INNOVATION AND IMPROVEMENT
Improvement Happens

Improvement Happens: an Interview with Furman McDonald, MD MPH

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In October 2010, the Accreditation Council on Graduate Medical Education (ACGME) published a long-awaited modification to its 2003 common duty hour standards following an international symposium and intensive task-force review of recent literature on safety, supervision, sleep and competence. Although this recent duty hour policy stopped short of adopting all recommendations of the 2008 Institute of Medicine (IOM) report ("Resident Duty Hours: Enhancing Sleep, Supervision, and Safety"), particularly the 5-h nap following 16 h of continuous duty, the new standards were strongly informed by the report, leaving many training programs scrambling to marshal resources and develop new systems to ensure compliance by the July 1, 2011 implementation deadline.

Though the new standards maintained the maximum 80-h resident work week, the most widely discussed rule established a 16-h maximum shift for interns, effectively eliminating traditional intern overnight call. In addition, the continuous duty period for senior residents (PGY2 and beyond) was modified from 24 h for patient care plus 6 h for transfer of care, education or clinics to a slightly shorter 4-h period for transfer of care alone. Admission and census caps remained unchanged. The new policy also emphasized supervision requirements, which vary by training level, though in-house, nighttime attending supervision was not specified as a new requirement. Other statements called for improvements in patient handoffs, resident education regarding ways to maintain alertness while on duty and case-by-case monitoring of duty hour exceptions.

Some programs have already made substantial progress toward compliance in advance of the upcoming deadline. One such program is the Internal Medicine Residency Program at the Mayo Clinic in Rochester, Minnesota. In this installment of Improvement Happens, a recurring journal feature sponsored by the California HealthCare Foundation, JGIM spoke with Dr. Furman McDonald, program director and associate chair of the Department of Medicine, about his program's early experience with duty hour implementation.

Electronic supplementary material *The online version of this article (doi:10.1007/s11606-011-1790-x) contains supplementary material, which is available to authorized users.*

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Figure 1 Furman McDonald, MD MPH

JGIM: Can you start by telling us something about your residency program?

Furman McDonald: We have 48 categorical residents in each of 3 years of training and 24 preliminary interns, so our total compliment is 168, making it one of the larger internal medicine residencies in the country. Most of our training is done at the Mayo Clinic in Rochester, though we have elective opportunities at other Mayo sites in Scottsdale, Arizona and Jacksonville, Florida and with our Mayo International Health Program.

JGIM: What are some of your program's distinguishing features?

FM: We emphasize evidence-based education. We do a lot of work here to try to study what we're doing and whether it works. We are also one of 19 ACGME Educational Innovations Project (EIP) programs, which has been a great opportunity for us to collaborate with other fantastic programs around the country and meet with them twice a year as a group with ACGME representatives. We've been doing that since 2006—a 10-year project. On the EIP front, I give a lot of credit to early duty hour adopters like David Sweet at Summa, who converted his entire program to 16 h long before the IOM report. We also got ideas from Anne Pereira at Hennepin County and Eric Warm at the University of Cincinnati and many others—watching what they were doing, coming back, and trying some of those things here.

JGIM: What was your initial reaction to the most recent ACGME duty hour regulations?

FM: I wasn't very surprised by them, given the IOM report that came out in 2008. I guess the big difference between the IOM recommendations and recent ACGME requirements was that the 16-h duty period would apply only to interns. We had done some of our previous pilots trying to make this work for all of the residents, so the intern-only policy gave us a little more latitude.

JGIM: To what degree was your program impacted by these changes?

FM: As soon as the IOM report came out, we began looking at what we could begin to pilot with regard to 16-h duty periods. By fall 2010, we had a good 2 years of experience. Not on every rotation—we tried to pick our areas and do small tests of change. And I'm glad we did, because by the time the final policy was announced, the only rotations still on the old system were two Medicine rotations and the MICU. We had no inside knowledge. We were just looking at the way the winds were blowing. What we didn't want to do is come to the fall of 2010 and start from scratch. So now, in 2011, we're iterating pilots on our Medicine and MICU services to try to find the balance to get 16 h into place.

JGIM: When you first discussed these changes with your residents, what did they have to say?

