

Notable Grand Rounds

of the

**Michael & Marian Ilitch
Department of Surgery**

Wayne State University
School of Medicine

Detroit, Michigan, USA

September 15, 2021

About Notable Grand Rounds

These assembled papers are edited transcripts of didactic lectures given by mainly senior residents, but also some distinguished attending and guests, at the Grand Rounds of the Michael and Marian Ilitch Department of Surgery at the Wayne State University School of Medicine.

Every week, approximately 50 faculty attending surgeons and surgical residents meet to conduct postmortems on cases that did not go well. That “Mortality and Morbidity” conference is followed immediately by Grand Rounds.

This collection is not intended as a scholarly journal, but in a significant way it is a peer reviewed publication by virtue of the fact that every presentation is examined in great detail by those 50 or so surgeons.

It serves to honor the presenters for their effort, to potentially serve as first draft for an article for submission to a medical journal, to let residents and potential residents see the high standard achieved by their peers and expected of them, and by no means least, to contribute to better patient care.

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Overcoming Challenges in Surgical Training

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September 15, 2021

This paper is a summary of Dr. Farley's telepresentation at Wayne State University Surgical Grand Rounds on September 15, 2021.

Introduction

What are the main challenges of surgical training and how we can counteract them in the midst of a perfect storm of pressure to make money for the institution, the growing complexity of surgery, and the fragility of patients, all of which contribute to making it more difficult and dangerous to be a surgeon educator these days and to give autonomy to surgical residents?

Medical school has not changed. It is still a four year curriculum, with some students getting less than four weeks of surgery in those four years. It is hard to prepare surgeons that way. Money for education is rarely enough, and not likely to be enough anytime soon. There is a difficulty between the generations—between baby boomers and Gen X or Gen Y or Gen Z—but generational differences will always be there. The amount of material that has to be learned over time continues to increase exponentially. It is harder to be a surgical trainee these days because there is more material and perhaps less time to master it.

So while it is really the perfect storm for surgical training, that makes today the absolute best time to be a surgical educator. The key premise of this presentation is that despite RVU pressures, surgical complexity, the need for autonomy, the

rigid medical school curriculum, and the generational differences, there are things we can do to be better learners and better educators. Above all, we can help surgical trainees to become better learners. Indeed, it is not the teaching that counts: It is what trainees learn.

Learning is key.

Keys to Learning

Three things help trainees learn:

1. Praise them when they put forth effort,
2. Provide individual feedback, and
3. Repetitively challenge them with tests, quizzes, and questions: in M&M conferences, in the operating room, in the ICU, in the clinic, and on rounds..

The aim is not for staff to try to be Teacher of the Year—that tends to be mainly a popularity contest. The aim is to be the Coach of the Year, because coaching awards are based on performance, not on popularity. Coaches get their learners to perform, to produce, to achieve. Coach John Wooden won ten national basketball championships for UCLA. Coach Vince Lombardi and the Green Bay Packers won five National

Football Championships. You cannot argue with success.

The human brain has at least 2 billion neurons, and between them are more than 15 trillion connections. The human brain is the most complex thing in the known universe, and it endows us with unlimited memory capability—in theory. In theory, we could remember every second of our life because every second was recorded within our brain. The problem is: We can't retrieve every second. Our retrieval is limited—but it can always be improved.

Over the last 40 years, the science of learning has changed. We know now that it is a process that leads to changes in the brain—changes that result from experience. Thus, we have got to give medical students, residents, chiefs, fellows, and peers experiences. That is easy to do: Reading a book is an experience, attending an M&M conference is an experience, doing a procedure with an Oscar Mayer hot dog and a piece of felt in the surgical simulation lab is an experience, doing an actual procedure in the operating room or the ICU on real patients is probably the best experience of all, and the best way to learn.

