiology group raised its own capital to install CT and MR units, ultrasound, mammography, and general diagnostic facilities. Radiation oncologists financed radiation therapy facilities with linear accelerators, simulators, and computer-based dosimetry.

Many imaging centers were joint ventures. Hospitals invested in some, often hoping to share the profit with staff physicians and to hold their staffs to the institution. Private investors started many. Most were physician joint ventures, in which physicians who might expect to refer patients to the center became its owners.

Questions of ethics and propriety arose. Did a physician-investor's return from an imaging center tied to his volume of referrals skew his medical judgment? Did the tying of referrals and profit represent a violation of anti-trust laws or other public policy?

The ACR council wrestled with the issue in 1984. ACR President Jerome F. Wiot cautioned that "...we will have abandoned our ethical standards if we give any support to the concept of imaging centers owned partially or totally by physicians other than radiologists." \(^{104}\) But the council adopted a guideline which asserted: "Dividends or profits related to such investments should be commensurate with the individual's investment. No physician investor should participate in a system which offers financial rewards for patient referrals or practice patterns which are medically inappropriate." \(^{105}\) The next year, the council amended its statement to "recognize and acknowledge the potential for abuse by self-referral in imaging and/or radiation therapy centers owned either in whole or in part by referring physicians." \(^{106}\) By 1988, with joint ventures proliferating, the council reversed its 1984 stand. "The position of the ACR is that the practice of self-referral of patients for a diagnostic or therapeutic medical procedure may not be in the best interest of the patient. Accordingly, referring physicians should not have a direct or indirect financial interest in diagnostic or therapeutic facilities to which they refer patients." \(^{107}\)

By that time some public agencies had also become concerned. The 1987 Medicare amendments strengthened the government's ability to pursue fraud and abuse in the Medicare program. \(^{108}\) Authority for this was vested in the Office of the Inspector General (OIG) of the Department of Health and Human Services. OIG was directed to develop guidelines for acceptable business practices by health care providers. The ACR encouraged such public attention in its 1988 resolution.


The AMA House of Delegates began to study the issue in 1989 and referred the matter to its Council on Ethical and Judicial Affairs via the board of trustees. \(^{110}\) The initial AMA position declared that a physician-owner of a medical facility had the obligation to advise patients of his ownership interest. \(^{111}\) Resolutions at the June 1990 House of Delegates meeting stirred the
issue and asked action against hospital kickback demands on physicians, as well.

The documentation of self-referral abuse began to mount. Bruce Hillman and others in the New England Journal of Medicine for 6 December 1990 demonstrated a seven-fold increase in volume and charges for imaging services by primary care physicians who did their own imaging over what was needed by primary care physicians who referred imaging to radiologists.\(^{112}\)

Two studies of joint ventures in Florida demonstrated the extent of physician investment and concluded that such enterprises ran up the cost of health care.\(^{113}\) "Joint ventures in radiation therapy appear to have adverse effects on patients' access to care. They also appear to increase the use of services and costs substantially," Mitchell and Sunshine concluded in one study.

At its winter 1991 meeting, the AMA House approved of a report from its Council on Ethical and Judicial Affairs (CEJA) condemning joint ventures: "Physician investment in health care facilities can provide important benefits for patient care. However, when physicians refer patients to facilities in which they have an ownership interest, a potential conflict of interest exists. In general, physicians should not refer patients to a health care facility outside their office practice at which they do not directly provide care or services when they have an investment interest in the facility.\(^{114}\) An exception would be allowed, CEJA wrote, "if there is a demonstrated need in the community for the facility and alternative financing is not available."

The delegates reversed their stand in June 1992 in adopting resolutions from New Jersey and Florida delegations, whose members argued that they should not be obligated to give up joint ventures. Then, in December 1992, the delegates again reversed their stand to end up supporting the CEJA report strongly.

Early in 1991 Richard Kusserow, the Department of Health and Human Services inspector general, issued a management advisory and then followed in July with guidelines on what the Medicare program would consider acceptable business practices. The guides were expressed as "safe harbors," in effect, defining accepted practices and leaving any other arrangements in some jeopardy of prosecution.\(^{115}\) The eleven areas covered not only investments but also rentals and services. "The amount of return must be directly proportional to the actual capital investment and not related to past or expected referrals. Physicians, and hospitals, in a position to refer might not own more than 40 percent of the enterprise, with investment open to all comers on the same basis."