FM: It was a bit of a mix. The concern that residents have—and I think this has been borne out nationally—is not 'We need to work less.' No. They say 'We need to preserve our ability to take care of patients and learn from taking care of patients.' They were very concerned that we would become a day residency, for instance—that they would lose their ability to be on at night, admitting a patient with a senior resident, so we worked really hard to avoid that. The way we cover nights with 16-h periods varies across services, but for the most part, it remains a team-based model. Three interns and a senior resident is our standard team. The interns rotate night duty, except now they can't stay there during the day like they could in the old world. But we absolutely wanted to maintain night duty for our residents where possible because things happen at night. The other thing residents told us was 'We're not looking for less intensity.' I think they will tell you that we've maintained that portion of our program (*laughs*).

JGIM: How did you embark upon the process of change within your program?

FM: I'll be quite honest—we have a very supportive Department of Medicine leadership; both the prior chair and the current chair have been very supportive, and I think that makes a world of difference. I will say we've essentially done what many places have done, which is to say, 'Look, this is our finite number of resident services. This is what we can cover,' and we have to find coverage outside of that. That has required the institution to look at non-resident service models. These are expensive, but what are you going to do? I've had to stand up in a lot of meetings and say 'Here's what we can cover.' Colleagues put me on the spot: 'Is this *really* all you can do?' Yep, this is it. When we can demonstrate why, that's good. There's no blank check here, so we've had to go through cost analyses and all of these things, but it really came down to 'Look—it's coming. We've got to become 16-h compliant.'

JGIM: It was estimated in 2009 that IOM compliance would approach 1.6 billion dollars nationally, so duty hour implementation is a costly proposition. What this is costing you—and who is paying?

FM: From a financial standpoint, we made a commitment to try not to decrease admitting capacity to become compliant, so that was helpful. But we had already done a lot of work prior to the most recent work hour changes to cap our services and make sure we were complying fully with the old rules. We made those changes because our hospital census has just gone up and up. We're out there trying to hire constantly—hospitalists, nurse practitioners and physician assistants. Is all of this duty hours? No. Is it related to the growth of the health care enterprise in general? Yes. It's hard for me to estimate the dollar value for growth related to duty hours alone. We have a commitment here; the patient *will* get the best care possible. So the conversations are about how to make sure this happens regardless of external regulation. I know that this same conversation is going on at every academic medical center. This is Mayo's commitment, and they're willing to invest in it.

JGIM: Who is doing the heavy clinical lifting in place of the residents?

FM: We have long outgrown the ability to cover every patient with residents. That was a little hard for some people and is still hard for some. Our hospitalist group has grown tremendously. I was just walking past the board that shows our pictures, and I think I count 27 or 28 now. They're not all 100% clinical FTE, but 28 people is a pretty big academic hospitalist group, and growing all the time. Several of our subspecialty services have nurse practitioner-based services, as well.

JGIM: Have you tried to maximize residents' clinical productivity by alleviating their non-clinical responsibilities on your teaching services?

FM: On some resident teams, we have nurse extenders that are very well-versed in that practice, and facilitate much of the testing, follow-up and record keeping. The residents still write notes and orders, but it's been helpful to get those in place. I wish we had these on every service. We know we don't have it perfect, though, because Amy Oxentenko, our current GI fellowship director and previous Associate Program Director (APD), published an article a while back on how much documentation residents do. The electronic medical record is great in many ways, but the amount of time residents spend on clerical duties has only increased. We've had a unit secretary pilot that's been very successful on core medicine services where outpatient appointments and tests are scheduled by someone other than the resident, but if you talk to our residents, I guarantee they'll tell you we need to do more. We're continuing to look for ways to decrease the clerical burden. Our residents dictate in the outpatient setting but on the inpatient side, they self-enter electronic notes, so we've done some pilots with voice recognition software. The problem is balancing the cost of these initiatives with the real efficiency benefit they may provide.

JGIM: Any other systems you've targeted to enhance duty hour compliance?

FM: We've started an effort to regionalize care—placing patients on a given service in beds within the same geographic area of the hospital. Bed control used to put patients wherever

there was an open bed, but our main teaching hospital stands about 6 blocks square, and the pedometers our residents would occasionally wear could register tens of miles on a call night. So we made a concerted effort to try to locate resident patients to a single geographic ward as much as possible. We have eliminated duty hour concerns and decreased readmissions with this change. As part of this complex intervention, we were also trying to infuse resident services with sicker patients by lowering the number of observation and short-stay patients. Even though this resulted in higher patient acuity, we still had much lower than expected mortality and fewer readmissions. We also saw our residents' conference attendance rates on these services rise.