To encode a memory in the trainee's brain we must change what happens in it by delivering an experience to the trainee, but the problem is they may forget it if they don't retrieve the memory, think about it, and consolidate it over a period of time. Ultimately, we want to help the learner to create strong, permanent, neural pathways. Richard Mayer said it best: Learning is not something done to students—it is something students must do themselves. So how do we make learning more efficient with so much to learn and so little time to do it?

Professors Elizabeth Ligon Bjork and Robert A. Bjork, co-principal investigators in the Bjork Learning and Forgetting Lab at UCLA, wrote that more effort put into learning leads to better retention and better retrieval. Thus, if you can make the learner put in more effort, they will retain and



Professors Bjork

retrieve memories better. Think like a football coach: "I'm going to make it harder for them, then I'm going to make them work even harder."

The key question is: "How?" One way, illustrated in the last sentence, is to phase out the word "harder"—making it harder to read, forcing the learner to REALLY focus on the word. The learner will have to squint and slow down and look carefully at that particular word but will be more likely to remember it than any of the other words in the sentence. Don't make it so light that it is illegible—that is an undesirable difficulty. That is not what we want to do in surgery.

In my opinion, among many desirable difficulties, the two best for surgical trainees are frequent testing, and distributive or spaced learning.

1. Testing

Attend any M&M conference and you will witness residents being tested all the time. In their 2014 book *Make It Stick*, Brown, Roediger, and McDaniel wrote that to get people to learn better and make it stick through testing, don't use the word "test." Nobody likes it, or the words "exam" or "quiz" either. If you take professor Roediger's course in human psychology you will sometimes do "practice retrieval"—a test by another name, but he never calls it that. Instead of final exams or quizzes, he has practice retrieval sessions.

Every time you dictate an OR note on a thyroidectomy, or a difficult trauma case, you are

actually testing yourself, quizzing yourself. And that is important. Your peers can quiz you, your staff can quiz you. It is not a cause for alarm. It is not a threat. Too many trainees think the staff are out to fire them. That is not the case. The idea is to get young learners (and—why not?—older learners like me) to generate and find that stored memory—to stop for a second, to go back and ask themselves: “What was it about that chest tube that came out? Why did it fall out? Think! Did I secure the knot?”

One of the best ways to get people to learn and to remember things is to perform. The operating room is a great way to perform, obviously. Putting in chest tubes in the ICU and taking histories and physical exams in the clinic also provide constant testing opportunities. The simulation center presents lots of opportunities. The more I test my trainees, the stronger the memory I create in them and the easier retrieval becomes for them. They do not *like* to be tested, but when they realize it is going to happen over and over and over, they grow used to it and stop worrying about being fired. They understand I am just trying to help them create better memories in their brain. I am giving them retrieval practice.

The more effort generated through tests, the greater the reward. Multiple-choice and true/false questions, whose answer is built in, generate less effort than fill-in-the-blank or essay questions. The brain does not have to work hard. Ask them instead: “Tell me what to do in this situation” or “What is the order algorithm for a pelvic fracture?” There is no pat answer to such questions. The trainees have to reach back into the brain and find out what they know. Testing must be frequent, to seal the memory more tightly each time they reach back into their brains.

Testing surgical technique in the operating room is difficult with actual patients on the line. But we can and must put forth more effort. Staff can and do challenge trainees and chief residents can and do challenge interns, all the time. Step-by-step instruction in the operating room is a good

and safe way to do things, and the right thing to do for patient safety. But in the sim center or cadaver lab, at M&M or even on rounds, the best way to be learning things is through trial and error. Let learners make mistakes. Mistakes are okay! (assuming patients are safe). Learning through trial and error creates more effort and thus better retention and memory retrieval.

2. Distributive Learning

The second desirable difficulty, is called distributive learning, or sequential learning, or spaced learning. A study by Richard Resnick showing that distributive learning is the way to go has been replicated hundreds of times in the real world. Resnick and his surgical education team taught 38 novice trainees how to do a microvascular anastomosis. But he taught half of them (19) in a single eight-hour session, and the other 19 over four two-hour sessions. A month after their training was complete, he tested each group on how well they could do a microvascular anastomosis.

