



Episode 9: Leading with Integrity
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Geoff: Hello and welcome to "Taking the Lead," a podcast from the Radiology Leadership Institute that profiles radiologists as leaders, seeking insight and inspiration from a variety of perspectives and experiences. I'm Geoff Rubin. Today, I'm speaking with Jim Thrall, the distinguished Juan Taveras Professor of Radiology at the Harvard Medical School. Dr. Thrall service to radiology spans over 40 years, leading academic departments of Radiology in both national and international professional organizations.

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His formal roles have included 5 years as the chairman of Diagnostic Radiology at Henry Ford Hospital, followed by 25 years as Radiologist-in-Chief at the Massachusetts General Hospital. Amongst his many accomplishments as chair at MGH was the establishment of research programs that led to the highest level of extramural funding among all academic radiology departments in the United States and a number of firsts in bringing sophisticated management systems, information technologies, and marketing approaches to the practice of radiology.

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He has served as president and chairman of the board of chancellors for the ACR, president of the American Roentgen Ray Society. And served important roles as an advisor to the National Institutes of Health, as well as numerous other influential leadership and strategic roles. He has been a member of a variety of corporate boards of directors and currently serves as chairman of the board of directors for both WorldCare Limited and Mobile Aspects, Inc.

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Well, it's easy to get lost in all of the titles and roles, what makes Jim unique has been his vision and commitment to advance the science and practice of radiology. By forging new capabilities, he has distinguished his organizations time and again, achieving success through creative and highly innovative approaches.

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Our conversation touches upon a wide array of topics, including the evolving nature of business and technology expertise that is fundamental to leadership in radiology, the coming revolution in artificial intelligence, and Jim's extraordinary ability to develop programs that delivered value to the department while endearing referring physicians to radiology.

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Before we dive into the podcast, I have a quick favor to ask you. After you've listened, please take a minute to subscribe to the series, share it with your colleagues, and rate the episode with five stars. It really makes a difference. Now, let's get started.

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Jim, welcome.

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Dr. Thrall: Thank you.

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Geoff: You were born in Ann Arbor, Michigan and, with the exception of a year in Tübingen, appeared to have stayed there until your graduation from medical school. With the University of Michigan being the dominant force on the local economy, I wonder if you had family members working at the university.

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Dr. Thrall: Very perceptive, Geoff. My father was a mathematician. He was on the faculty of the University of Michigan when I was growing up. In fact, I was born in the University of Michigan Hospital.

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Geoff: Terrific. And can you tell us a little bit about what your childhood was like growing up there in Ann Arbor?

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Dr. Thrall: It was terrific. Times, frankly, were much simpler then, I would say even idyllic. Because...at a time when you could open the door to the house even at the age of 5 years and venture forth without any concerns and at the same time Ann Arbor, being the home of a huge institution of higher learning, created a cultural environment that was unique. So by the time I was out of high school, I'd been able to watch Herbert von Karajan conducting the Berlin Philharmonic. Eugene Ormandy came with the Philadelphia Orchestra every spring for something called May Festival. And of course, there were many stage productions and other cultural events that my parents somehow made sure the children took advantage of.

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Geoff: And how many children were there?

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Dr. Thrall: There were three of us. I have an older brother and a younger sister. They both left town for school and I think that may be one of the reasons I remained in Ann Arbor. My brother was just a year older and university professors didn't make a lot of money in those days. I'm not sure they make a lot of money today. But I actually lived at home while I attended the university as an undergraduate.

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Geoff: And looking back, what do you consider to be defining moments and influences from your childhood that influenced your subsequent career and, in particular, your approach to leadership?

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Dr. Thrall: Well, I must say that growing up in the household of a mathematician, I was exposed to other mathematicians from around the world. And I thought that was basically all a person could do. I didn't really have a larger view of the world and when I matriculated at the university, I did so as a math major. But the pivotal time for me was when I went to Germany for my junior year of college. I lived in the household of a medical family. The father was the director of the Max Planck Institute for Virus Research in Tübingen, the mother was a pediatrician. One of the other children was in medical school. And my eyes were opened to the world of medicine.

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I pivoted during that year from math to interest in medicine, came back to Ann Arbor for my senior year, finished up my major in mathematics while I completed the prerequisites for medical school. I have to say, none of this actually led me in the direction of thinking about leadership. That came much later. I didn't really flourish in medical school, frankly. There were a number of cultural aspects to it in the 1960s that were not conducive to my point of view. And I never thought about an academic career. But it was the era of the Vietnam War, and I wound up going into the army for my internship and residency.

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And in the army, I had a chance, at a very, very young point in my career, to be the assistant chief of Nuclear Medicine at Walter Reed. That's what really started me on a leadership track. I realized that I really enjoyed helping make

things happen. And when I came back to the University of Michigan on the faculty, as a very junior faculty member, in some sense, I stepped backwards with respect to leadership. I was buried in a very senior group, very accomplished group, didn't have a lot of opportunity for leadership, but always has savored the opportunities when they came up. And when the chairmanship at Henry Ford opened up in 1983, I jumped at the opportunity.

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Geoff: That's a remarkable arc of activity. I'd like to go back and unpack a couple of those elements and topics. Your first comment relating to culture in medical school and the challenge of the era, could you provide a little more context of how your success or at least your feelings of success through medical school were impacted by what was going on culturally?

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Dr. Thrall: Well, the University of Michigan Medical School at that time...and I'm very loyal to my alma mater, so it's difficult for me to say this. But there were too many medical students. We had 225 people in the class. Today, there are 170. And no one really protected the medical students from the faculty and the house staff. The surgical rotations were what I can only characterize as malignant. The students somehow were always in the way, there were too many of them on each rotation to really have any kind of one-on-one attention from the faculty.

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And there was meanness involved. The concept of a just culture was still 40 years away in medicine. There was harassment. All of the things that we have worked over the last several decades to expunge from the healthcare delivery environment.

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Geoff: And thank goodness for all of those advances. Now, getting to your brief military career in Washington, D.C. during your training, I'm particularly intrigued by the culture in the military that provided you access to leadership opportunities at a relatively early part of your career. Could you talk a little bit more about that and whether or not this is something that you see as emblematic of military medicine, providing opportunities and a focus on leadership early? Or was this something unique to your experience at Walter Reed?