For radiologists, the related issue of hospital kickbacks proved equally difficult. ACR Board Chairman James Moorefield wrote in his "Chairman's Memo": "An increasing number of hospitals are attempting to extract a percentage of radiology professional fees. . . . The devices by which hospitals attempt this vary widely, from requiring radiologists to use the hospital's billing service, often for a fee that exceeds the fair market value of the services rendered, to outright demands for the radiologists to contribute to the building fund or . . . to pay an exorbitant monthly fee for unwanted 'marketing services.'\(^{116}\)

Kusserow also warned hospitals of possible liability for fraud in seeking portions of physicians' fees.\(^{117}\) Late in 1991 the Internal Revenue Service issued a memorandum warning that some kinds of joint ventures between doctors and hospitals might violate the tax-exempt status of voluntary hospitals.\(^{118}\) Several lawsuits had been filed by radiology groups who had lost hospital privileges for refusing kickback demands.\(^{119}\)

All the questions about relative values, fees, and relationships paled by comparison with the need for radiologists to adapt to managed care programs as these mechanisms gained significance. The bases of any managed care program were management efficiencies, economies of scale, and risk shifting. The idea is that an entrepreneur of sufficient size can arrange to buy health care for any patient population on an annual fixed price per patient basis from an enterprise which organizes doctors and hospitals to provide such care. Having accepted a fixed
price, the managed care plan is at risk to provide the needed care of subscribers without spending more for doctors and hospitals than it collects.

By the 1990s most radiologists had coalesced into radiology groups ranging from two to sixty radiologists and averaging seven. Some worked in multispecialty clinics, some in faculty practice plans, and a relative few were salaried hospital employees. But for most, radiology practices had become sizable businesses, covering one or more hospitals, owning several offices or imaging and therapy facilities, and having capital investments of several million dollars.

These groups found themselves negotiating with managed care plans as those plans captured patient populations. In effect, radiology groups had to bargain away a percentage of their fees, or accept a per patient stipend, to keep the patients they and their hospitals had been serving. In some cases, the reductions were fixed by agreement. In others, the radiologists’ ultimate payment related to the managed care plan’s financial viability. In some communities, hospital responses to managed care packages prompted mergers, which, in turn, required mergers, or accommodations between radiology groups.

Medicare and its related programs had much earlier been authorized to allow beneficiaries to join managed care programs as an alternative to fee-for-service practice. Many large companies such as Dupont strongly urged or even required employees to obtain health care through managed care plans to retain coverage under employee benefit programs.

**CONCLUSION**

Said Lee F. Rogers in his 1991 ACR presidential speech:

We started out with red goggles and barium... We came literally from darkness into light. We have been propelled by a technologic tempest, urged on by our more adventuresome colleagues, men and women of energy, insight, courage and skill, who created, accepted, and met challenge after challenge to bring us to where we are today. We started out as an accessory to the practice of medicine and became central to the diagnosis and treatment of disease.

As the specialty of radiology approached its one-hundredth year, its practitioners in the United States exceeded twenty-seven thousand and the annual billings for their services were estimated at $11 billion or more. Most radiologists practiced in groups with other radiologists. Most groups had multiple sites of practice in hospitals and their own private imaging or therapy offices. Most groups had developed sophisticated billing, financial, marketing, and management structures. By 1995 radiology groups faced the challenge of relating to the managed care mechanisms, the hospital chains, the federal payment programs, and the venture capitalists that were changing all of medical practice. By dint of their size and sophistication, many radiology groups were better able to make effective responses than were physicians in many other disciplines.

Radiology had been an acquisitive specialty, incorporating the bulk of isotope and ultrasound procedures, adding CT and MR, scrapping for performance of catheter-based interventional procedures, asserting a strong role in cancer treatment, and adopting the electronic wonders of the computer age to every element of image production, storage, retrieval, transmission, and even analysis. Advances in radiology practice significantly altered the practices of surgeons, neurologists, urologists, orthopedists, and others, thus fomenting the medical turf squabbles which became a dominant concern in the last quarter of radiology’s first century.

The technical advances in equipment and procedures had eliminated the hazards of early radiology. Radiology posed no unique health problems to its modern practitioners. Public regulation of radiology was relatively benign, though special requirements for medical uses of radioisotopes continued in force.

Much of the success of radiology in its first century can be credited to the willingness of radiologists to create effective organizations to further their myriad causes. By the turn of the cen-
tury radiologists had created more than forty national professional organizations to reflect their range of interests. Most were devoted to advancing the science of radiology. In the second half-century the lead in economics, practice management, public relations, professional relations, government relations, and standard setting fell to the ACR, which attained the membership and resources to undertake substantial programs in these areas.

Radiology thrived in its first century. As a group, radiologists were aggressive, inquisitive, and inventive. Their practices and their techniques prospered. In the face of great changes in medicine in the 1990s, radiologists were secure in widespread recognition of the value of radiologic science. But they remained concerned about the future of a specialty devoted to that science.

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