The differences were startling. Certainly, the single-session trainees thought their training was efficient and effective, while the four-session trainees found their method frustrating and inefficient. But when tested a month later, the four-session trainees dominated compared to their single-session peers in the speed of their anastomosis, their finesse and surgical technique, and their performance. Again and again researchers find that distributive or sequential learning beats blocked learning every time. Repetition is key.

Long-term retention is best achieved through sequential learning and frequent repetitions. Short term cramming might work for the next exam but knowledge and skill will not stick for life. Lifelong learning takes serious effort, and effort may need to be provoked through some amount of pressure and anxiety. Learning cannot be easy or relaxed if it is to be retained in the long term. General surgery training takes at least five years

to support a career spanning 20, 30, 40, or more years as a surgeon.

To repeat: The three keys to better surgical education are: 1. Teachers must praise effort so that trainees put forth effort, 2. Staff must offer individualized feedback to learners, and 3. Frequent challenges, in the form of tests and quizzes must occur.

1. Praise the effort

Professor Dweck of Stanford University talks about mindset: Fixed mindset and growth mindset. For all of us, part of our brains or mindset is fixed, and some is malleable and capable of growth. The ratio differs in different people. The critical thing in a person of a more fixed disposition is a need to do things now, not so much to plan for the future. For the fixed mindset, success is the immediate goal, and learners rely on performance and natural talent. People with a fixed mindset believe they can either dance or they cannot – their ability to dance is a function of their genetic talent.

For the growth mindset, success is malleable and learners can achieve through effort. You can learn to dance, over time. You will step on your partner's toes at first, but that is nothing to lose sleep over. A growth mindset is focused on the

future, on becoming better later today, tomorrow, and next week. It is a better strategy for learners.



Angela Duckworth writes about passion and perseverance over time—what she calls grit, a term football coaches use a bunch. She asks which is more important: effort or talent, and suggests effort is worth twice as much as talent. Having worked with hundreds of general surgery trainees, I would value effort even higher—as perhaps three or four times more valuable than talent. I want trainees who are never going to give up, who will always keep battling. Always striving to improve.

So effort is what deserves praise, not talent. When trainees are working hard, praise them, because the ability is not fixed. We will make stupid mistakes, but we can keep learning from those. Intelligence is not fixed, so we *can* get smarter, all the time. Grit and surgery should be friends. There is no question about that. Effort, passion, and dedication are needed over the long haul. So praise the effort and the process.

Too often, in the operating room, some of us (I myself plead guilty) praise talent. “That’s the best anastomosis I’ve ever seen—you really are talented,” we say. That is a mistake, especially for a trainee with a fixed mindset. It effectively paralyzes them. Now, they don’t want to do anything other than just that perfect anastomosis. Other



procedures pale into insignificance. They are reluctant to try other skills as they are nervous they won't be as good as they were with the anastomosis.



How a dandelion fights its way through hard asphalt clearly cannot be the result of a fixed mindset. It takes repeated effort to break through and grow. It is the mindset we want in surgical trainees—a growth-oriented mindset in which basically anything can be accomplished. It would seem impossible for a tree to grow between a crack in concrete, yet it can be achieved—with time and effort. In sum: Do not be afraid to praise effort, determination, time put in, and resilience you see in trainees.

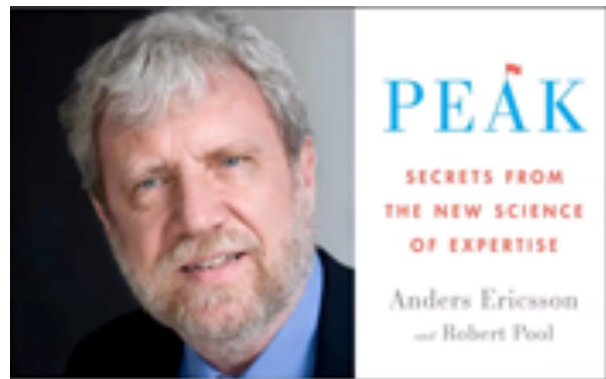


Learners, you need to put forth that effort. There will be numerous times that your staff are going to say, "You didn't work hard enough, you didn't

prepare hard enough and you have got to do better." Effort is critical to gaining skill and acquiring knowledge.