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Dr. Thrall: Actually, early opportunities for leadership is something that is characteristic of the military. And of all the organizations and society, I might

say that the military spends more time thinking about leadership training than just about anyone else. Frankly, they have to because there's a steady influx of new people, young people, and the young people have to be prepared to lead the troops in battle. So to some extent, this flows over to the medical side of the operation to the medical corps. So it's not unusual to see people take on what would be considered amazingly large leadership roles in the civilian community, in the military, very early in their careers. So there is a link in that sense.

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Geoff: Can you identify any aspects of your exposure to leadership within the military that specifically influenced your approach to leadership later in your career?

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Dr. Thrall: The one thing that I would touch on is performance evaluation and documentation. These are two things that I believe are done, in general, very poorly across the academic world. It is very difficult to establish a consistent, rigorous, meaningful performance evaluation process in academic centers. There's a lot of glossing over of performance deficiencies, frankly, and feedback is often limited. In the military, the process of performance evaluation is taken extremely seriously. And this is something that served me well through the rest of my career.

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Geoff: You mentioned that in typical medical culture, and academic medical culture in particular, that performance evaluations, particularly ones that are honest and transparent, are uncommon. As you initially began to bring the sensibilities from the military into the academic culture, did you find resistance? And what did you do to gain acceptance for your ideas?

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Dr. Thrall: There is definitely resistance. It's interesting that in the three institutions where I served after the military, when I initially joined those institutions, none of them had requirements for regular performance review apart from the process of reappointing the faculty to their hospital appointments. Then at the Harvard Medical School, a periodic performance evaluation and, more importantly, a career counseling or career planning session was mandated. And that really got us, I think, on the right track where each faculty member would go through an annual review with a lot of input from the faculty member about their goals and aspirations, their accomplishments, the progress they were making in their career.

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And through these annual evaluations, I think we were able to establish a much more rigorous feedback system. And a system that was much more beneficial to people in giving them sort of milestone progress reports in how they were doing in their career advancement.

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Geoff: You know, there's one other element that you just described that might not be apparent when people think about performance evaluations, and that is that you listen to people's aspirations. And by providing that opportunity to hear that from them, it offered you insights into how to help them be successful.

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Dr. Thrall: Absolutely, and of course, what you learn in any large group is that you have different factions. There are some people who are very serious about moving forward in their academic careers. And they are focused, they're eager to learn what they should be doing. They're eager to learn where the department chairman or the division chief thinks they are relative, let's say, to the next promotion.

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Then there are other people who are not so concerned about moving forward academically. They love the practice of medicine. They enjoy the culture and the environment of the department. And quite honestly, my goal with them was to appreciate the fact that they were not on a high-powered academic pathway and therefore not to harass them about publishing more. But to find outlets for them in teaching and clinical practice that were professionally rewarding.

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Geoff: Yeah, so important not to treat each person identically and to recognize those individual aspirations. Getting back to your time in D.C. for a moment. And you mentioned being at the University of Michigan was during the Vietnam War. The years that you were at Walter Reed was during the height of the Vietnam War and Watergate. That must have been an interesting time to be in the city. What drew you back to Ann Arbor from sort of the excitement of the city?

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Dr. Thrall: I think the professional opportunity. The Division of Nuclear Medicine under William Beierwaltes, at that time, was one of the two or three leading divisions of nuclear medicine in the country. So the professional

opportunity was unique and it happened to be in my hometown. So it was a very easy decision. I might come back to your question about Washington, D.C. Yes, it was the height of the Vietnam War. I started my internship four months after the Tet Offensive. Our quota was 30 air evac casualties a day coming into the hospital. And we had probably somewhere in the order of 1,500 of the 1,800 beds in the hospital filled with Vietnam War casualties. It was a very emotionally difficult and draining experience to see the young kids, frankly, come in with serious injuries, loss of limb, loss of function.

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Geoff: Yeah, I can well imagine the indelible impact that would have on your medical career and the rest of your life. So you mentioned that your time at the University of Michigan was very academically fulfilling, not much in the way of leadership opportunities there. And so when the opportunity to go to Henry Ford as the chair came up that you jumped on that opportunity. Now, Henry Ford Hospital is a much smaller place than University of Michigan. What were the principal issues of the day that occupied your attention as chair at Henry Ford?

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Dr. Thrall: Actually, Henry Ford is an enormous institution. In terms of delivering clinical care, it was either at the same size as the University of Michigan or maybe even larger because it had established a series of satellite ambulatory centers in the community. So from that standpoint, it was a huge management challenge. And I would refer to Henry Ford as a leading teaching hospital with an associated research program, but not focused on research to the same extent as a university center.

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So my challenge was to balance the predominant orientation of the institution of delivering clinical care with, let's say, more support for the academic side. And I'm very proud to say that we were able to do that as a team. I recruited a couple of Ph.D. scientists that joined our faculty. And by the time I left Henry Ford, we went from substantially no research funding to a small number of NIH grants. We affiliated with the University of Michigan Department of Nuclear Engineering to recruit graduate students into our department. And the year I left, our first student received her Ph.D. And I won't mention her name, but she is a very prominent, active in radiation oncology and regarded as an expert in radiation dose considerations.

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Geoff: Sounds like a very rewarding five years and a rewarding transition for you. As you think back to the time of your recruitment, you, as you described it, were principally focused on academic activities within the University of Michigan. What do you see led to your candidacy being attractive to Henry Ford?

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Dr. Thrall: Well, that was just at the time that radiology was making one of its many pivots. It was pivoting from an anatomic orientation to more of a functional orientation. Coming from nuclear medicine, I saw this very, very clearly. And I saw how we could take a lot of the learning's from nuclear medicine and bring them into radiology. So apparently, the story I told during the interview process was compelling.

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Geoff: No doubt. But let's jump ahead a little bit. Serving 25 years as radiologist-in-chief at the MGH, which included the birthing and nurturing of the partner's healthcare system, must be a tremendously multifaceted arc that you can ascribe to your career and experiences along the way and no doubt a basis for a multitude of instructive recollections. I'm hoping that you can take us on a journey of both your greatest hits and turmoils from your perspective as chair at MGH.

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But before we sort of open it up broadly, I might like to explore a few specific topics from that era. And the first relates to the digital transformation. I've heard it said that you led MGH to be the first truly digital department around 1996 or 1997. What specifically did you accomplish for the department in those days, and what do you mean or did you mean by the words the "electronic round trip?"