JGIM: What are the most practical duty hour lessons your program has learned through the past 2 years of pilot experience?

FM: Here are the principles that have proven helpful for us. We have created "sister services"—2 paired teams each comprised of 1 PGY3 and 3 PGY1s. Each team is on call q2 days, but each individual PGY3 is on call q4 (we have 4 total teams, 2 sets of "sister services"); there is always a PGY3 present to supervise interns on their senior's post-call day. Each individual intern is on overnight q6 (now 16-h duty periods). With 2 teams, A is on one day and B the next, each team admitting every other day. Many people wanted us to try—and we did in pilots—to have teams admit every day. But if the night provider is only on for 16 h and day providers keep admitting the next day, you still have to care for patients admitted overnight and distribute them into the team somehow. We have not found a way to successfully match daily team admissions and education. Our rhythm here has been every other day. Some in the greater community say that's just culture—I don't think so. I think residents need an opportunity to take care of patients admitted overnight, move care forward and learn. So that was one thing that worked: preserving a model where residents can process admissions and patient care for patients admitted overnight and learn from these patients, even if they didn't admit them.

Another thing we're finding is that we can't continue to compress the admitting period. When I was a resident, I capped at 6 admissions in 24 h. Then it was 5 admissions in 24 h. In 2003–2004, our services went to a late-start call model where the resident would come in at about 12:00 or 1:00 p.m., but could stay later the next day to deal with transfer of care. Essentially, our admitting period was reduced to 18 h, but the total number of admissions was still 5. Now our admitting period is being reduced to 12–14 h to allow a margin for transfer of care within the 16-h limit. The call person has to come in much later in the day, so we're going to accept 4 admissions during the day and 4 at night—not changing the RRC total of 8 admissions in 48 h, but distributing that work in a more even fashion so that the night resident is not admitting a day's worth of patients in 12 h.

JGIM: Some have suggested that the primary rationale for limiting PGY1s to 4 admissions during either the day or night admitting shift is avoiding any chance of exceeding the limit of 8 new admissions in 48 h, rather than attempting to 'distribute the work in a more even fashion' or avoid work compression.

FM: To understand our system, one needs to know that we also have census caps. These caps limit the total number of admissions that will come to the service regardless of the ACGME limit. We've found that duty hour violations tend to occur when the census is high. You can't tell the resident, 'Don't take care of the patient.' So we've tried not to put our residents in a position where the conflict is to abide by duty hour rules and provide poor care, or not abide by duty hours and continue to care for patients. We needed to establish a system where they could do both; otherwise it just wasn't going to fly.

For services with interns, we allow the census to rise to 14 during the night, but require "sister service transfers" (i.e., the team admits up to 14 patients, but transfers 2 to the sister service the next day) so that no team starts the day with more than 12 patients. Our average length of stay is close to 3 days, so with turnover, we rarely exceed this cap, but it's very helpful to have it in place when the services get very busy. These caps do not appear to decrease the number of patients residents are seeing, but do reduce census variation. The maximum 4 admissions can happen, but usually doesn't, due to our census caps. Practically, this change has incented our system to admit patients during the day if possible to avoid loss of daytime admitting capacity, while trying to ensure that some night capacity remains. Thus it has, in reality, spread admissions out more evenly across the day and night. Census caps and 'sister service transfers' have been great successes from a duty hour standpoint.

JGIM: Have you identified any notable problems?

FM: In our early pilots, we found a lot that worked, but also a lot of things that *didn't* work. On our GI service, for example, we found that we could decrease total work hours with schedules designed to improve 16-h duty period compliance, but could also increase 10-h duty violations. For instance, we can not round the way we've always rounded in the past with the admitting resident staying for all of morning rounds. We're going to have to take sign-out of patients from the overnight team, let them leave, and the day team will need to pick up the care and move forward.

JGIM: You're alluding to the challenges of transitions in care. Data published in the article describing your experience with 16-h shifts on your gastroenterology service suggest that those residents felt less prepared to handle cross-cover. Does Mayo have any ongoing initiatives to optimize care handoffs?

