To Be or Not to Be a Multimodality Imager!

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WHO IS THE FUTURE IMAGER, AND WHY DO WE KEEP REVISITING THIS?

Perhaps the biggest question left unanswered in the past 10 years is, who should the future imager be (1–5)? After decades of holding the benefit of cardiac imaging to be “self-evident,” showing “value of imaging” is becoming the cornerstone of appropriate utilization. This combined with a lingering perception of overutilization, poor ability to accurately estimate pre-test probability to drive appropriate testing, and ground realities that show a huge rate of normal test results (6) will continue to keep imaging under undue scrutiny. It thus remains an important issue that will affect how we train our fellows, how imaging fellows will find jobs, how we will efficiently prioritize testing, how society will judge and pay us, and how the field will evolve. What paradigm of training and what practice privilege patterns will create the best imager, capable of providing care under such a formulation, remains stubbornly unsettled.

WHAT SHOULD ANY SOLUTION SOLVE?

At a minimum, any practice paradigm should be able to best address most of the following issues.

First, patients should proceed along the most optimal testing pathway that is based not on local expertise but on the best available evidence (7). There should be a mechanism to access such evidence-based testing elsewhere if best expertise is not available locally.

Second, imaging pathways should focus on high quality, timeliness, and cost efficiency. In the future, these would need to become even more economical.

Third, imaging pathways should support the financial and disciplinary viability of cardiology and radiology departments.

Fourth, the imaging programs should have a bearing on training paradigms. They should be congruent with job opportunities and should align with what trainees want and employers are looking for.

Fifth, both referring physicians and patients should have clear guidance about the appropriateness of the testing paradigms, expected outcomes, limitations of medical technology, and alternative approaches. They should be able to access the correct test without multiple visits and rescheduling for what the imaging department considers an inappropriate test request for the clinical question at hand.

Last, imaging paradigms should be amenable to decision support systems and be able to create an ongoing data stream to improve and evaluate these algorithms.

CURRENT PARADIGMS

Current expert opinion is divided on how to best position our training and practice patterns (Table 1). The most often chosen course, more because of inertia than evidence, has been to stay the course in the current, fragmented, and modality-parochial strategy. A recent think tank (4) recommended changing to an “imaging department” model; such a department presumably would have wide (covering all imaging modalities) as well as deep (imagers with the highest levels of expertise) offerings but would still operate along the lines of modality-centric experts housed within a single administrative unit. In a perfect world, this could even be a cardiac imaging service line with experts from both cardiology...
and radiology working under 1 roof or in 1 imaging center. In contrast, the imaging investigators at COCATS (1,2) proposed a “multimodality imager” for the future as a person who can choose the right test for the right question in the most expeditious manner and then execute it. This also is proposed as a modern solution to the current environment accounting for the realities of fellows’ expectations and employers’ preferences. The editors of iJACC have proposed hybrid models, such as a pyramidal structure whereby day-to-day work is carried out by level 2–trained experts in multimodality imaging, with in-house access to level 3 expertise in individual modalities for solving knotty problems (3). Such a strategy would expect all cardiologists to become echocardiography savvy for rapid bedside diagnosis, interventionists to develop basic coronary and vascular imaging reading skills, and electrophysiologists to be able interpret chamber and venous anatomy as well as some computed tomographic and magnetic resonance images used in fusion with their mapping systems. The universality of imaging training is eminently possible when in-house high-level expertise is available for all modalities.

Many of these proposals are only good to the extent that they can be practically applied (Table 1). It is difficult to predict the economic milieu of the future, and quite like war plans, any predictions may evaporate upon encountering the realities on the ground. The practice climate is also different in different parts of the world, and each society will have to find a locally applicable model (5).

**TABLE 1** Possible Logistic Advantages and Disadvantages of Various Imaging Practice Models

<table>
<thead>
<tr>
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<th>Multimodality Imager*</th>
<th>Multimodality Department†</th>
<th>Hybrid Multimodality Imager‡</th>
<th>Current Model§</th>
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<td>Optimal testing pathway</td>
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<td>Congruent with future job opportunities</td>
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<td>Congruent with training fellow aspirations</td>
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<td>Least need for referring physician to relearn system</td>
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<tr>
<td>Economics of division</td>
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*Multimodality imager in the vein of the 2008 COCATS guidelines (1,2). †Multimodality imaging department as envisioned by the American College of Cardiology think tank (4). ‡Hybrid multimodality imager described by the editors of iJACC (3), which is a derivation from the 2008 COCATS guidelines (1,2). §Current modality-centric pay-for-service model.

HOW CAN EARLY-STAGE TRAINING FIT IN WITH ANY PARADIGM?

We also need to resolve the paradox that imaging is finding its way into an ever increasing number of diseases and interventional procedures at a time when enthusiasm for payment for such imaging is waning. One cannot imagine practicing medicine without imaging, and nearly every clinician is becoming increasingly reliant on imaging, either as a test performer or as a consumer of test results.
Part of our focus on how to create the best imaging expert is probably blinding us from also considering the other, albeit larger end of the spectrum: medical students and residents. They can undoubtedly benefit by incorporating practical, hands-on training rather than just a theoretical working knowledge of imaging in their training as medical students and residents. Therefore, as discussed earlier: 1) imaging must become a routine tool for fellows with all-around training such that it minimizes diagnostic uncertainty and reserves the use of high-end imaging for more specific questions that only sophisticated imaging can answer; and 2) the sub-subspecialties must include more thoughtful and in-depth imaging exposure as part of their curricula. It is quite possible that the economic forces and changes in the health care environment might make imaging part of the bundled payments in a future restrictive environment, and preparing wisely for some such eventuality might be prudent now, when we have a choice about how we can do it, rather than later, when we will be told how to do it.

**CONCLUSIONS**

The imager of the future is no longer a theoretical debate, and how we train future imagers will greatly affect the professional and economic viability of our specialty. *JACC*, although it does not have all the answers, will continue to raise this issue and provide a platform for vigorous exchange of ideas on major questions that will affect our field. As a small start, a short survey of imaging programs in the country showed a slow but surely increasing interest among fellows to train in multimodality imaging and among programs to create resources to provide such training (8). A second small survey of our readership also showed vibrant interest in multimodality imaging. Let the debate continue, but hopefully we will settle on an answer in this decade!

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**REFERENCES**