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Dr. Thrall: I had again come from the background of nuclear medicine. There were many all-digital nuclear medicine departments or divisions by the mid-1980s. In fact, the all-digital nuclear medicine department had already been described in the 1970s. So I regarded a digital transformation as inevitable. And it was just a question of finding the right entry points. So in 1995, we formed a collaboration with IBM to initiate our activities in speech recognition. And we've been largely a speech recognition department since then.

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I also realized in having worked at Henry Ford and Mass General, where we were already doing hundreds of thousands of examinations a year, that we were never going to solve the film folder management problem with physical pieces of film. They can only be at one place in one time, and it's possible that no one actually would know where that place was, frustrating for everyone involved. And from my own computer background, which had dated to a couple of summers working as a Fortran programmer in college, I knew that eventually, we would be operating in a digital world.

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We, along with several other departments in the early '90s, were building our own PACS. But in about 1996, it became clear that Agfa had built a PACS that was very functional and would serve the needs of a large department. And so we began our journey in the PACS era, obviously starting with cross-sectional imaging and then later expanding to plain film and breast imaging.

Interestingly, the secret to our success was not just installing a PACS in the department, but in working with another company called AMICAS that had a web-based image distribution system. So at the time, we installed the Agfa PACS in 1996. We installed AMICAS, I think of it as sitting on top of the PACS, that allowed any doctor in the partner's healthcare system that had a PC to see the images in the PACS.

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When I look around the country and the experience of many other departments, many of them installed what I call departmental PACS systems where it was almost impossible to share the images outside the department. And these institutions struggled. Now the electronic round trip came from this digital transformation. We realized that there's a high likelihood in transcribing any medical information of a keystroke error. In fact, the literature says that there's one keystroke error for every 15 to 30 keystrokes.

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So if you have to take a worklist and give it to a technologist at a CT scanner or an MRI scanner, and have them retype the name of the patient, the registration number, and other information, there are going to be mistakes. And in fact, in the early days of PACS, because we did not have electronic connectivity between the scheduling system and the scanners, we had cases wind up in what we call the penalty box. So these were cases where there was a keystroke error, and we couldn't reconcile what was coming to the PACS with what was in the radiology information system.

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And we actually, in the early going, employed two people full time to look at these cases and adjudicate them. So the concept of the electronic round trip is that you start out on the desktop of the referring physician who is able to order an examination electronically. And then all of that information flows over to the RIS. And then from the RIS, electronically, the information flows to the imaging device. When the scan is completed, the information flows electronically to the PACS, and then the report and the images, again, flow electronically back to the referring physician. So the electronic round trip basically says that there's no need to re-enter any data at any step of the cycle from order entry to results reporting.

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Geoff: For most of our listeners who maybe grew up in the era of electronic health records and integrated RIS, they might not appreciate the degree of invention and vision required to connect these dots, and to create a system as you described. How long did it take from the time that you visioned the electronic round trip till the infrastructure was in place to actually see the full realization of that principle?

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Dr. Thrall: At least 10 years, the Achilles heel of all of that turned out to be the imaging devices. All of the legacy devices were unable to receive a worklist. And it was only in the first decade of this century that the imaging vendors began to write the necessary software into their imaging systems, CTs, MRIs and so on, to be able to receive a worklist.

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Geoff: It's amazing what we take for granted. As an early adopter of, you know, truly novel technology but also critical path technology, what downsides did you and the department experience?

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Dr. Thrall: I love that question, Geoff. I savor conversations with two thoracic surgeons whose offices were next door to each other. One of them said, "Jim, what you've done with PACS is brilliant. I can bring all the images up on my computer. I can turn the screen around and actually go over the cases with my patients." His colleague in the next office said, "Jim, you've taken film away from us. This is horrible. I can't make the system work."

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And so one of the learnings, of course, is that for any major C change like this, it can't just be unilateral. We didn't fully understand this because radiologists

tend to be more technologically savvy than physicians in other departments that are less used to working with computers. So the cultural change outside the department was one of the biggest challenges. And we actually put teams of people together to teach the referring physicians and their office staffs how to beneficially use these new systems.

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Geoff: Taking on that task of putting together teams and sending them out to help the rest of the center adopt the new technology is bold. And I could see where there would be many dividends coming from establishing those relationships and having those dividends come back when other decisions needed to be made at a health-system level. Do you see any examples where you feel that seeding the institution with trainers for this new technology ultimately return other value to the department?

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Dr. Thrall: Geoff, absolutely. We actually undertook an initiative based on that experience that I think is somewhat unique in the country. We actually established a marketing group. We have five people in the group. Every year, we get a list of new faculty appointees from the registrar of the hospital, so people coming in, in surgery, orthopedics, gynecology, and so on. We divide up the list between our marketers. Each of the new faculty is then visited by a member of the marketing team. The marketer, our person, takes with them a few small gifts, a gym bag with a water bottle, but also a map of the Boston area, coupons for local restaurants and businesses, as well as brochures and instructional materials on how to most beneficially access radiology services.

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Now, not every physician will necessarily meet with our folks, but their office staffs will. And our representative in the marketing group then becomes their permanent personal ombudsperson in the Department of Radiology. So if a problem comes up with the scheduling issue or a negative patient experience, we have someone who is identified with that doctor and that office who makes periodic revisits to make sure that things are going well. And from that standpoint, as we expanded our PACS efforts, we got increasingly strong support from the physician community outside the Department of Radiology.

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Geoff: That's brilliant, brilliant idea. I wanna return...

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Dr. Thrall: Oh, incidentally, if I could interject.

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Geoff: Sure.

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Dr. Thrall: As near as we can tell, the majority of physicians are not actually greeted in any other way. No other department in the institution does this. I have not come across any other radiology departments that do this. And I'm not saying that any of the people we have visited has broken down in tears, but many of them have said, "You know, I have gone to medical school, I've gone to residency, internship, fellowship, I've been on the staff of other hospitals, and I have never been greeted in this way before." So it's been, I think, a very successful program.

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Geoff: Such a simple concept in hospitality. I reflect back in my exposure in academic centers has been identical. That onboarding, you know, recognizing that a new person is there and ready to be part of the community, it's a huge opportunity. And the fact that the radiology department is serving as the hospitality front door for the center, it's fantastic.

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Dr. Thrall: I love it.

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Geoff: Yeah. Turning back to the digital transition just for a moment, I want to get your thoughts on artificial intelligence and imaging. Putting aside the hype surrounding the topic at the moment, it seems clear that we will soon see algorithms emerge into clinical practice that may diminish the degree of engagement that radiologists have traditionally needed to apply to the interpretation of imaging studies. I'm curious what parallels do you see with the era of your digital transformation, and would you consider seeking a first move or advantage in the AI arena if you are positioned to do so?