2. Staff must provide feedback to learners

Professor Anders Ericsson, a wonderful researcher who passed away last year, would say to me and our Mayo staff: "In the operating room, you have to offer up your technique and you must be specific. You have to give individualized feedback so they know exactly what it is that you want them to do. Surgical residents want to be like you." The staff are no good for learners unless they give detailed feedback specific to the trainee.



Many staff are afraid of being written up for harassing their trainees. But don't be afraid to give positive or negative feedback. Negative feedback is retained better than positive feedback. I gave a lot of it in my career—but I tried to make it constructive. I did not try to break down trainees; rather, I tried to give them pearls of wisdom. But I was often guilty of not being specific. I was noted at Mayo Clinic for being "the guy who gives out grades." I would observe a trainee and say: "That was an 'F' move. It was terrible. It was absolutely wrong." Or "That was an 'A' move—well done!" They liked it a lot better when I graded myself, so anytime I failed to make a perfect "A" move—I would say: "That's an 'F' move by Dr. Farley, I did not have enough traction on my left hand or I did not pronate enough, etc.." So be specific when giving feed-

back. Let your learners know what it is they should be doing better. Don't just give them a grade.

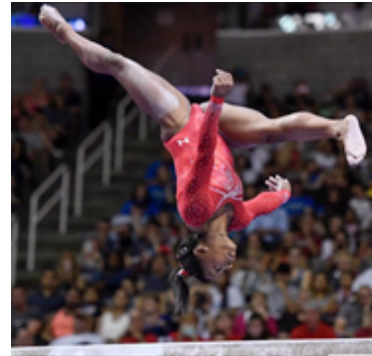
3. Repeat the challenges

Professors Bjork from UCLA talk about desirable difficulties. Professor Roediger talks about assessment. Testing and sequential learning should be omnipresent. ALL of us should want to be tested—again and again and again. Assessment is nothing more than retrieval practice. It reinforces memory until it is there for us to use forever.

Testing helps to confirm for both staff and trainee whether the knowledge and skill are present in the learner. If the trainee knows the material, then together you can move on to something else, but if not, together you understand what remains to be learnt. It is not an embarrassment. It is just something to learn. We must repeat these challenges, deliberately. It is what a coach does to increase performance. So if a trainee is weak on the trauma resuscitation algorithm, or pelvic fracture, or whatever—let's go over that again today and maybe in a couple of days and again in two weeks. Testing in a distributive manner allows the strengths and the weaknesses of the learner to become clear and creates a path for competency... proficiency... mastery.

When people are passionate about sequential learning it is amazing what can be achieved. I don't think I can be a gymnast—I've got a fixed mindset on that. I'm never going to be able to walk and do a cartwheel on the balance beam—I'd kill myself. But Simone Biles can do that.

It is just as amazing what our surgical trainees can do with repetitions, feedback, and challenges. Those of you reading this paper, know this: You *are* going to get there. If you put forth the effort and you get feedback and are tested and tested and tested, you are going to be a stellar surgeon.



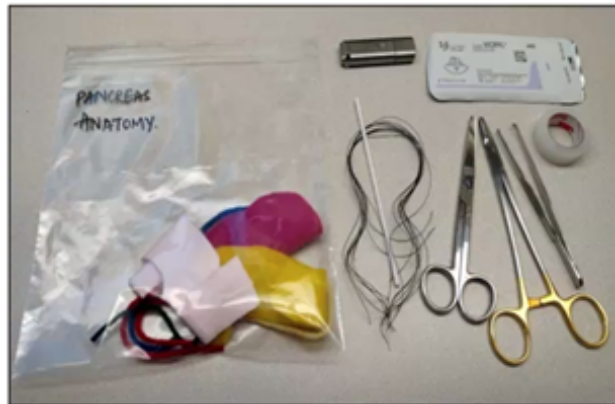
Two educational efforts that might work well for you

