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ACADEMIC INTERNAL MEDICINE INSIGHT

By the Numbers

75%
Complaints that can be accurately diagnosed with a thorough medical history
Page 11

1,800
Weighted panel size for one FTE physician
Page 6

15%
Clerkship and curriculum information based on outdated or mislabeled survey data
Page 14

Update from the Editor

As we complete our first full year of publishing *Insight* with its new structure and under new and expanded leadership representative of all our founding organizations, our editorial board has become progressively more involved in soliciting articles under each of our major topic headings, and often assisting authors with the writing of their manuscripts. Most of the feedback we have received so far has been strongly positive, noting higher-quality papers, improved content, and highly professional writing. We continue to work on building a pipeline of articles for each section (Undergraduate Education, Residency Education, Fellowship Education, Faculty Development, Administration/Financing/Regulation, Quality/Safety/High Value Care, and Opinion and Commentary), variably supplemented with leadership interviews, technology articles, book reviews, and feature articles that either bridge several topics or present concepts outside these categories. We have had our bumps along the road, but addressing them as they arose has allowed for the "new and improved" *Insight* you see today. We certainly have far to go, but most agree we are on the right track to see *Insight* rise to its potential of high value to our members.

The single greatest challenge still facing the *Insight* editors is obtaining enough quality manuscript submissions. We see *Insight* as a platform to publish educational innovations, unique solutions to challenges affecting many programs, new metrics, system adjustments or developments to meet new needs, effective components of and approaches to faculty development programs, and ways to efficiently integrate quality, safety, and high value care into our undergraduate and graduate curricula. Virtually any topic germane to academic internal medicine now has a home and vehicle for dissemination in *Insight*. We encourage members who have limited authorship experience to submit their drafts for review and writing assistance by our assistant and associate editors, respectively. In fact, initial drafts of individual experience papers need to have only three key components: the problem/issue identified, the intervention executed, and a measure of the efficacy of that intervention. Obviously, not every article will describe individual experiences. Surveys and their interpretation, summaries from the available literature and conclusions that may be drawn by them, scholarly reviews of new policies and regulatory requirements (including potential unanticipated consequences), and other types of manuscripts are welcome.

Academic Internal Medicine Insight holds a unique place in the spectrum of health care-related publications. Its focus on academic internal medicine is in fact unique, as other publications address medical education across specialties, or lack the academic focus of AAIM. We can only succeed, however, with your participation and contribution. Ask yourself, "Is this something that others in my field would find useful and/or informative?" If so, you have identified a publishable content area and we will help you with the rest.

AAIM is an organization that generates ideas, mostly originating from its members, committees, and leadership. The best ideas typically arise from need; we are all effective problem-solvers, committed to making our departments and educational programs work. Sharing your novel approaches or interpretations of information might help other members apply your work at their institutions, allowing them to move forward to address other needs.

We also welcome your feedback, criticisms, and suggestions on how we might make *Insight* more useful to you, our members. Please feel free to email publications@im.org with your thoughts. Each message will receive an individual response.

Thank you for your contributions to AAIM. We are truly even better together.

Stephen A. Geraci, MD
Editor, *Academic Internal Medicine Insight*

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Got a great idea? A process or system that has really improved your program? Share it with the readers of *Academic Internal Medicine Insight*—10,000 faculty, staff, chief residents, and other leaders in academic internal medicine.

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Insight is quarterly, so it's usually fewer than four months.

Does writing for *Insight* prevent me from publishing my work in a peer-reviewed journal?

Because Insight articles are less about data and more about practice, there usually is no conflict of interest. (You should discuss the issue with the journal to which you plan to submit.) Very often, wriring an article for Insight proves to be a great "trial run" for developing larger manuscripts.

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AAIM Interviews Susan D. Wolfsthal, MD

Susan D. Wolfsthal, MD, is Program Director in the Department of Internal Medicine at University of Maryland School of Medicine.

Her interviewer is Paul B. Aronowitz, MD, Clerkship Director in the Department of Medicine at University of California-Davis School of Medicine. He is a past president of APDIM.

Susan D. Wolfsthal, MD

What was your earliest leadership experience?

An opportunity arose to direct the inpatient consultation service here at University of Maryland. The residents had been roaming the hospital doing consults without much supervision, and the chair wanted a director and supervisor. I didn't really know anything about pre-op consultations, so I took the job and started with lectures and handouts. I ended up attending 12 months each year on the medical consultation service. I also ended up running two or three different CME courses on perioperative risk assessment in the region. That was really my first leadership experience—leading the service, writing and editing books on the topic, and teaching the residents medicine consultation. Running the medical consultation service was really my first love in medicine.

What were some of your earliest leadership lessons?

You need to have a collaborative role with the people you work with, and you need this collaborative role with the stakeholders in the issues you're trying to fix or improve. Whenever you leave someone out and then have trouble actuating a fix, you realize that you were missing something to begin with because you didn't adequately communicate with someone at the table.

Encapsulate your leadership style into one or two words.

Collaboration and listening.

What's your favorite part of your job?

Watching my residents becoming successful makes my job. I was being recruited for a job as a chair of medicine at a community hospital, and in the middle of this process, I was attending a scholarly talk, which is required by each of our senior residents. The resident absolutely knocked the talk out of the park in terms of quality, and I thought, "Why would I ever want to leave all of this?"

The other thing I love is working with my associate program directors [APDs]. I love my APDs. I've groomed them and mentored them since they were residents and chief residents, and now they prop me up when I'm not at my best. They come up with great ideas.

What's your least favorite part of your job?

The things that occur cyclically are onerous. For example, when I think of how hard the recruiting season is, of bringing through 350-400 applicants each year and making a welcoming speech for them twice per week, I dread it. It's like doing Broadway all week and twice a day on the weekends. We do well in the Match but the workload is tremendous.

There are also the pressures from the hospital. I'm also not a fan of misaligned incentives. For example, in seeking more efficient care from the residents, hospital administrators will ask me why we need to have a morning report. Their incentives are sometimes at cross purposes to education, and it can make my job tough at times.

What do you look for when you are hiring someone to work on your team?

They have to really want, deep down in their hearts, to do education. They have to be interested in the overall welfare of the medical students or the residents. They have to be fun, be collaborative, and possess a good sense of humor. I want them to be goal directed and deadline focused. They have to be able to get done what they need to get done in a timely fashion.

The people we hire also have to like the residents. If a chief or an APD starts to hate the residents, it's all over. I say to them, "You are the face of medical education; without the residents and students, we would not have jobs. We have to serve them appropriately—that is our purpose." They have to take joy in the successes of our students and residents—to feel great about their accomplishments.

Who carries out the semiannual meetings with your residents?

I still do. I meet with all 90 residents, twice each year, at least 45 minutes per meeting. It's super hard but it's my chance to get to know all of them. I believe in reflective therapy, so I say to ask them, "What do you want to do, and how are you going to get there?" I get tremendous joy in helping them figure it all out, but they are the ones who really figure it out in the end—I am just the facilitator.