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Dr. Thrall: Geoff, AI has been a little controversial. Let me point out a couple of things that I think are very interesting. If you look at the productivity of radiologists before PACS, it wasn't nearly as high as it is today. So in our department, we were averaging around 4,500 RVUs per faculty member before PACS came in. And after PACS, we're up in the 8,000 range. So no one was particularly worried about radiologists being less engaged or losing their jobs at that time. These are now issues that have come up with AI.

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I think AI is just going to make radiologists more efficient. Radiologists will still be as engaged, but they'll be able to handle more complex cases more efficiently and productivity should increase. Moreover, I think AI is gonna let us take care of patients more effectively. And let me offer just one example. People are focused on AI for diagnosis but one of the projects that I've been involved in with my little research group is developing what I call a sniffer program.

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So the particular problem that we're looking at is pneumothorax. At one level, this is pretty easy for radiologists to diagnose. But in a big institution like Mass General, we may have 200 chest CT cases sitting in the queue, waiting to be interpreted. So the idea is to have an AI program that runs instantaneously as soon as each CT is performed. And if the program says there may be a pneumothorax present, then that case gets reprioritized to the head of the worklist.

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So we're allowing the radiologists to work smarter, to work on higher risk, higher value cases, if you will, sooner. And we're not replacing the radiologist, we're not taking away the final diagnosis from the radiologist. But I think we can have a very beneficial impact on the quality of care, and frankly, the safety.

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Geoff: Yeah. I know there's clearly a lot of opportunities out there. I wanna return to the question and that is would you... if positioned similarly, as you were in the mid '90s, would you jump all in? Would you seek to be the first digital or first AI department in the country? Do you see a pathway toward that implementation today or would you perhaps be a little more cautious?

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Dr. Thrall: Geoff, I have to say I never saw a technology I didn't like. We were always crazed to get our hands on the next technology. I'm not the chairman at Mass General anymore, and I'm proud to say that Jim Brink actually has been a leader in getting AI started at Mass General. He developed a proposal that he took to the president of the hospital, who supported it. And then when our friends at the Brigham and Women's Hospital heard about it, they jumped on it, asking to be part of it. So we have a data science center that really got started from the initiatives in radiology.

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If I were still the chairman, I would be asking each of the division heads to identify the one, the two, or the three areas where AI could have the most beneficial short-term impact. Now, I don't think there's a direct analogy between the digital transformation and AI. With digital, we knew we were gonna go all in. With AI, we're gonna have to take baby steps. We're gonna have to see what works. Take what works, what helps. Reject what doesn't work, what doesn't help. And it's not as clear this time around what the final answers are going to be.

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Geoff: Thank you for that. Yeah. And kudos for the leadership position that MGH and in partnership with the Brigham is taking in AI and for recognizing Jim Brink's efforts in that that should be emphasized. So thank you for that. Now, over the years, you adopted a number of management practices from the business world into your department, ultimately resulting in the formation of a consulting group that advise practices around the country. Would you tell us a bit about the evolution of those business practices, and perhaps share a few vignettes of how you used them to advance the position of the department and the health system as a whole?

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Dr. Thrall: Yes, it's interesting. At Henry Ford, we had an operations analysis group and access to people with industrial engineering backgrounds. And incidentally, some of that crossed over with my father's mathematical interests in game theory, queuing theory, and things of that sort. So I was programmed to look at radiology operations from a more, let's say, engineering, industrial engineering, systematic viewpoint that I think was historically prevalent.

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When I came to Mass General, I inquired about an industrial engineering group or systems analysis group and learned that they had had one, but had laid them all off about three years before in a budget crunch. This is like eating the seed corn, I think. So, a couple of years later, we had the opportunity in a quality improvement initiative of the institution to propose the establishment of a quality management team in the Department of Radiology.

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The team initially had four people in it: a person with a master's degree in organizational development, a person with a master's degree in industrial engineering, a person with a master's degree in educational program development, and a support person. So the idea was to look systematically

through the department at the major issues that seem to bedevil us. So I thought of the quality management group as sort of a little bubble that would move around the department helping solve problems and creating new systems.

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So we used the industrial engineer. And incidentally, we specified that the industrial engineer have no medical background because we did not want to hire someone that already knew why we couldn't do something. So the idea was that we would flowchart different processes. And then by identifying the process steps that took place at each step of the process, each box in the flowchart, we would understand the educational requirements. So who was going to do that step and what education did they need to have in order to accomplish it?

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This is where the person with a background in educational program development came in. And we would then optimize the flowchart, create an educational curriculum for all of the people involved, so technologists, nurses, support personnel of other kinds physicians. And by implementing that, improve the function of that particular area. And we applied that to the film library, this was before PACS, made some great strides there, completely revamped our scheduling system.

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We had 28 different phone numbers for scheduling different procedures in radiology. Each division fought valiantly to keep their own phone number, explaining to us that only someone in the division could understand the details of scheduling that case. We took a different view and created a central number, and then a system for fine tuning requests, if necessary, and a couple of additional phone numbers for highly specialized things like neuro-interventional cases. So this created a much simplified user interface for the department.

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So as we were creating these systems in our own department, people would contact us and say, "Oh, Jim, we'd like to come and observe for a couple of days, see how you're doing this, you're doing that." And it always made me feel badly because I knew that if I said yes, they would come and be a distraction to people in the department. But if I said no, they would think we were unfriendly people.

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So we created the Radiology Consulting Group, as sort of the flip side of the Quality Management Group. And when people then would call up and say, "Can we come and visit?" I would be able to refer them to the head of our Radiology Consulting Group. "Here's the person who will take care of your needs, they'll tell you how much it will cost for the visit, and so on." That's how we got started. Then we had outreach to other departments. And over the years, I think we've been in 40 different states about 6 or 8 foreign countries with our consulting practice.

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Geoff: That's a tremendous tale of success. You mentioned the quality management system and operational efficiency, was that the extent of the scope of the consulting, or what other activities might have been encompassed in the consulting?