FM: Transitions of care are a huge focus for us going forward. I don't think we've got it quite right yet, but by allowing the seniors to remain on-call, the ACGME has allowed for some overlapping time periods that are helpful for transitions. The senior can help oversee and ensure a protected sign-out, and we're trying to leverage that. Over the last couple of years, a Mayo chief resident-faculty team developed an innovative sign-out OSCE (Objective Structured Clinical Examination) that we use in our simulation center during orientation. Still, actually observing residents signing out and giving feedback to ensure that effective sign-out occurs is where I think we have room to grow. We're planning to do more of that. The literature is clear that effective sign-out is possible, but I think that the greater resident education community has not put enough emphasis on how to do it right, how to actually monitor it and give feedback because many of us have never been well trained in it.

JGIM: The 2011 standards only make slight changes to the duty hour limits for senior residents by reducing from 24+6 h to 24+4 h. Programs are also required to encourage the use of alertness management strategies with a strong recommendation to implement 'strategic napping' for senior residents on duty more than 16 consecutive hours. What has been your experience with alertness management and strategic napping strategies, and will you be implementing any additional changes?

FM: Our experience is limited, though we are familiar with the literature on the subject including the studies by Vineet Arora at the University of Chicago. Even in that controlled trial, compliance with napping was poor. We do not plan to implement required naps.

JGIM: These inpatient work hour changes also have ramifications for ambulatory training and continuity clinic experiences. Have your residents' clinic experiences changed, intentionally or unintentionally, as a result of inpatient reform?

FM: Yes. In looking at EIP innovations, we realized that the balance of inpatient to outpatient training was probably askew, not just at our program, but nationally, based on what internists actually do. Much of training has been inpatient, whereas much of practice is now outpatient. There are entire swathes of pathology that are no longer cared for in the inpatient setting. Think of DVT. If I get called for a DVT admission, my question is 'What comorbidities require us to admit this patient?' So we looked to rebalance our clinical portfolio to 50-50 inpatient/outpatient. Also, recognizing that de-linking inpatient and outpatient care has some advantages for patient care and education, our residents now provide only inpatient care when they're on inpatient rotations, but do 2 half-day continuity clinic sessions weekly when they're on outpatient months, in a one-to-one alternating fashion. This added back time to inpatient rotations, gave residents more ability to concentrate and increased access for their patients on the outpatient side. It was a real win-win for us, and the residents are finding it good to be able to manage these complex, high-acuity patients in the outpatient setting. De-linking inpatient and outpatient care and 50–50 modeling were part of our EIP planning before the duty hour changes, but in the long run it was a happy coincidence, in that our duty hour environment is better because of these changes.

JGIM: Any related changes in clinic productivity?

FM: PGY2 and PGY3 residents can bill for encounters in our non-hospital based outpatient clinics after they get their state medical license. Attendings must see all intern (non-licensed physician) patients; attendings are still present to review each case with upper-level residents, seeing those patients with them as they deem necessary. One thing we found in a cost analysis after optimizing the inpatient/outpatient blend was that by increasing the amount of resident outpatient coverage, some clinic areas had increased billing. Not a lot better, but even *some* better is better than a loss.

JGIM: How has the fact that residents do not have clinic while on inpatient services affected outpatients with regards to relationship building? How are patients cared for when their doctors are unavailable?

FM: We now pair residents one-to-one in 6 person "sub-firms" within 6 outpatient firms; each sub-firm is comprised of 2 interns, 2 PGY2s and 2 PGY3s. Half of these residents (one from each year) are on inpatient rotations when the other half are on outpatient rotations; they work together to see their patients when on inpatient rotations. Other systems ensure that non-visit care occurs as needed.

JGIM: Do you have specific ambulatory handoff systems?

FM: We have electronic messaging and verbal signoffs of post hospital follow-ups if needed.

JGIM: Is Mayo measuring ambulatory continuity?

FM: Yes. We are looking to measure how often residents see their patients in the clinic and how often patients get to see their own resident physicians. We are assessing the same metrics for the clinic care teams as well. Look for this in the peer-reviewed literature in the future, but early results indicate the new system is certainly no worse than the old system and likely better when it comes to outpatient continuity.

JGIM: Apart from your own involvement with the EIP, is it your sense that internal medicine program directors have collaborated around duty hour reform?