What's the greatest misperception people have about you?

I'm a bureaucrat and that all I care about are the RRC rules. Some people don't get the work hours rules, and they go ballistic when we point out violations of those rules. They don't understand where our accreditation comes from and that we need to be in compliance. They don't see that I care more about lots of other things, about the curriculum and how good and how competent our residents end up. But I have to make sure that we are in compliance with the ACGME rules—it's part of my job.

What thing in your career as a leader are you most proud of?

Being a residency program director. I feel like I've helped create something special. It's about the whole package—I'm very proud of where the program is and how far it has come through my many years of program directing.

What's the secret of being a great mentor?

I think that being a great mentor is sort of two-pronged. First, a mentor has to find out what the mentee wants to do. Once that's been clarified, the other prong is to go over the road map or the "rules" for getting there. For example, if someone wants to do a pulmonary and critical care fellowship, is that resident doing the things that will lead to success in matching to that fellowship? To be a good mentor, you have to be a good, reflective, supportive listener, but above all else the mentor has to know what the rules of the road are to get a mentee to his or her goals.

Who were a couple of your most important mentors?

Frank Calia was the chair of medicine when I came to run the medical consultation service. He asked me to do many things over the years, from chairing the big curriculum committee for the medical school to running the ambulatory program for the residency. He would always begin by saying, "Susan, you need to do this, and it will be good for you to do this." He also helped me become a full professor.

The other great mentor I encountered was William Henrich, who is now the President of University of Texas San Antonio Medical Center. He conveyed a humanism and caring for others that I've never seen matched. His welcoming talks to the applicants were renowned for the way in which he talked about learning the art of becoming a physician. He would somehow dig down and tap into their deepest desires about why they wanted to do what they wanted to do. He emphasized keeping your eyes on the horizon and not on your feet—on keeping the long view of why any of us do what we do in medicine.

"You are the face of medical education; without the residents and students, we would not have jobs. We have to serve them appropriately—that is our purpose." They have to take joy in the successes of our students and residents—to feel great about their accomplishments.

How do you deal with the syndrome where physician leaders struggle to be the "bad guy" in their leadership roles?

You have to be firm and you have to be fair. You can't favor one person over another. You have to treat people with equanimity. You have to be clear and never vague about what you expect from them.

What advice do you have for younger, up-and-coming leaders?

Go to APDIM and AAIM meetings. I have missed only two APDIM meetings in my 24 years of program directing. APDIM has been a life saver for me. Networking and meeting people who do what you do is of vital importance to developing as a leader.

I'm also a big believer in lateral mentoring. For many years, our pediatrics program director and I co-mentored one another. You've got to have someone locally that you can talk to and bounce problems and ideas off of.

Transforming Primary Care Compensation from Volume to Value: An Innovative Change at UW Health

The macro changes in the health care system have caused a transformation in the way physicians practice medicine, moving from providing care based on volume to value. The Affordable Care Act shifted the focus of health care toward the Institute of Healthcare Improvement's (IHI's) triple aim to improve the health of patients and populations while improving quality at a lower cost (1). Creating a clinical compensation plan that allows physicians to have time for population health management has been challenging. Compensation plans need to reward the total work performed, not just the face-to-face work. Current productivity-based compensation models incentivize physicians to provide a higher volume of services without a demonstrated improvement in quality of patient care (2). The relative value unit (RVU), used primarily to determine compensation, no longer represents the total work primary care physicians perform on a daily basis.

In the RVU-based environment, patients are more likely to have face-to-face office visits rather than ongoing care managed through other mechanisms, including patient portal visits, e-consults, patient registries, and telemedicine. Physicians are also more likely to close their panels, limiting access for new patients. Physicians are reluctant to make time to address chronic disease management registries, participate in practice improvement projects, or manage a primary care team because it decreases RVUs and income. The RVU model of care does not align with new models that require care for populations as well as individuals.

At University of Wisconsin (UW Health), the primary care enterprise spans three clinical departments: General Internal Medicine (GIM), Family Medicine, and General Pediatrics. Together, this group provides care for approximately 299,000 medically homed patients from 121 primary care physicians and 57 resident physicians who also have a panel of patients. A cross-departmental coalition redesigned the organization's primary care compensation plan to fulfill the IHI triple aim, specifically emphasizing population health management that requires physician work beyond the normal face-to-face visit. The compensation plan's goals encouraged providers to manage larger panels of patients, improve patient access, and provide high quality care (**Figure 1**). Additionally, the organization needed to attract qualified primary care physicians in a high-demand market.

An important part of redesigning the compensation plan was creating a unified primary care job description across all three groups that included establishing standard panel sizes, work hours, and quality improvement expectations (**Figure 2**).

In the plan, clinical compensation has both a salary base component and a work component. Clinical compensation is based on the number of patients medically homed at a clinic site (**Figure 3**). We first calculate the clinic compensation pool by multiplying the number of patients medically homed at the site by the benchmark median specialty compensation (derived from the weighted average of three national benchmark surveys: American Medical Group Association, Medical Group Management Association, and Sullivan Cotter), divided by 1,800 (the weighted panel size we expect for a 1.0 full-time-equivalent [FTE] physician). The physicians at that site divide that compensation pool based on their individual panel size and the proportion of work they do to take care of patients medically homed at the site. The work metric is currently defined by RVUs and a physician's FTE. Of an individual physician's compensation, 25% is based on the proportion of his or her FTE to his or her clinic site's FTE and another 25% is based on the proportion of his or her RVUs to his or her site's total RVUs. In addition, 5% of a physician's clinical compensation is at risk if he or she does not meet the standards outlined in the primary care job description.

Improved quality of care was also an objective of this plan. Physicians can earn an additional 5% if they achieve certain quality metrics. These metrics are determined annually based on primary care initiatives. Current metrics for adult medicine are shown in **Figure 4**.

Now in the fourth year of this new compensation plan, we have achieved many of the initial goals. Physicians opened

FIGURE 1. UW Primary Care Compensation Plan Goals

Align physician work and compensation.
Stabilize workforce.
Recruit the highest-quality workforce.
Improve care quality.
Improve patient access.

FIGURE 2. UW Health Primary Care Job Description

- Establish and maintain a weighted panel (2) of 1,800-2,200 patients for a full-time physician.
- Manage and coordinate care for patient panels, including chronic disease management.
- Work on a team with an Advanced Practice Provider.
- Maintain physical presence in clinic from 8:00 a.m. to 5:00 p.m.
- Maintain 30 patient contact hours and 40-50 total in-office hours per week.
- Maintain physical presence in clinic a minimum of 44 weeks per year.
- Participate in a call group.
- Serve on committees.
- Attend divisional meetings.
- Participate in quality improvement initiatives.