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Dr. Thrall: The consulting turned out to evolve in a very rich fashion. We were called into many institutions to do what we called marriage counseling, where a group of radiologists was having difficulty with its intragroup relations or its relationship with the hospital. We were called in to help with the billing, it turns out we have an excellent billing office at Mass General, people involved at the national level in the radiology, business managers organizations. So we were able to help people in that way. We helped with a lot of PACS and voice recognition implementation. So writing RFPs, request for proposals, and then helping institutions go through the responses.

[00:48:22]

So it evolved in a very nice way. One of our more fun projects was with the National Health Service in England. They would send us 40 of their C-level executives once or twice a year for a one-week-long immersion in the U.S. healthcare system. We did not recommend that they go back and try to implement the system, but we were able to show them some of the components that we thought were particularly beneficial and worked particularly well. And they would go back, and one of the things that they were then supposed to do is take on a project that had been motivated by the visit, and we would consult with them on those projects. And then we actually wound up being invited to England to do a couple of consultations there.

[00:49:18]

Geoff: Yeah, I can't help but reflect on the breadth of relationship building that this consulting initiative provided. As you reached into the organization to draw in competencies that might not have been right there in your department, even

into industry, potentially, to help bring their competencies aboard, all in the interest of helping the clients of the consulting service realize success. You're building a tremendous network and set of relationships that ultimately must have really come back to further bolster and strengthen what you could do for the department.

[00:50:00]

Dr. Thrall: Yes. And in fact, one of the aspects of this that may not be immediately apparent is that we sent out teams of what we call the experience-based consultants. Now, many of us have been the beneficiaries of the Boston Consulting Group and McKinsey. They typically send out a team of people that know nothing about what you do. They borrow your watch to tell you what time it is. You spend hours educating them, and then you read the report and see that it's 90% what you've told them.

[00:50:40]

But we would match up a manager in the department, let's say, a manager in MRI or CT, with an MBA. And so it was not unusual for our team to hit the floor of a department, diagnose the problem, and, frankly, solve the problem almost instantaneously. Well, the advantage of that, from our standpoint, is that we did not allow our managers to go out on consulting visits until they'd actually gone through a training course. This was very motivational to them for a variety of reasons, not the least of which is that we pay them for their consulting activities.

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But it allowed us to upgrade their skills, their presentation skills, their facility with spreadsheets, their facility in different graphical methods. So yes, we were networking, we were making some money. But I think in the long term, maybe the most beneficial impact was in actually upgrading the skillset of our own people.

[00:51:58]

Geoff: While we're on the topic of people, you built a tremendously stable group of luminary faculty during your years at MGH, and I'd like to unpack your approach to talent recruitment and retention. Firstly, amongst MGH trainees, and certainly MGH has top-notch residents and fellows, what did you look for when considering who to offer a faculty position?

[00:52:27]

Dr. Thrall: It's opportunistic, Geoff, as well as situational. In some instances, we simply needed manpower, and so the bar to hiring might be different. In

other instances, we recognize that we were dealing with an extraordinary person and would find a position no matter what. And in some cases, even hire someone that we "did not need" in the near term. I always was impressed with people who could go through the training curriculum, and at the same time, we're getting other things done. This is a terrific indicator of future behavior.

[00:53:19]

And just to mention one name that a lot of people know, Ralph Weissleder, during his time as a resident would go home every night, and transcribe his notes, and organize them in different summary form. And the month that he graduated from the residency, he brought in a three-ring binder that was basically the manuscript for what we call "the purple book." His introductory outlined textbook of radiology. And incidentally, while he was not transcribing his notes, he was in his laboratory and working with Tom Brady and secured his first NIH grant before he had finished the residency program. So Ralph is probably three or four standard deviations from the mean, but other people would accomplish remarkable things during their residencies, and we always tried to hang on to them.

[00:54:26]

Geoff: And how did you view hiring from within versus hiring from outside the organization?

[00:54:33]

Dr. Thrall: This is an interesting balance. Medical institutions tend to be inbred. And I think one of the reasons for that is that during the course of training, you really get to know a person. You know their intellectual capabilities, you know their personalities, you know whether they will be a cultural fit or not. And this is very, very difficult, particularly assessing the cultural fit, in bringing people in from the outside. And I might comment, by the way, that the opposite approach is used in a lot of non-medical academic departments.

[00:55:16]

So for example, at the University of Michigan, while my father was on the faculty, it was their policy, not to hire anyone who'd graduated from their program because of the risk of becoming inbred. So it's a balance. And I don't think there is one right answer, I don't think there's a single prescription. I think you have to evaluate the capability of people and then make a decision.

[00:55:46]

Incidentally, I think the other reason that there's a lot more sort of inbreeding in medicine is that by the time you finish, you're at least 30 or maybe older. And a

lot of people already have roots in the community, they have spouses that have roots in the community, and they wanna stay. So it kind of applies in sequence, you're trying to recruit someone who wants to stay somewhere else. And at the same time, you have a good person in your own department who wants to stay where you are. So it's case by case in the end.

[00:56:26]

Geoff: Sure. And when you've got a great pipeline of people being developed in your institution, and you see how they could fit into your team, it's understandable that you really want them to stay. But do you see circumstances where a leader might need to sort of push against those tendencies to bring in a great local person in the interest of building more diversity of experience and being sure that there is some degree of external input? Or at the end of the day, do you think that maybe that's hyped too much?

[00:57:08]

Dr. Thrall: I think it's healthy to bring people in from the outside. But I can tell you a cute story. I looked at a job at the Mayo Clinic back in the 1970s with Glen Hartman. And before I went out to Rochester, I looked up all the people in the department and noticed that every one of them had trained at the Mayo Clinic. So when I went out for my visit, I asked Glenn, about this, and he laughed and said, "Yes, that's the only way we can know that they've been properly trained." It's hard to argue against the Mayo Clinic. They're pretty good. They're also pretty inbred.

[00:57:48]

Geoff: Indeed. As radiologists feel the pressure to produce in the reading room, many have suggested that a return to a time when patient contact occurred more frequently in daily practice would solve many of the modern problems facing our profession. How would you propose making patient contact a critical path to daily production?

[00:58:11]

Dr. Thrall: I think this is extremely challenging. The American College of Radiology, going back more than 20 years, has tried to promote more daily contact with patients, suggesting that if each radiologist in a department went out of his or her way to interact with five patients a day, it adds up very quickly. It hasn't happened, I don't think it's gonna happen.