FM: I think so. I'm a frequent APDIM attendee and chairman of its survey committee. There's been something on duty hours on every survey we've done for the past 4 years. I think there's a desire to be collaborative, but many people may feel a little bit 'out there' and overwhelmed. One thing we know from the yearly APDIM survey is that about 40 percent of program directors have been in the job less than 3 years. That's a lot of turnover. So someone who is new to the position may not know what's going on elsewhere. In 2008 our APDIM survey tried to quantify variation in service models, and the answer was *a lot*, so in thinking about how to structure duty hour compliance even within a single program, one may need several different approaches.

JGIM: Have you considered whether your new structures affect your ability to supervise residents or assess and certify their clinical competence, and if so, how?

FM: I don't see an adverse effect on this for us. We have been working on competency assessment for a long time, but I think because we spread duty hour changes over 2 years instead of trying to do it all in 8 months our evaluation structures, if anything, are more robust than they've ever been. All inpatient faculty go through our Faculty Enhancement and Educational Development program. That came out of our EIP, so we've had a lot of collaboration there on how to do faculty development. The benefit on the outpatient side has also been robust, because residents are now there twice a week on outpatient rotations, and you have opportunity for multiple, closely spaced observations. Feedback can be given on Monday and you can see effects on Thursday. So, if anything, supervision and evaluation have been enhanced. For Internal Medicine, at least the way I read these rules, the new common program requirements aren't changing our supervision structures much. We weren't supposed to have unsupervised interns—even before 2011. It's hard to argue that we shouldn't find ways to more directly observe and supervise residents to give them feedback and help them learn.

JGIM: I'm wondering if you have any thoughts on whether the ultimate product of residency training—a new graduate seeking a position in ambulatory or hospital-based internal medicine—may differ in the changing duty hour landscape.

FM: I don't think the sky is falling. I really think that we are going to train excellent internists. Do we have to extend the length of training? That's already happening. People are going into fellowships. Even our generalists are going into fellowship. We have a hospital medicine fellowship here. So I think people are going to

continue to seek further training, regardless. I don't see the end-product internist as less trained or less capable moving forward because of duty hours. What has changed is that the tired intern isn't there the next day after they've admitted patients overnight. And that's going to cause internal medicine training to collapse? I don't think so. It's very arguable how much those people were getting out of being around in the post-call state anyway.

JGIM: Present in body, but not in mind?

FM: Yes. And the ACGME made a wise move with regards to senior residents. Senior residency is two thirds of our training and remains effectively unchanged by these rules. It's hard to argue that a 24+4-h duty period is a major shift from 24+6 h. Our senior residents are still going to be there. It's essentially no different for them.

JGIM: One could argue that the senior resident experience will be affected by supervising a rotating stream of interns—that they may be left holding the bag a little more often.

FM: Perhaps. On the other hand, isn't that what supervision and leadership is about? Being able to manage the entire service and know what's going on? I don't see that as a down side. The other way to look at it is that this senior resident is now going to interact with at least two interns over a 24-h period—maybe more than two—and may have more opportunity to lead and supervise.

JGIM: And tailor teaching to multiple learners.

FM: Yes. Internal Medicine Residency is a 3-year package. All of training is not internship. We've got 3 full years to get people ready for where they need to be. I know this may not be the opinion of everyone else, but I do think that most program directors will adjust to these rules and ensure their residents are extremely well trained at the end of 3 years.

JGIM: Where does your crystal ball tell you these regulatory policies are headed in the future?

FM: I can tell you where I wish the conversation about training would go. I'm hoping that we as a community can get over duty hours, accept the fact that we need to train people within the constraints we have and move on to issues that in my mind are more important for training. I think the whole issue of milestones-based training that the ABIM, ACGME, EIP and others have supported is a bigger issue. How do we know that a resident is competent? What are the markers of competence, so that we can have measures that are reliable? And how do we train for excellence beyond competence? Can we make the evidentiary link between what we're doing in education and patient outcomes? That's where I hope we'll go. That's what we're trying to do here with our evidence-based education initiative. I don't know where duty hours will go next, but by being on the APDIM survey committee, seeing the responses from various programs and getting to interact with colleagues nationally, I'm very optimistic about the internal medicine program director community. I have found them to be, on the whole, a group of bright, creative people who have their hearts in the right place. They want to produce the best internists and deliver great care to patients. I am really optimistic that this can happen. I think it will happen best when we can stabilize the environment from a duty hour standpoint so we can say 'This is what it is. Let's move on and find a way to work within it.'

Editors' Note: *A list of research publications related to duty hours experiments at Mayo and elsewhere is available as electronic Appendix A.*

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