FIGURE 3. GIM Compensation Plan Model

Basic Formula			Example Compensation for a 1.0 MD Three Physician Clinic, 5,300 Total Panel Size		
1. Total panel for clinic site	National x benchmark 1,800	Total clinic = compensation pool	1. 5,300	x $225,285 / 1,800	= $662,500
2. Individual panel size / Total clinic panel size	50% of x compensation pool	= Panel/Base	2. 1,800 / 5,300	50% of x compensation pool	= $112,500
3. Individual RVUs / Total clinic RVUs	25% of x compensation pool	RVU-based = compensation	3. 3,500 / 10,300	25% of x compensation pool	= $56,280
4. Individual FTE / Total clinic FTE	25% of x compensation pool	FTE-based = compensation	4. 1.0 / 2.8	25% of x compensation pool	= $59,151
5. Panel/Base + RVU-based comp + FTE-based comp		**= Individual comp**	5. Panel/Base + RVU-based comp + FTE-based comp		**= $227,931**

FIGURE 4. GIM Quality Metrics

Access	• Patient Satisfaction Survey: Appointment available when needed
Service	• Patient Satisfaction Survey: Did the doctor explain my illness in a way I could understand?
Health Outcomes	• Diabetes all-or-none outcome measure • Controlling high blood pressure

their panels, improving access for new patients. In GIM, the number of open panels increased from 17% to 48% from 2009 to 2013 (4). Our quality performance metrics, compared with other organizations in Wisconsin, improved dramatically (3,5). The move away from RVUs has aligned physician work with compensation, allowing physicians the time to monitor chronic disease registries and manage patients through mechanisms other than an office visit. As expected, RVUs decreased by 3% as the plan was implemented. The UW Health primary care workforce stabilized with no attrition of physicians to local competitors.

We experienced some unintended consequences as well. When the primary care job description was put in place, some providers reverted to meeting the minimum standards, which required increased monitoring. We experienced a decrease in visit volume, which was a concern for operations leaders. Finally, administrator and nursing roles changed with the decrease in visit volume but increase in non-face-to face work. We had not adequately prepared staff for those changes.

Ultimately, the compensation plan that UW Health implemented more closely aligns compensation with the work of the primary care physician in a population health environment. This plan accomplishes the goals of the IHI triple aim by creating monetary incentives to manage greater populations while continuing to care for the individual patient and improve quality. As the role of primary care physicians continues to evolve, this innovative plan and others like it allow flexibility to perform the work that the new model of care requires.

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Engaging Trainees to Become Lifelong Learners

All physicians train with the goal of becoming master clinicians. Medical school and residency training introduce us to those omniscient, senior physicians who can diagnose systemic illness by looking only at the patient's fingernails. After formal medical training ends, many of us make elaborate plans for continued study, lest we become an "out-of-touch physician" (1). However, the noble goal of furthering clinical skills through reading one journal article per day or completing a board review topic per week becomes difficult with the other demands on our time. Fortunately, clinicians can use concrete methods to continually improve their skills. Physician educators can enhance their own lifelong learning skills and provide learners with these same vital tools. Gurpreet Dhaliwal, MD, Professor in the Department of Medicine at University of California-San Francisco School of Medicine, has drawn on the science of expert performance in nonmedical fields to describe four methods to further medical clinical reasoning and judgment skills among all clinicians: progressive problem solving, feedback, simulation, and deliberate practice (**Figure 1**) (2).

Progressive Problem Solving

Progressive problem solving involves reformulating a straightforward problem to make it harder, akin to making every patient presentation a "teaching case" by building on seemingly simple problems to push the boundaries of individual knowledge. For example, for a patient who presents with community-acquired pneumonia, consider what the alternative antibiotic regimens would be if the patient had an allergy to the first-line treatment option or if the patient were pregnant. This exercise of making the clinical situation more complicated than it is helps continually increase clinician knowledge.

Feedback

Integrating feedback from patient care into daily practice is based on the premise that many professionals with expert judgment (for example, meteorologists) get frequent feedback on their decisions. In the absence of feedback, clinicians assume that their diagnosis was correct and the treatment effective; it is human nature. Clinicians can employ electronic medical record tools and calendar reminders to seek out and learn from patient outcomes, thereby maximizing learning and minimizing overconfidence. Clinicians should extend this practice to a variety of patient presentations and not limit it to the patients who present an "interesting case."

Simulation

The use of simulation increases the frequency that clinicians encounter subject material. Already familiar with task-based simulation, such as hands-on practice of a procedure with a mannequin, clinicians can expand this technique to cognitive simulation as well. Many journals have clinical cases with expert discussion that clinicians can read and consider as if they were the provider at the bedside. These exercises force the reader to make a decision about the most likely diagnosis, work-up, or treatment prior to reading the experts' opinions.

FIGURE 1. Four Methods for Lifelong Learning

Method	Definition	Examples
Progressive Problem Solving	Reformulation of a straightforward problem, making the problem more complex	• Consider how the differential diagnosis for the etiology of a patient's heart failure would change if the cardiac catheterization showed normal coronaries. • Consider two teaching points you would share if a learner were present for the care of an outpatient with gout.
Feedback	Establishment of a mechanism to evaluate whether a diagnosis or treatment was correct or improved the patient's symptoms	• At end of an inpatient ward rotation, review the follow-up care received by the patients the team discharged during the rotation. • In clinic, set time aside monthly to review the outcomes for patients you saw in urgent care visits.
Simulation	Repetition of a specific clinical practice, outside the actual clinical environment, to improve hands-on ability or clinical judgment	• Image challenges • Published expert reviews of clinical cases • Online heart sound simulators • Procedure training on mannequins
Deliberate Practice	Focus of efforts on developing or honing a specific skill to a minimum predetermined goal	• When ordering an echocardiogram to evaluate a patient with a heart murmur, list the top three predicted diagnoses and continue this practice until your most likely predicted diagnosis matches the echocardiogram findings more than 90% of the time.

Deliberate Practice

Deliberate practice means focusing on a relatively underdeveloped skill until performance achieves a personal goal. For example, perhaps the inpatient team decides to improve lung examination skills. Team members could perform a lung examination on every patient, draw the expected chest x-ray findings, and then compare their expectations to the actual chest x-ray (an objective measure of some but not all lung findings) until the team is correct 90% of the time. The team could augment this focus with use of existing online teaching modules for lung examination and interpretation of chest x-rays. To expand an electronic teaching repertoire, the authors recommend the AAIM E-Learning Resources, which provide reviews of e-learning websites and apps (3).

Building a Culture of Lifelong Learning

Although drawn from experience in fields outside of medicine, the concept of a culture of lifelong learning has been discussed in medical education for some time. Despite awareness of these techniques to improve performance, teaching the skills remains difficult. The challenge lies in working around the unique restrictions on resident time and energy—particularly when these demands continually evolve. We must consider how to make methods for lifelong learning relevant in training today.