[00:58:39]

However, one avenue that we have taken at Mass General that has proven to be very popular with both the faculty, the house staff, and patients is a consultation

clinic. So patients that would like to go over their imaging findings can come to the clinic and sit with a radiologist and look at the images. This is turning out to be particularly important in patients with cancer, they wanna know how they are responding to therapy. It's a required rotation for the residents, but very popular with the faculty as well.

[00:59:26]

Geoff: Now as a really experienced leader, I'd like to present you with another hypothetical that I think is probably increasingly playing out for radiology leaders around the country. Imagine you're invited to a meeting with leaders from other clinical and hospital departments and told that the practice is preparing to engage in a shared savings plan for joint replacement that aims to return up to 50% of the savings to the practice. You learn members of the orthopedic service line, including MDs and hospital staff, have developed care pathways already intended to reduce costs through reduced utilization of imaging, among other high-cost diagnostics. The discussion for today's meeting is how to allocate the shared savings. What are your thoughts as you enter that meeting?

[01:00:17]

Dr. Thrall: Well, I've actually been through this in care pathways for neurological disease. And quite frankly, my philosophy, and this may be a contrarian view, is that we are substantially paid on a per case basis. And I've always been comfortable accepting that. So if there's less imaging done in a particular pathway, we will make less money in that pathway. Then the challenge is maintaining the right size of the faculty, which cannot be done in instantaneously. But typically, these initiatives are only marginal in terms of, let's say, the amount of work an FTE radiologist would do. So I'm really not bothered by it.

[01:01:16]

Geoff: And you know, if the chair of orthopedics expresses the view shared throughout his department that as a service managing the patients, they're making the decisions regarding what is needed, and are thus responsible for any savings realized. He believes that all the savings should be returned to orthopedics.

[01:01:35]

Dr. Thrall: Well, I think you have to look at what savings we're talking about. If we're talking about money the hospital is saving, that it's receiving on the DRG side, then I think there's an argument to be made. That if any doctor is gonna get something, then all the doctors should get something. But if the savings are

just on a reduction of professional fees, and particularly outpatient-per-case fees, then it's hard to see the argument that the orthopedic surgeon is making. You know, in some cases, there's a saving, but it's not to the hospital, it's to the health system as a whole. So it really would only apply on the inpatient side. And then the accounting is extremely arcane.

[01:02:30]

Geoff: So as this scenario has the potential to expand to broader service lines and broader spheres of activity, how would you advise radiology leaders to prepare for these types of conversations?

[01:02:50]

Dr. Thrall: Well, they absolutely must know their own cost structure. And you know, the word cost is interesting in healthcare. Some people use the word cost when they really mean the hospital charge. Some people use the word cost when they mean what the insurance company actually paid the hospital. But then there is the cost of delivering a procedure. So those are three different concepts of cost. And typically, what most radiology departments don't understand is their cost of production.

[01:03:31]

And I would urge people to do activity-based costing to understand what is the marginal cost and the fully loaded cost of performing each examination. We've actually gone through that process and the marginal cost for the next CT scan is practically nothing. You already own the CT scanner, you already have hired the technologist, it comes down to the cost of the contrast material. The fully loaded cost takes into account the allocation of the capital cost of the space, the equipment, and the allocated cost of the time of the technologist. So marginal versus allocated costs are different.

[01:04:28]

And incidentally, that's what activity-based costing gives you. You can understand the allocated or distributed costs. And that gives you the background then to start talking about cost savings. Because when a patient comes into the hospital, and just, let's say, doesn't get a CT scan, the incremental savings to the hospital is practically nothing.

[01:04:57]

Geoff: Yeah, that's fantastic. I'm really glad that you mentioned activity-based costing and the nuances, or maybe they're not even nuances, but the big differences between price charge and true cost. I'm a big fan of that approach, and it's terrific that you made that emphasis. Now, imagine yourself advising a

candidate evaluating a radiology chair position five years ago versus today, what differences would you envisage?

[01:05:29]

Dr. Thrall: Well, I think a lot of it is the same. There is the evaluation of the circumstances of the department per se, you know, the things that an institution is responsible for, the things that the department itself is responsible for. I don't think a lot of that has changed. But the kinds of things that have changed are the kinds of things that you have mentioned. You know, are there now alternative payment systems? You know, has the hospital entered into some performance-based pay for performance, etc.? The candidate for a chair position must fully understand those issues to understand the financial impacts the department of radiology. So I think that's probably the number one issue at the basic business of radiology.

[01:06:25]

Another very important issue is where an institution views radiology with respect to research. We certainly did not have a strong research tradition when I started in radiology. But around 1990, a convergence of molecular imaging, increased feasibility of PET scanning, conversion to digital methods that allowed us to be quantitative, created a pivot point for radiology research.

[01:07:00]

And so, what is the institution doing? Does the institution have a small animal imaging facility, for example, that would be a core facility for many departments? Does the institution have major imaging devices in dedicated research environments? And if not, why not? Because, again, particularly in the neurosciences, fMRI has revolutionized psychology, neurology, neurosurgery, neuroscience. So those are things that have changed.

[01:07:39]

Geoff: In your opinion, what does it take to be an effective leader in radiology?

[01:07:44]

Dr. Thrall: There's no one answer. One view I have is motivation. I think that anyone who is thinking about becoming a leader has to understand their own motivation for doing that. I actually keep a copy of Dr. Seuss's book "If I Ran the Zoo," in my office. So I think there are two dominant thought processes about being a chairman. One is, "I've gone through the ranks, I'm now a professor, and the next step in my career is to be a department chairman."

[01:08:27]

The other is, "You know, I've watched my departments function, and I just have so many ideas that I would like to implement. 'If I ran the zoo,' said young Gerald McGrew, 'I'd make a few changes. That's just what I do...'" So to me, I want the Gerald McGrew person to become the chairman, the person who just is bursting with energy, and enthusiasm, and wants to make good things happen. I don't want someone who looks at it as the next logical step in a career.

[01:09:14]

Now, coming to the leadership component of that, a lot of it comes down to personality. I know that we have the Radiology Leadership Institute for the ACR, we have the Radiology Leadership Academy for the RSNA. But the one quality of leadership that I think everyone should remember is that you can either have a philosophy as a leader that people work for you or you can have a philosophy that as a leader, you work for the people you're leading. And that's the other characteristic that I would like to see in a leader.

