iVIEW

EDITOR'S PAGE

Training in Multimodality CV Imaging
Is There an Inclusive Model?

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All the inhabitants of the world should know that the power of kings is vain and trivial, and that none is worthy the name of king…heaven, earth and sea obey eternal laws.

—King Canute, reported by Henry of Huntingdon, Chronicle (1)

Even a cursory comparison of medical journals today with those from a decade ago shows that the tools of diagnostic medicine are sharper than they have ever been before. New technologies, higher definition images, and hybrid output from multiple modalities have challenged the traditional view of imagers and how they should be trained at a time when spiraling costs are a major concern and sequential visits to various kinds of imaging test centers is frowned upon.

In this issue of *iJACC*, experts from 11 major academic medical centers in the United States provide the report of a "think tank" on the future of cardiac imaging. Despite the opportunities provided by new and better imaging modalities, there is no doubt that cardiovascular imaging faces practical challenges pertaining to cost reductions, overuse, access to care, and demonstrating value. The goals of this think tank were to consider the relevance of cardiac imaging in a value-based health care system, to define the cardiac imager of the future, to ensure robust innovation and research, and to improve outcomes (2).

Among all the challenges of imaging in the United States, perhaps the greatest will be the process of moving the imaging laboratory from a revenue center to a cost center. Of course, in many parts of the world where imaging does not occur on a fee-for-service basis, this has always been the case. Indeed, movement away from paying for volume and toward paying for value may be an important step to control the perverse incentives that drive the growth of imaging and paradoxically have led to reductions in reimbursement. Yet of course it is not just reimbursement that has driven growth but also the likelihood of imaging physicians to direct patients toward modalities with which they have the greatest familiarity. Removal of financial incentives will not necessarily solve this problem, because there may be a residual risk for competition among different modalities within the imaging establishment. Showing value needs better clinical integration; in other words, we need to attend to the nexus between the test result and treatment decision, which will lead to better outcomes. Thus, the section of this document pertaining to defining the cardiac imager of the future was of particular interest to the *iJACC* editors in the context of our previous opinion piece on this topic (3) and the opinion that test selection should be determined by the characteristics of the patient and not be influenced only by the skills of the imager (4). To some degree, the think tank is aligned with our position, emphasizing the imager as a cardiac imaging expert (2).

Anticipating tomorrow and delivering today is always a difficult task, and it is here that the alignment between our vision of how to get there and that of the think tank starts to substantially diverge. The previously published proposal of the *iJACC* editors (3) and that the think tank has proffered (2), see fundamentally different roles for imagers. The main philosophical difference seems to be whether a motivated, above-average individual physician is capable of learning broad principles and pattern

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recognition across modalities to deliver competent standard of care or whether individual modalities should be islands of great expertise, with multiyear limited-modality training, which while housed in a center deliver quality care by shuttling patients to the appropriate islands as needed, a somewhat distilled version of what is happening today anyway. In other words, we see multimodality imagers as a good way to deliver high-quality patient-centric imaging, whereas the think tank takes the multimodality department approach.

Alas, as with most of the published research in imaging, we have plenty of opinions but few data. So which vision is correct? Both groups, the *iJACC* editors and the leaders of the think tank, recognize that a change is needed, and both papers distill what the groups believe are good courses forward. The think tank report in this issue of *iJACC* derives from the considered opinions of leaders from high-volume academic environments in the United States. The reader might reasonably ask 2 questions: 1) are these facilities kindred where most patients are taken care of (and where most imaging occurs); and 2) are the guidelines informed by a knowledge of what the challenges are for delivering high-quality imaging in the wider community? In the United States and especially in practices overseas, the proposed policies will be recognized as a fine solution for the highest level U.S. academic medical centers, but they may not be the best solution for most of the other practice environments. Our dream for the future is that more cardiologists will be trained in multiple modalities, providing a competent skill set outside of centers of excellence and in small to moderate-sized practices. Internationally, and even in the United States, these places are where most cardiovascular imaging is done, where the risk for duplication and inappropriate use may be unchecked by the educational and audit programs of many major teaching centers. The medical resources of apex teaching hospitals are very different from these places; indeed, in many such situations, the non–apex hospital imager is a part of a small group, and having a wider set of skills and competence is vital to providing good patient care in those practices. Moreover, the leadership and research skill requirements will be different in a teaching hospital than in these places in the community, where such requirements may actually be nonexistent.

The status quo in imaging training is that the development of expertise within individual imaging modalities is obtained independently. This means that the acquisition of skills in echocardiography, nuclear imaging, computed tomography, and magnetic resonance imaging requires time far in excess of what is available during a cardiology fellowship and usually in excess of what is available in most imaging fellowships [5]. Because many of these skills are generic, we have argued previously that the status quo involves a significant amount of duplication and wasted time. In fact, much of the process of learning in imaging is essentially pattern recognition, a task that is easily learned with high-quality repetition and practice. In addition, these discussions about increasingly longer training before conferring competence for day-to-day delivery of imaging services risk becoming progressively irrelevant in an era when an interested trainee could realistically evaluate thousands of abnormal images in web-based libraries and develop better interpretive skill than a counterpart who sat before numerous normal studies of uncertain appropriateness in the course of an imaging fellowship. In fact, with the widespread use of imaging as a vehicle for teaching anatomy, physiology, and pathology to medical students, future fellows will already be quite well versed in the basic nuances of imaging and may require less basic imaging training during subspecialty training [5]. Finally, many medical schools are incorporating ultrasound training very early into the clinical curriculum, and the imager is likely to have many more years of experience in pattern recognition, thus becoming far more facile than current generation of physicians. Instead of forming a barrier around the use of acquired skills, perhaps the learned bodies involved in training future imagers should seek to guide what is happening anyway, by resourcing and curating well-interpreted images that allow trainees to climb the learning curves of as many modalities as they like. Instead of allowing learning to occur with uncertain guidance, a college-based image bank would provide interpretive feedback on hundreds, probably thousands, of individual studies. A competency-based approach to accreditation [2] could then be based on testing learners in the same fashion. If the test is sufficiently discriminative, we will find those who can and cannot read accurately, and fundamentally, that is exactly what we want. The enactment of such a system would allow us to rationalize the current stipulations for duration of training, which are not evidence based, and instead provide an individualized training process to cater for trainees who learn at different speeds and remove an important barrier to the training of a new breed of imagers who are expert in multiple modalities.

A crucial fallout of the information era is the availability of vast libraries of information within a few strokes of the keyboard. We know that this has

changed, and will continue to change, many aspects of life and work almost beyond recognition. In this environment, continuing to do what we have done before does not seem to be a viable option. Ongoing adherence to the current process of individual apprenticeship, without cognizance of how trainees can learn in their own time, risks being about as effective as Canute's apocryphal efforts to hold back the tide.

There is no right or wrong answer when we peek at the future: only time will tell what works and what does not. However, crowd wisdom has been useful in business and industry, and we certainly want to harness the immense wisdom of our readership. We would be delighted to hear what our readership thinks about this important topic. Please participate in the *iJACC* survey (https://www.surveymonkey.com/r/7DSGL9G) that is linked to this Editor's Page and tell us what you think is a good model for training future imagers. We may find that crowd sourcing might produce something entirely novel!

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