Behavioral economics increasingly teaches how subtle inputs from the environment can dramatically influence behavior (4-6). Analogously, to create a culture of lifelong learning in a training program, the authors advocate integrating these four techniques into the daily routine of residents. One inherent value in these methods is the limited time required for practice. Begin by adding specific, deliberate practice goals to the learning objectives for rotations. Use the morning report conference as an opportunity to demonstrate progressive problem solving while working through a case or to emphasize the importance of feedback by revisiting previously presented cases for an update. Encourage attending physicians to role model deliberate practice in the clinic and on rounds by helping the team set a learning goal for the week and meet it. In clinic, for example, residents or fellows could use a risk calculator to consider the role of lipid management in each of their patients that week. The integration of lifelong learning skills will vary for different programs and environments. To this end, chief residents serve as invaluable resources to identify system-level areas for improvement and serve as the catalyst for implementing these processes, regardless of educational level.

Self-reflection is an important activity in clinical practice and teaching (7-8). Therefore, we recommend creating an atmosphere where residents can determine their own strengths and weaknesses and then employ the appropriate lifelong learning method to personalize the process to their individual needs. Take a moment to reflect on which of these four methods you rely on in your current practice. Choose the method you are least comfortable with and introduce it into your upcoming week. Ultimately, the secret to becoming the sage oracle we encountered in medical training is to motivate ourselves and our learners to develop lifelong learning skills. By adopting the methods of progressive problem solving, feedback, simulation, and deliberate practice into the institutional culture of training programs, all physician educators can engage and empower learners to become master clinicians.

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Uncertainty in Medicine

A lot of uncertainty exists in medicine. Uncertainty is a state where incomplete knowledge or unpredictable outcomes are experienced. Coping with uncertainty is where the science and the art of medicine meet and should be an important facet of medical education. Physicians with fewer years of practice (especially residents) are more uncomfortable with uncertainty than individuals with more experience (1). Even so, many practicing physicians are also not able to cope well with their own uncertainty.

Uncertainty causes anxiety and self-doubt, which contribute to burnout. New physicians are terrified of making mistakes and want validation that they are right. In spite of the pervasive lack of certainty in medicine, the medical field as a whole is intolerant of uncertainty (2). A robust hidden curriculum reinforces that uncertainty is not to be tolerated: an admissions process that has traditionally placed much higher value on "hard" sciences versus humanities, our heavy reliance on multiple choice tests where one answer is correct, and preclinical curricula that package diseases neatly by their signs and symptoms. These types of cues lead our learners to perceive medicine as much more black and white than it is. The culture of medicine is still reluctant to admit error and fosters a highly competitive atmosphere in which being wrong is taboo. Our learners are not taught that being certain does not mean you are correct.

However, uncertainty is not all bad (3). It promotes creativity and critical thinking. It promotes self-reflection and collaboration. Uncertainty is what sustains hope during prognosis discussions with patients. Survival curves are universally asymptotic—they never touch zero, because an outlier always exists. Discussing uncertainty with patients can build a strong foundation for shared decision making.

How Can We Teach Our Learners to Be Comfortable with Uncertainty?

Encouraging learners to engage in deliberate thinking about uncertainty and anxiety may help. Educators can unmask the hidden curriculum by identifying and labeling uncertainty and discussing how to will deal with it. Understanding that the presence of several categories of uncertainty is a good place to start (1).

For the first type, the answer to a question exists but is not apparent to the learner. This kind of uncertainty is easy to manage by looking up the answer or engaging a consultant to help manage a diagnostic or therapeutic question. Educators may need to help learners explicitly craft and refine their questions to get the best answers from their sources.

In the next type, no one knows the answer to a question, which is a more challenging situation. In the current era that emphasizes evidence-based medicine, physicians are often surprised at the lack of evidence available to support a decision. They can turn to consensus guidelines or resort to thinking about the physiology of a problem to try to come up with solutions. Shared decision making with a patient is important in these situations, particularly to partner with them so they understand the choices being offered. Educators can role-play these conversations with their learners before observing their approach with actual patients.

Most challenging—and where physicians find themselves most often—are situations where general answers to a question exist but the physician is not sure how they apply to the patient or whether that patient will respond as predicted.

Editorial Note

The concept of understanding and managing uncertainty is so fundamental to medical education at all levels (and, in fact, to most situations everyone deals with on a daily basis, regardless of profession) that it is rarely discussed with the frequency and at the level it deserves. Despite all we do to "digitalize" medicine into dichotomous choices, in reality, we deal constantly in relative probabilities—that a diagnosed disease is in fact present; that a given treatment will produce the sought-after result; that a test result does make a specific diagnosis more or less likely.

Nowhere does the conflict and challenge of managing and developing comfort with uncertainty become more acute than in resident education. For the first times in their professional careers, residents are placed in a position of significant autonomy, writing orders for tests and treatments before or even without supervising physician approval. Students are more protected from the consequences of their decisions, and fellows have developed some mastery of this issue during their residency years. Yet, I doubt many of us can recall discussions with our residents specifically about the process of developing comfort with uncertainty. More data, more research, and tests with better sensitivity and specificity all will decrease the amount of uncertainty, but every experienced practitioner knows that we will never have enough data to make medical decisions for our patients with 100% accuracy, as so many variables (including the "known unknowns" and the "unknown unknowns") exist for each patient and every disease that diagnosis and management will remain a process of inductive reasoning.

I applaud the authors of this paper in committing the time and effort needed to produce this eloquent, articulate discussion on an important educational concept.

Stephen A. Geraci, MD
Editor, Academic Internal Medicine Insight

Patients are all different. They bring different values, experiences, and comorbidities with them to each visit, which can influence their reaction to a work-up or treatment plan. Trying to apply even the best evidence to a single patient can be complicated. Instead of making an "executive decision," educators should think out loud and identify for their learners where the uncertainty is affecting their approach to that patient's situation.