[01:10:01]

As I was driving to Henry Ford Hospital for my first day as chairman, and it was a 40-mile drive so I had time to think about it, I was suddenly gripped in panic. How would I know what to do? No leadership training per se, the kind available today. And as I drove along, I realized, first of all, I can't change who I am, I have to be me. Secondly, I need to be honest, I need to use my experience, I need to listen to the other people in the environment for their ideas. And so if I can be the person that got me to this point, and not try to be someone different, and to be honest, with a little luck, I'll make the right decisions as a leader.

[01:11:02]

Geoff: That's great. I guess it's good they didn't that podcast to listen to in those days so you can consider those things. Do radiology chairs need formal business training?

[01:11:13]

Dr. Thrall: Absolutely, I learned on the job, and actually had the wonderful experience at Henry Ford of becoming a good friend of the CFO. And sitting on the Finance Committee of the Board of Trustees, where the CFO of the Ford Motor Company was the chairman of the committee, so I had an incredible indoctrination into how healthcare financing works, the concept of a marginal analysis, the concepts of debt-to-equity ratios, and on and on. I have always felt that, particularly in this age and it's even different than 35 years ago when I

started out, radiology chairmen need to understand the language that's being used in the business of medicine.

[01:12:16]

And when I've had a chance to talk about leadership in the past, I have a slide where I'd say, "We want a new CT scanner." And historically, we would go to the hospital leaders and say, "Man, we're getting killed in CT, we need another scanner." Whereas, today, you go and talk about net present value with different levels of discounts, and discounted rates of return, and have a much more businesslike and rigorous approach to the discussion. So with smaller, simpler departments of 25 and 40 years ago, you could learn on the job. Today, if you don't have some level of business training, you're walking through a minefield.

[01:13:17]

Geoff: Yeah, I couldn't agree more. What do you say to a radiology chair who says, "You know, I got a terrific business manager, I don't worry about the finance or, you know, any of the, you know, cost accounting issues, I just hand that off to them."?

[01:13:36]

Dr. Thrall: I am bemused, because ultimately if a leader abrogates leadership responsibilities, they're not a leader. This is a person that would find it very difficult to create an environment conducive to the growth of his or her practice, or the development of research programs. They need to have their own understanding, independent understanding of the issues. And incidentally, I've worked with tremendous "business people," and one of the things that is very challenging for them is to understand the culture of medical practice and the utilities.

[01:14:26]

So to the business manager, getting an NIH grant may not be important. But to the department, in a greater sense, it may be extremely important. They just don't have a visceral feeling for that. So I think, chairman that just turn it over to the business managers are leaving a lot on the table.

[01:14:49]

Geoff: Yeah, absolutely. You know, the field is currently facing a number of challenges as a profession. These include high rates of physician burnout, challenges to quantify our value amongst other healthcare providers, maintaining professional identity and standards under corporatization, and concerns that our services risk being commoditized. How do you rank these as

threats to radiology's future, and what steps might the profession take to mitigate the concern?

[01:15:22]

Dr. Thrall: Well, if you'd asked me that question 5 or even 10 years ago, I would have ranked commoditization near the top. This actually has turned out not to be the biggest challenge today. I think the biggest challenge right now is the consolidation of radiology groups in the ownership structure of for-profit entities. And to me, it's a bit of a scandal.

[01:16:00]

In many of these situations where a group sells out to an investor group or a for-profit group, the senior partners that are very close to retirement are very happy to take the million-dollar or multi-million-dollar payout knowing that they only have a couple of years to go or they might just retire. Whereas, the 35-year-old junior members of the group are looking at another 30 years of practice. They are then left in a situation where their salaries, their income is going to be reduced, the expectations on them for production are gonna be increased, and their latitude for any kind of decision making sharply curtailed. I think this is the number one negative trend that we're seeing.

[01:17:06]

What to do about it? We need to educate and call this question into the mindfulness, particularly of junior partners, junior, younger radiologists, so that they understand the long-term negative outcomes that are likely to be associated with selling the practice.

[01:17:33]

Geoff: Yeah, you've held many leadership positions in national radiology organizations, including president of the American Roentgen Ray Society, chair of the Board of Chancellors for the ACR. You've also been highly engaged in advising the NIH and the NIBIB in particular. How do you view the commitment to focus inward on the relentless pursuit of excellence and innovation and support of the mission of the home institution versus turning outward in support of medicine radiology as a profession in scientific disciplines?

[01:18:10]

Dr. Thrall: That is a very important question, it speaks to the balance of how a chairman spends his or her time. And it has to be a balance. I, quite frankly, had the opportunity to move up in the leadership of a number of other organizations to take on chairmanships or presidencies but felt that it was more important to

maintain a balance where I was physically present in the department more. We've seen other examples where I think people have overdone it, quite honestly, and been away too much.

[01:18:54]

And it comes down in part to the fact that in a major department, the self-image of the department is influenced by the kinds of roles that the chairman takes on nationally. So if a chairman takes on none of those roles, none of those leadership roles, it has a negative impact on the self-image of the department and even the reputation of the department. On the other hand, if the chairman takes on too many of those and is gone too much, it has a negative impact on the morale of the department and the way the department functions. And I won't name names, but there are examples of people that definitely overshot the mark.

[01:19:41]

Geoff: Yeah, tremendous point and really important perspective for folks to hear and to consider. I recently read your advice to future physicians, to quote "Stay true to the basic values of medical practice, put patients first, and act with honesty and integrity." Can you recall any times in your career where you were challenged to adhere to these basic tenets?

[01:20:08]

Dr. Thrall: I feel that I've never been externally challenged, that no one has ever come along and said, "Jim, you're not being honest, you're not putting the patient first." But I can absolutely say that one of the things that bothers me is seeing so many instances where doctors put their own financial or professional self-interest ahead of patients. I think this is all too common in healthcare. In radiology, I think it occurs in the context of people who are number one, trying to interpret too many studies in too short a period of time. And in other situations where someone happily engages in a technology for which they have not been fully trained.

[01:21:08]

Geoff: Yeah. As one ascends within healthcare leadership, one encounters many ambitious people. How do you deal with a leader who does not share your respect for integrity and honesty?

[01:21:22]

Dr. Thrall: Again, this is highly situational. It's hard to scenario plan because it comes down to the specific details. And often it requires, within an institution, that the issue be taken to the level of the institution. And as I mentioned earlier, unfortunately in my experience, even when that happens when the issue is

brought to the attention of the most senior leadership in the institution, for whatever the reason, it's not dealt with appropriately. I have to say that the concerns I expressed earlier happened right at the end of my career. If they had happened 10 years before that, I might well have looked for a different position.