At the Mayo Clinic, M&M is held on Wednesday mornings. We have a Chief conference on Monday evenings, where chief residents present their cases over the previous two weeks. We also have a basic science conference on Fridays. Attendance at all the conferences is never close to 100%, usually for good reasons. So if some pearl of wisdom that is really worth learning is generated in the Chief conference on Monday, we encourage the staff or maybe a chief resident to mention it before M&M gets under way. Each meeting presents another retrieval and reinforcement opportunity.

This is best done in the form of questions and quizzing. Make learners go back into their brain and retrieve that memory!

In 2015 we began sending a “welcome package” to all our matched general surgery trainees. The 30 kits cost about \$600 in total. Each contains some felt, suture, a scissors, a needle driver, forceps, and a thumb drive, with instructions on how to do a variety of skills. We then test the trainees on their first day in what we call our Surgical Olympics. They were told they would be tested but otherwise given no further guidance.

In 2016, new trainees received the same package but we asked them to record video on three occasions as they performed a subcutaneous



skin closure on the piece of felt. My research team edited their productions down to one minute from starting to tie the knot, which I watched and responded with 60 seconds of feedback, such as: "I like the way you're holding that needle driver with the finger down the needle driver. It gives you more stability—nice job. But I don't like the way you're holding the forceps, it's too close to a 90 degree angle when it should be more of a 45 or 60 degree. And that should be touched with your fingertips, where the

nerves are most concentrated. Same thing with a needle driver: Don't put your ring finger and thumb through those holes—just barely place them in there so then you can pronate and supinate easier. Hey, but I like your effort, you put time and practice in, and you made your own homemade model—I love that—and you found extra sutures. Keep working. I look forward to next time, when I will see that you don't put your fingers through the needle driver. Good luck to you." And that was my 60 seconds of feedback. Repeated sessions occurred with video feedback at 6 weeks and 9 weeks after match day.

At the Surgical Olympics, 13 weeks from match day, the 2016 group far outperformed the 2015 group, not just for the suturing station—where they were faster and more cosmetic, and their knot was tighter and more secure—but also for their blood gas analysis station, for their chest X ray reading, and for their anatomy station.

Again: *Praise effort, offer feedback, and repeat challenges.* Football coaches know how to use video in this way, to greatest effect. Peyton Manning probably watched more film than anybody on the planet and became one of the greatest NFL quarterbacks of all time. Surgeons should use video more. Don't be afraid to use video in your surgical educational program, it is a phenomenal way to create better learning opportunities. It works. If you want greater learning, staff: praise the effort; learners, put forth the effort; staff: offer individualized feedback, positive and negative—don't be shy; learners: accept that feedback and think about it critically; staff: repeat the challenges and learners: look forward to those challenges—they will make you smarter and more skilled.



Staff: Be a coach, not a teacher; drive them to perform, not to contribute to your Teacher of the Year award. If you want an award, go for the Coach of the Year award.

Detroit has had a lot of great athletic coaches. Sparky Anderson won a World Series in 1984

and Chuck Daly won a couple of NBA championships in the 1980s. Scotty Bowman had a great run in Detroit with Stanley Cup titles. The Detroit Lions have had it a little tougher, but don't forget that back in 1957, the Lions won the NFL Championship—kicked the Browns' booty 59 to 14.

And the 1957 NFL Coach of the Year was Detroit's very own George Wilson of the Detroit Lions. He was a guy who talked about effort and praised effort. He was a guy who gave feedback. He challenged his players and he got them to accept his challenges.

This year, with Minnesota, Chicago, Green Bay and Detroit all losing their first game, the Lions are currently in first place in the NFC North! 😊
They make a lot of mistakes and I hope the team has a growth mindset and works to improve... every day, every hour, every play!

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