Uncertainty and High Value Care—Avoiding the Futile Search for Absolute Certainty

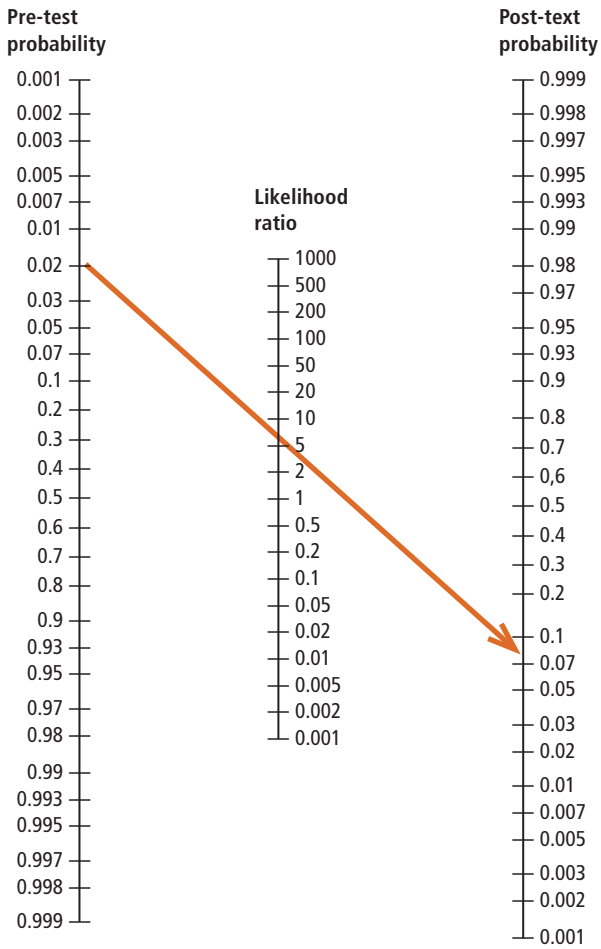
The elusive quest for absolute certainty can cause problems. It generates over-testing. Physicians seeking the security of additional testing "just to be sure" trigger the use of low-value testing that does not usually make things more certain (4).

As educators, we need to go back to the basics. A good history and physical will rarely lead you astray. In 75% of patients presenting with common complaints, the diagnosis is apparent after taking an accurate and thorough history. The physical exam adds 10% to 15% of diagnoses; diagnostic testing adds only 10% (5). Most diagnostic errors are due to inaccurate or incomplete history taking (6). We should rely on history taking in our own practice and emphasize it for our learners. Our learners will value what we value (7). As Osler did, take learners to the bedside of real patients; refine their interviewing and physical exam skills, sharpen their critical thinking skills, and show that diagnostic testing is an adjunct to, and not a replacement for, a careful history and exam.

Teach the process, not the answer. When residents feel they have vetted their diagnostic reasoning and have been given feedback on how they got to the answer, they are better prepared to handle the next unknown situation. This approach includes safety checks and mental heuristics to give them confidence that in spite of uncertainty, the likelihood of harm to the patient is low. These checks include teaching "do-not-miss" diagnoses that must always be considered and an understanding of the most common biases that contribute to diagnostic error (confirmation bias, anchoring bias, etc.) (8).

Understand test characteristics, especially testing done in very high or very low pretest probability situations, will not add meaningfully to diagnostic certainty (**Figure 1**). Even "gold standard" tests or therapies are not 100% predictive or effective. The statistically significant *p*-value of 0.05 to which we cling translates into a 5% chance that the results are due to chance alone. Test characteristics are reported in sensitivity and specificity and positive and negative predictive value, but those numbers rarely, if ever, hit 100%. Generating false positives from low-yield testing, not to mention the cost of testing, does not bring high value to our patients. In spite of a perceived expectation that a "right thing to do" always exits or that the physician will always know exactly what is going on, in patients with a low pretest probability of disease, testing has no impact on their long-term worry (9). Discussing testing with your residents, asking what they expect to find,

FIGURE 1. Fagan Nomogram Results



This Fagan nomogram shows that a pretest probability of 2% only increases to 7% with a positive test that has a likelihood ratio of 5. Testing doesn't meaningfully change your level of certainty if your pretest probability is very high or very low, no matter how good the test is.

and asking what they will do with different results brings value to the forefront of the treatment plan. If the answer is "I don't know" or "It won't change my plan," then the test is not valuable and is unnecessary (10).

Role-model your own coping skills and discuss your uncertainty openly. People are more risk-averse when seeking gains and will take chances to avoid loss (11). Knowing this tendency can help us reframe diagnostic questions about testing from "What might we be missing?" to "What are we looking for?" which may steer you away from the temptation to over-test. Treat "watch and wait" as an active strategy; it is learned behavior that must be modeled by teachers of medicine. Ease with watch and wait strategies does appear to be teachable (12). Use resources that will help steer residents away from overutilization without added diagnostic certainty,

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The Clinical Competency Committee Collaborative Learning Community: A Look Back

In January 2015, the AAIM Innovations Committee brought together 15 educators from diverse programs to form a collaborative learning community (CLC) focused on the function and processes of clinical competency committees (CCCs). AAIM's goal for CLCs is to "engage members on a specific academic internal medicine issue" (1). Initially facilitated by Lauren Meade, MD, the collaborative reviewed the available literature on CCCs and identified broad areas for further exploration: milestones revision, resident engagement in CCCs, CCC goals and structure, and faculty development for CCCs. Ultimately, four subgroups were formed to discuss issues and create deliverables for the AAIM community. Through monthly conference calls, in-person meeting presentations, and working with a mentor from the Accreditation Council for

FIGURE 1. CCC Collaborative Subgroups and Deliverables

Subgroup	Members/EIP Mentors	Deliverables
Milestones Revision	Saba A. Hasan, MD *(Leader)* Capital Health Regional Medical Center Stephanie A.C. Halvorson, MD Oregon Health & Science University School of Medicine Kathleen M. Finn, MD Harvard Medical School Massachusetts General Hospital EIP Mentor: Andrew Varney, MD Southern Illinois University School of Medicine	1. "Reporting Milestones Opportunities: Feedback from the Field." Poster presentation at 2016 ACGME Educational Conference 2. "Hitting Your Milestones? Educational Theory versus Practical Reality." Workshop presented at 2016 AAIM Skills Development Conference
Resident Engagement in the CCC	Jennifer Jeremiah, MD *(Leader)* Warren Alpert Medical School of Brown University Jacqueline Darcey, MD Morristown Medical Center Nacide Ercan-Fang, MD University of Minnesota Medical School Candice Majeta, DO University of South Florida Health Morsani College of Medicine EIP Mentor: Kerilyn Bollmann, MD University of Arizona College of Medicine	1. Materials on the AAIM website: • "Engaging Residents in the CCC." 2. "Helping Residents See, See, See the CCC: Resident Engagement in Clinical Competence Committees." Workshop presented at 2016 AAIM Skills Development Conference
CCC Goals and Structure	Matt Blackwell, MD *(Leader)* Carolinas Medical Center Jacqueline Fairchild, MD Mercy Hospital Omar Vargas, MD Southern Illinois University School of Medicine EIP Mentor: Benjamin Kinnear, MD University of Cincinnati College of Medicine	1. Materials on AAIM website: • "Utilizing SMART Goals" CCC feedback form (4) • CCC reviewer script • Resident self-assessment guide
Faculty Development for CCCs	Jaya Raj, MD *(Leader)* St. Joseph's Hospital and Medical Center Andem Ekpenyong, MD Rush University Medical Center Adam Treitman, MD University of Illinois College of Medicine at Chicago/Christ Hospital Matthew Burday, MD Christiana Care Health System EIP Mentor: Diana McNeil, MD Duke University School of Medicine	1. Materials on AAIM website: • Rater training workshop for CCC members and core faculty • Rater feedback for core faculty by CCCs • Using a direct observation tool (clinic shift card) • Quality improvement for CCCs (SWOT analysis) 2. "Faculty Development for CCC's: Getting the Most out of Ratings and Raters." Workshop presented at 2016 APDIM Spring Conference

Graduate Medical Education (ACGME) Educational Innovations Project (EIP), each group developed their projects. **Figure 1** includes the subgroup members and deliverables, which will be available on the AAIM website in late 2016.