[01:22:11]

Geoff: When we chatted a few weeks ago, you mentioned that you had taken up the euphonium. Would you share your thoughts on the instrument and why you find it worthy of your time?

[01:22:21]

Dr. Thrall: I was a failed tuba player in junior high school. And moreover, I was very envious of the trumpet players because they got to play the melodies. And somehow this always stuck in the back of my mind. So when I stepped down as chairman, I thought, "What can I do with the time I now have?" Although I'm still involved in research, I still have an office, I still go to my office, but I knew I would have some extra time and I decided to do three things.

[01:22:54]

One, try to relearn German since I'd really had not had a chance to speak it much since being there as a junior student. Two, take up a musical instrument. And three, work my way through one of my father's math books. So I'm doing pretty well on the German. I initially purchased a trumpet, which turned out not to be a good instrument for someone who lives in a condominium. This led me to the euphonium, which is the most mellow, baritone pitch brass instrument that you could imagine. So it's not as loud and piercing as the trumpet, it seems to fit into condominium living.

[01:23:40]

And I have learned so much. I realized that my first time around in music, I didn't learn much about music. I didn't learn about solfège, which is the Do, Re, Mi, Fa, Sol, La Ti, Do, and where it came from, and a lot of the music theory, just intonation, tuning ratios, how we owe so much to Pythagoras and the Greeks for the tonal relationships in Western music, how Western music differs from Eastern music.

[01:24:17]

And in yesterday's "Boston Globe" crossword puzzle, I was able to answer two questions because of my musical training. One was, what does it mean if you're singing Do, Re, Mi, and that's a solfeggio. And the other one is a chordal progression and that's an arpeggio. So I'm having a great time. I started out, I could hardly play a scale. I just got checked off at 160 beats a minute for all of

the major and minor scales. And I'm looking forward to continuing my musical journey.

[01:25:02]

Geoff: That's marvelous. I particularly appreciate the sort of quantitative left brain overlay that you bring to musical sensibility in terms of analyzing the details. But I'm delighted that you're enjoying that. I'm actually a failed tuba player myself. I just could not imagine releasing enough air to sustain a note on that instrument.

[01:25:27]

Dr. Thrall: Well, Geoff, I encourage you to look into the euphonium.

[01:25:31]

Geoff: I will add it to my list. Now of all of your accomplishments to date, are there any that stand out for which you are most proud?

[01:25:44]

Dr. Thrall: I think it always has to come back to people. I get the most satisfaction from is seeing people that I've been involved with flourishing. Secondly, something that pertains to people in the academic world. It's interesting that when you get up in the morning, it's very nice to know that somewhere in the world, a patient is gonna have a better experience because of what you have done in the past. Either because of some research you've done, someone that you have taught, or perhaps something you have written that someone has learned from. So those would be the two things that I would point to.

[01:26:34]

Geoff: Yeah. That's marvelous. And looking back, is there anything that you wish you might have approached differently?

[01:26:48]

Dr. Thrall: I wish I'd done more.

[01:26:50]

Geoff: Done more. More what?

[01:26:55]

Dr. Thrall: Hard to say. You know, one of the things that I was always interested in was some faculty that would come to me and say, "I wanna be promoted." I would look at the CB and realize that they hadn't published

anything. And so we'd have a discussion. And I would learn that this faculty member did not have enough time to do research or to write papers. And what I've realized in my life is that our time is the one resource we can never get back. You know, if you lose some money, you can make some more money. If you lose some space, you can find more space. But if you lose time, you never get it back. And I just have a feeling that in some situations, if I'd managed my time better, I could have done more.

[01:27:53]

Geoff: Wow. Well, you have done so much, not in terms of just work what you have accomplished for MGH, for the field of radiology, for innumerable patients around the world, but for all of the people who have worked with you, who have worked for you. I know many people who hold you in such high regard as a leader and somebody who has really created a generation of leaders in radiology that carry forward such important sensibilities about caring for individuals, about helping people to be the greatest that they can be, and about focusing on the health of our patients and advancing the science of radiology. Jim, I can't thank you enough for joining us today on "Taking the Lead."

[01:28:49]

Dr. Thrall: Well, Geoff, thank you.

[01:28:59]

Geoff: Okay, that's it for this time. Thank you for listening. If you've enjoyed this podcast, I invite you to do three easy things: subscribe to the series so you can never miss an episode, share the link so your peers can listen too, and like or rate every episode so more people will discover it.

[01:29:19]

Please join me next month when I speak with Ricardo Cury, Chairman and Chief Executive Officer of Radiology Associates of South Florida in Miami, and the Chief Medical Officer of MEDNAX Radiology Solutions. After attaining his medical degree and completing a radiology residence in Sao Paulo, Brazil, he became a staff radiologist at the Massachusetts General Hospital, an assistant professor of radiology at Harvard Medical School, where he served as director of Clinical Cardiac MRI for three years. He left Boston in 2008 to join the Miami Cardiac & Vascular Institute, becoming the director of cardiac imaging for Baptist Hospital of Miami, as well as the MCVI. In 2011, he became the Chairman and Chief Executive Officer of Radiology Associates of South Florida, a private practice of 76 physicians performing over 1 million imaging studies annually, do operations in 9 hospitals and 23 diagnostic imaging centers in South Florida.

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Two years ago, the Radiology Associates of South Florida ceased to operate as a private practice after its acquisition by MEDNAX Incorporated, a national provider of health care that comprises over 3,700 physicians, serving 4,000 healthcare facilities across all 50 states. Recently, Dr. Curry was appointed to serve as the Chief Medical Officer of MEDNAX Radiology Solutions, which encompasses over 800 radiologists and includes the teleradiology company, vRAD.

[01:30:50]

"Taking the Lead" is a production of the Radiology Leadership Institute and the American College of Radiology. Special thanks go to Anne Marie Pascoe, senior director of the RLI and co-producer of this podcast, to Peg Helminski for production support, Linda Sowers for our marketing, Bryan Russell for technical support, and Shane Yoder for our theme music.

[01:31:15]

Finally, thank you, our audience, for listening and for your interest in radiology leadership. I'm your host, Geoff Rubin, from Duke University. We welcome your feedback, questions and ideas for future conversations. You can reach me on twitter @geoffrubin or the RLI @RLI_ACR. Alternatively, send us an email at rli@acr.org I look forward to you joining me next time on "Taking the Lead."

[01:31:49]

[Music]

[01:32:11]