Recognizing the tremendous impact of reporting milestones on resident assessment and feedback, the milestones revision subgroup members used their experience as CCC faculty raters to identify opportunities to enhance the effectiveness of the milestones ratings scale and address areas of competency not included in the current framework. The group drafted a proposal for a potential new subcompetency, the "efficiency/executive function." The group presented this concept as a poster at the 2016 ACGME Annual Educational Conference.

Inspired by the ACGME directive that residents must be engaged in their learning and assessment (2), the resident engagement subgroup investigated ways of involving residents in the CCC process before, during, and after CCC meetings. First, the subgroup surveyed the entire collaborative to identify individual perceptions about resident knowledge regarding CCCs and how members engage residents in their CCC process. The subgroup followed this survey with an institutional review board-approved study in which all 376 residents from the four diverse programs were invited to participate in a survey about their knowledge of the role of CCC in their training and how they would like to be involved in the process. In tandem, subgroup members held focus groups with residents to gain insight as to how they feel they should be engaged. Using this information, the subgroup created an audio slideshow describing methods of resident engagement before, during, and after the CCC meets. This subgroup will also present its work during the upcoming 2016 AAIM Skills Development Conference.

The CCC goals and structure subgroup began its work with a review of the article published by Hauer and colleagues that defines two paradigms for the role of CCCs: a problem identification model and a developmental model (3). In the problem identification model, CCCs focus on the performance issues of struggling residents, whereas in a developmental model, CCCs attempt to guide all residents' progressive development (3). The authors found fewer programs using the developmental model. The subgroup created tools to assist CCCs in moving toward this model, including a checklist to ensure all the needed data are available, a CCC reviewer script that outlines a format for presenting to residents during CCC meetings (including examples of residents at different performance levels), and a self-assessment guide for residents.

Recognizing the key role that each CCC member plays in the function and effectiveness of the CCC, the faculty development subgroup created a short series of workshops that programs can use to educate their CCCs and core CCC faculty members about the resident assessment process. While the ACGME CCC guidebook (2) outlines a process for creating a CCC and running CCC meetings, this subgroup chose to focus its efforts on faculty development activities centered on quality improvement of assessment systems. Each subgroup member created a workshop based on a faculty development activity specifically for CCCs that he or she had conducted at his or her home institution. These workshops have been compiled into a toolkit. Each workshop includes a detailed facilitator guide and an accompanying PowerPoint slide presentation with speaker notes.

The deliverables will not be presented as final products, directives, or best practices since there are still many unanswered questions about how CCCs should function, especially given the variability in programs and institutions. Instead, the collaborative hopes that the deliverables will be used to trigger conversations across institutions about how they can improve assessment systems for the benefit of residents and, ultimately, patients.

The members of the CCC CLC would like to express their appreciation to the AAIM Innovations Committee for this unique opportunity to learn from each other and to serve the AAIM membership through the highly engaging CLC format, which allows for critical thinking, creative teamwork, networking, and innovation. The collaborative is especially grateful to Dr. Meade for her direction and inspiration in her role as the facilitator. The collaborative would also like to thank the EIP mentors, the AAIM staff, and ACGME (particularly Eric Holmboe, MD, and Lisa Conforti) for supporting our efforts.

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NBME Medicine Subject Exam: What Do We (and Our Students) Really Know?

Most Liaison Committee on Medical Education (LCME)-accredited medical schools use the National Board of Medical Examiners (NBME) Medicine Subject Examination as an end-of-clerkship assessment for their third-year internal medicine clerkship. As of 2015, 134 US LCME-accredited schools use this exam. Despite its wide use, a mismatch between clerkship content and examination content may exist. For instance, the exam covers curricular content such as ambulatory medicine, hospital medicine, dermatology, and neurology that the schools using the examination may not address. Surprisingly, even though medicine clerkship experiences vary considerably in curricular content and structure across institutions, the impact of clerkship characteristics on the shelf exam and US Medical Licensure Examination (USMLE) Step 2 Clinical Knowledge performance has not been thoroughly studied. Only one study examined the effects of several internal medicine clerkship characteristics related to structure, pedagogy, and patient contact across several schools on medicine subject exam and USMLE Step 2 performance (1).

Several clinical clerkships have examined the effects of clerkship characteristics on exam performance (1-11). Research on clerkship timing has shown that performance on end-of-clerkship assessments in obstetrics-gynecology (2), surgery (3,4), medicine (5,6), and psychiatry (7) improved for successive cohorts over the academic year. Research on the effect of clerkship length on exam performance has been mixed. A couple of studies examined clerkship length and timing on exam performance for obstetrics-gynecology clerkships (8,9). These studies found that longer clerkship length resulted in higher exam performance, especially when exams were taken during the first half of an academic year. The relationship between psychiatry NBME scores and the length of psychiatry clerkships has been mixed (7,10-12). One study showed an improvement for one school with a shorter clerkship length (12), but a larger study across multiple schools found a direct relationship between clerkship length and improved exam performance (7).

Although these studies have been informative, one limitation is that the majority were conducted at single institutions and only a few were conducted across multiple schools (1,4,7). Furthermore, the length of the internal medicine clerkship as a potential variable affecting scores has not been studied extensively and only a few studies have looked at the USMLE Step 1 score as a control variable for the construct of clerkship medical knowledge, when examining the impact of clerkship length and sequence (13).

This information is increasingly salient as internal medicine clerkships decrease in length. In the collaborative project between NBME and 62 LCME-accredited schools examining clerkship characteristics and exam performance from 2011 to 2014, the number of eight-week internal medicine clerkships was slightly more (43%) than the number of 12-week clerkships (40%) in 2011-2012. Over the next three academic years, the number of eight-week clerkships increased to 48%. Between 2011 and 2016, eight of the participating schools with 12-week clerkships have reduced their clerkship length, often to eight weeks. Additionally, more than one-half of these eight-week clerkships have little or no ambulatory component. Of note, during this time, the content on the shelf exam has not changed.

The collaborative project between NBME and 62 LCME-accredited schools began two years ago. Each participating school obtained institutional review board (IRB) approval or exemption for the study; NBME received independent IRB approval. This ongoing study is attempting to answer some fundamental questions: when controlling for USMLE Step 1 scores, what is the impact of clerkship curricular content, clerkship length, preclinical curriculum, and dedicated study time on medicine subject exam scores? Additionally, how do internal medicine clerkship characteristics impact USMLE Step 2 scores, and what is the impact of multiple subject exams throughout the third year of medical school on USMLE Step 2 scores when controlling for Step 1 scores?

When working with large datasets, either for research or programmatic reasons, concern should always exist regarding the veracity of the data. During the review of the data, the investigators discovered that approximately 15% of the clerkship and curriculum information based on previous year survey data collection was outdated or mislabeled. In cross-referencing examinee data from individual schools participating in the study, the investigators also discovered errors in classification of satellite campuses and mislabeling of academic years. The dataset of the examinees taking the medicine exam included approximately 8% of fourth-year students and 8% of second-year students.

Mislabeling of academic years is significant for two reasons. First, third-year student performance will generally be lower than fourth-year student performance and higher than second-year student performance. Mixing fourth-year and second-year student performance on the medicine exam with third-year student results will confound the findings. Second, because NBME reports quarterly norms based on academic year, having accurate information is essential. The quarterly norms help clerkship directors better compare individual student performances to national data. Many schools provide not only pass/fail marks, but also school-based numerical scores for their students based on the medicine exam scores.

The study schools show great variability in what number they use for a passing score and their school-based conversion of a numerical score. NBME conducts grading guideline studies every three to five years with clerkship directors who review the exam and recommend pass and honor scores for schools. This research will provide insight into how different clerkship characteristics affect performance and will provide individual clerkship directors a better understanding of how these cutoff scores should be applied based on their clerkships.

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such as Choosing Wisely (www.choosingwisely.org/) or the American College of Radiology Appropriateness Criteria (www.acr.org/Quality-Safety/Appropriateness-Criteria).

In summary, as attending physicians we need to acknowledge that uncertainty is certain and understand how it affects our decision making and job satisfaction. To combat the hidden curriculum, we need to show our learners that a small amount of uncertainty will be present in everything they do; they must learn how to cope and even thrive with it.

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Enhancing the Rigor of Interdisciplinary Research in Academic Internal Medicine

In this era of precision medicine, the steps from basic discovery to translational impact to bedside application have been shortened dramatically, in part because of critical technological advances and in part from greater molecular, genetic, and biological insights generated by prior investigation. Team-based science crossing traditional medical and scientific disciplines is the norm today, particularly as we delve more deeply into the complexity of human disease at the genomic and epigenetic levels. No one would argue that it is not a blessing, but it also means the stakes in this process have become high, particularly in terms of the development, application, and economic cost of new medical interventions. Not unexpectedly, as the pace of discovery has hastened, so has the proliferation of scientific journals, the rapidity of submissions, and the time to acceptance. Unfortunately, however, these changes have occurred during a period when both industry and federal support for biomedical research has waned, leading to a highly competitive environment with a record number of article retractions and the subsequent evolution of the online journal *Retraction Watch*.

It is critical that the emerging cadre of young clinician scientists poised to follow a primary investigative career understand, follow, and fulfill the fundamental obligations for transparency and rigor.

In response to these changing times, the National Institutes of Health (NIH) and the scientific community at large became concerned about not only the overall paucity of rigor in certain applications for research funding, but also the inability to reproduce some highly visible preclinical datasets. Because the foundation for scientific advancement rests with the ability to reproduce research findings by developing robust and unbiased experimental designs and analyses, the issue of rigor came to the forefront in several ways. NIH was the first but not the last to address this question directly by defining scientific rigor and mandating that all NIH research applications for funding include statements that attest to rigor. Journal editors have begun endorsing the concept of open access, not just for their journals, but also for complete datasets from clinical trials as a means to enhance transparency and provide source data for subjects and investigators. Industry, although initially nudged by regulatory agencies, has now wholeheartedly embraced open access and has become a leader in this nascent movement to provide all investigators with datasets from every study, filling a gap between what has been published and what has actually been accomplished.

The convergence of these events bespeaks a new era in academic medicine, one that must be punctuated by a new rigor. Interestingly, although five definitions of *rigor* appear in Merriam Webster, only the most recent entry seems appropriate for these times: "the quality or state of being very exact, careful, or strict" (1). In the second decade of the 21st century, this definition is certain to be the foundation for all work going forward. Although one could question how we arrived at a point where attestations of exactness are mandatory to move a scientific field forward, a more appropriate query would be to consider how we can enhance the rigor of scientific investigations in academic medicine.

Big genomic data, generated as part of consortium arrangements between institutions, often funded by NIH or not-for-profit foundations, are shared electronically so that consensus datasets can be enacted. However, with the current focus of preclinical studies mostly using genetic mouse models to recapitulate human disease, a number of variables can lead to different results in otherwise genetically identical animals from different laboratories. Indeed, we have learned from genome-wide association studies in people and genetic studies in mice that gene mutation by environment interactions are at the heart of biologic variability in all species; it not only complicates data interpretation, but also leads to confusion when reproducibility is in question. Minor chemical differences in compounds to be tested can produce differing results in the same animal models. Therefore, can we refine our approach to rigor and thereby provide a stronger rationale for scientific advancement?

Transparency is essential for scientific rigor. Although as clinician scientists we would all attest to the highest degree of scientific discipline and precision, openness with respect to our experimental design and outcomes is essential. In a simple way, the laboratory notebook is our guide and each experiment becomes our legacy. However, in the brave new world of the Internet, the written word is often forgotten. Electronic laboratory notebooks with each and every data set provide some reassurance, but in the long term, other, more collaborative means of reassuring funding institutions and our colleagues that experimental data are both rigorous and reproducible must be available.

One approach may not only ensure rigor, but also serve to enhance collaborations and reduce even slightly the extreme competitiveness that punctuates current scientific endeavors. A laboratory led by a notable clinician investigator recently discovered that a hormone synthesized by both men and

women has a significant impact on obesity. Although the hormone has been known for many decades and circulates in high concentrations, its relevance to adipocyte biology had been ignored. The investigator sought new tools to define the magnitude of its effect and developed a polyclonal antibody to that hormone to study its effects in respect to weight gain in mice. The results were startling. Instead of moving directly to publication, this clinician investigator sought out another competing clinician scientist in the field for help and to indirectly inquire about a putative validation study for confirmation. The second clinician investigator requested independent funding, and all the previous studies were repeated in his laboratory. Albeit time-consuming and expensive, the second clinician investigator's lab reproduced most of the data and drew a sketch of the paper. Candid discussions between the two laboratories about reproducibility and precision followed. Ultimately, a consensus emerged about the interpretation of each set of data and a final manuscript was produced and submitted to a high-profile journal. The submission described precisely in a supplementary table the contribution of each laboratory. The two senior investigators were co-last authors and the two junior investigators from each laboratory were co-first. On reflection, both laboratories agreed that the process was worth the extra effort and what emerged was enhanced mutual respect for all the personnel involved in the study.

This strategy is just one example of how rigor and reproducibility could be attained in a highly competitive environment in biomedical research. It is critical that the emerging cadre of young clinician scientists poised to follow a primary investigative career understand, follow, and fulfill the fundamental obligations for transparency and rigor. This approach should allow them to thrive as contestants for extramural funding. Overall, our challenge moving forward is to find creative ways to assure funding agencies, and ultimately the people we serve, that our work represents the highest level of science and integrity and that the data produced can be used for the betterment of humanity.

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Evolving Administrative Models

In the "old days" of the 1960s and 1970s, it was easy. Medical schools were organized around specialty departments. Today—with changing fiscal pressures, new medical schools (with and without large teaching hospitals), and the integration and collaboration of research teams—medical school structures include traditional specialty departments, limited department structures, service lines, centers, and institutes. No matter the structure, teaching, research, and clinical care remain the three primary components of the medical school mission.

Medical school department chairs have significant administrative responsibilities. Their fiscal resources are of a magnitude greater than that of most other colleges or schools within the university. The number of divisions a chair manages is higher than the number of chairs managed by most nonmedical deans. Clinical chairs of large departments in established medical schools manage their departments with vice chairs for research, education, and clinical care productivity; the "fiscal bottom line" is the dean's major responsibility.

In a medical school, a faculty member may answer to a division chief who is subordinate to the department chair, who in turn answers to the dean. The faculty member's contract outlines the position's duties and fiscal implications described in the three categories of teaching, research, and clinical care; university and community service is often required but not usually financially supported. Faculty members bring the majority of their salaries into the organization through clinical practice income and research grants, receiving limited support for teaching or administrative (including educational administrative) roles. Few dollars are allotted to faculty for their teaching hours, unless a faculty member accepts additional duties such as curriculum or course directorship. Assessment of the faculty member's success is based on the fulfillment of his or her contractual agreement with the department.

In many medical schools and health systems, two other administrative disruptions have occurred: development of centers/institutes and creation of service lines. Both centers and service lines, reporting directly to the dean, hospital chief executive officer, or vice president for health affairs, have been developed to facilitate efficiency and quality in patient care while limiting cost.

Enter Administrative Disruption

In new medical schools without an aligned large medical facility, the number of departments may be limited to clinical science, basic science, and perhaps medical education or community medicine. However, the traditional direct supervision by the faculty member's chair and assessment against their contractual obligations remains an unobstructed pathway. The challenge of this governance pattern is the paucity of full-time faculty due to lack of research infrastructure (unless the new medical school has been developed in alliance with an institution that has a strong research base) and no clinical practice from which to cull a "dean's fund." Hard money support from a state government or a large philanthropic grant can jump-start a new school, but without a source of renewal, nonstate fiscal support, faculty growth, and program development beyond the basic requirements are difficult. Developing an "endowment" for student scholarships, faculty recruitment, and research startup funds is a significant challenge.

Regional medical campuses, now the most common model for increasing medical school size, pose additional governance problems. Regional campuses have opportunities for greater educational flexibility and experimentation, because they are often found in communities without traditional educational structures and have fewer students. Studies have demonstrated that students can obtain academic success at these campuses and, in many cases, enjoy opportunities for a more active clinical experience. However, clinical preceptors are almost all volunteer faculty without clinical educators to either develop the teaching and assessment skills of the new enthusiastic preceptors or provide more formalized academic education, such as student inpatient rounds and physical findings rounds. Hiring clinical educators for regional campuses often requires them to continue their physician practice. The medical school too often wishes to control all faculty clinical practice, with all monies being returned to the main campus administration through the department's or school's practice plan. Federal regulations, state contracts,

and the inability of the "mothership" to be flexible about offsite clinical practice may cause conflicts for the practicing community, the faculty member, the home institution, and the community hospitals.

Must all profits return to the mothership? Why should the dean or the specialty-specific department chair garner the overage, rather than the campus dean and/or the campus clinical chair? Lack of money for investment by the regional campus leadership translates into keeping the regional campus as "second class" and obstructs the ability of campus leadership to attract outstanding faculty. Of course, growth and success threaten the mothership and has led to development of separate institutions. These issues are similar to those experienced in Frankfurt, Germany. The medical school at Heidelberg University created a regional campus in Mannheim. Eventually, it became an independently accredited medical school, with successes in different areas than that of the Frankfurt Faculty of Medicine. Both separately accredited medical schools remain a part of Heidelberg University (www.umm.uni-heidelberg.de).

Another governance issue for a regional medical campus is departmental membership, promotion, and tenure. A faculty member who lives up to four hours away from the main campus cannot engage in significant activities in a department. Faculty can be connected electronically for departmental meetings, but shared research, teaching, and loyalty to an offsite academic community are difficult. Faculty on a promotions committee at the established campus are usually unfamiliar with a regional campus faculty member they have to evaluate; moreover, faculty on the regional campus have not had opportunities for course directorships or other departmental appointments, making their departmental contributions less than expected for successful promotion.

In many medical schools and health systems, two other administrative disruptions have occurred: development of centers/institutes and creation of service lines. Both centers and service lines, reporting directly to the dean, hospital chief executive officer, or vice president for health affairs, have been developed to facilitate efficiency and quality in patient care while limiting cost. Centers have been developed both within and outside of medical schools to accelerate interdisciplinary science. In both disruptions, fiscal issues, faculty loyalty, faculty promotion and tenure, and "assigned credit" are all significant challenges. For example, departments of internal medicine have lost considerable amounts of money and prestige when cardiology has been removed for a cardiovascular service line or oncology has been removed to become a cancer center. An integrated patient care system, which includes the hospital, profits from these governance decisions, but the individual academic departments may not. Breaking the university "silos" is an important step for excellence in science. Therefore, the governance of medical schools, in collaboration with the other involved colleges, must pursue how to help scientists and clinicians succeed while fulfilling the expectations of their departmental home.

Can the Challenges Be Resolved?

Challenges are opportunities, but only among individuals who can engage in shared leadership and true partnership. Regional campuses must be encouraged to develop in all areas of teaching, research, and clinical care, with their successful financial and educational initiatives accepted as positive outcomes for the institution or state rather than as a threat to the established campus. Philanthropy that remains local helps promote the community—an essential partner for success in medical education and clinical research. Sharing the financial success of a center or service line and celebrating the improved patient care is possible, but everyone must put the desire for unilateral power and control aside and accept that institutional success is shared success. This attitude must go beyond individual departments and schools. The environment, the expectations, and the awarding of credit at the highest administrative levels facilitate successful governance. We have all experienced a few individuals who have demonstrated the skills required for shared leadership. Unfortunately, they are the minority in all fields, including medicine. As someone privileged to have been engaged in leadership, I urge everyone to support individuals capable of shared leadership and to strive to keep personal desires for success in line with the ultimate goals of our field: improved patient care through excellence in education and scientific discovery.

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