

The Making of a Surgeon

By Dr. Stan Ashley with John Hanc

Table of Contents

Introduction

Chapter 1: Morning Rounds

Chapter 2: Learning

Chapter 3: Operating Costs

Postscript: On the Future of Surgical Education

About the Authors

Acknowledgements

Introduction

5:45 a.m.: A clutch of white-coated figures—five women, two men—gather around a dimly lit nurse’s station. The soft hum of air conditioning, the muted beeps and chirps of monitoring devices are the only sounds in the wee hours of this July morning.

That and the rustle of paper as white sheets with long lists of names and numbers are distributed among the group. One of the seven is checking her phone. “Jennifer,” says a tall, dark-haired white-coat in what can best be described as a firm whisper. “Drop that, we’re starting.”

She pockets the phone, picks up the paper. Another 12-hour day is about to begin.

While these young men and women are beginning their long day at the hospital, many of their friends are rolling over in bed, squeezing in a few more hours of shut eye after a night out of socializing before heading out to jobs in finance, law or high-tech; their college and graduate school years clearly in the rear view mirror as they push full speed ahead into their futures with the energy and optimism of youth.

These seven are, in effect, still in school. But, as we shall see, while they do attend lectures and classes and have homework and research papers to write, it’s a different kind of education.

“Okay, let’s start,” says Dr. Lawrence Lee, the tall, dark-haired white coat. “Peters.”

The young woman with the cell phone responds crisply and on cue. “He’s doing fine. No vomiting, no nausea, urinary output good.”

“Good, let’s give him some crackers today. Kennedy.”

A young man with a cherubic face and an Arabic surname responds, haltingly and in heavily accented English. “Complaining of indigestion. Says he feels some numbness around the incision.”

“Okay, check it and talk to his nurse. Fernandez.”

A prim, pretty young woman, who sounds so well-rehearsed you expect her to whip out a Power Point presentation, answers. “She was having issues at midnight, but her third set of cardiac markers came back, and there was nothing impressive.”

“Read by you?”

“Yes.”

“Okay, good. Give me the numbers.”

“5.5, 39.7, 29.2

(That’s a CBC--complete blood count, and in this case it means the patient’s white blood cell count is 5.5, his hematocrit is 39.7, his platelets 29.2).

Inside darkened rooms, the outlines of feet under blankets protrude from half-closed doors. These are the sum total of the numbers, the embodiment of the staccato summaries of bodily functions. For some of them, the morning will soon begin on a good note—for others, there will be more anxiety, another disorienting day in a strange environment.

“Jansen?”

“BP, 90 over 50, was asymptomatic. No other problems.”

“Good, she’ll go home today.”

“Rogers.”

There is some stumbling here in the response. The tall, dark-haired white coat looks up, his usually friendly demeanor now replaced by an icy, no-nonsense glare. There’s been a screw up. Someone was sloppy with “the list”—as these detailed, precise summations of patient data are called. The information was improperly recorded, and the erroneous information was passed along to others, in this case the radiology department who was supposed to do an MRI on this particular patient. A chain reaction will now occur, and it will be the responsibility of this team, led by the dark haired chief resident, to sort it out.

“Once you give it to radiology, they’re locked,” he says angrily. “We can’t correct it at that point. In the future, we need to make sure the list is right. We can’t have this kind of crap happening again. Understood?”

A downcast, ponytailed head nods.

“All right, everybody, ready? Let’s go.”

In a flash, the group of seven moves with startling speed, down the dark corridor. Clearly, there’s a reason that they’re all wearing running shoes. Outside, the sun is rising over the city of Boston. It’s the beginning of another day at Brigham and Women’s Hospital. For these seven, and 68 other interns and residents in what is one of the most competitive medical training programs in the country, this ritual of morning rounds is one more step in a marathon endurance test. If they reach the finish line, they will join the elite of their profession; a profession whose actions have a more dramatic and immediate impact on the lives of their patients than any other branch of medicine.

This is the story of how surgeons are trained at Harvard University’s premier teaching hospital.

The education of surgeons has long been a subject of lurid fascination to both artists and the general public. One of Rembrandt’s most famous paintings, the Anatomy Lesson of Professor Nicolaes Tulp, shows the good doctor revealing the forearm of a corpse to a group of astounded looking men (art historians tell us that the corpse was a dead criminal, and that Dr. Tulp’s audience are not really not medical students at all, but burghers who paid young Rembrandt to be in the painting). The great American artist Thomas Eakins produced not one, but two famous paintings on this topic. One of them shows a

bewhiskered late 19th century doctor in the midst of what appears to be surgery-in-the-round. A group of hirsute, nattily attired young men sit watching in an amphitheater around him, as the eminent physician flourishes a scalpel and appears to pontificate on the intricacies of the human body.

Even the name of this set-up, a “surgical theater,” suggests performance. In more recent years, television has struck gold with shows involving surgeons. From *Ben Casey* to *M*A*S*H* to *ER* to *Boston* (and now New York) *Med*, the airwaves have transmitted a steady stream of dashing, brilliant, kindly, sometimes, witty, and occasionally flawed, scalpel-wielding heroes.

As with any profession, the reality of both the training and the job is a little different than the Hollywood portrayal. They don’t operate on deceased miscreants, for one; nor do they perform surgery in front of large audiences like some musical theater troupe. And while surgeons can laugh in an operating room, if only to break up the tension and long hours, the non-stop riposte of Hawkeye, B.J. Honeycutt and Colonel Potter is rarely found.

If surgeons were really that funny, they would do stand-up.

The purpose of this book is to show you how it’s really done; how young surgeons today are taught, at one of the country’s oldest and most prestigious teaching hospitals. The reality, as you will see, is sometimes as or even more dramatic and demanding than the way it’s treated in popular media; oftentimes, less so. Either way, it’s undeniably important. According to the Centers for Disease Control and Prevention, there are 48 million inpatient procedures performed annually in the United States. These range from knee replacements to the insertion of coronary arteries; from hysterectomies to C-sections. And there are millions more that require longer stays.

If one of those patients happens to be you or someone you care about, you want to be damn sure the person performing the procedure knows what they’re doing in that operating room!

It’s the job of the co-author of this book to make sure they do. Dr. Stan Ashley has spent his entire career as a surgeon and an educator; a large part of it at Brigham and Women’s Hospital—or as it’s affectionately known by those who work there, “The Brigham.”

For 11 years, he was the Program Director for General Surgery Residency; essentially the person responsible for managing the training of surgical residents. This is the term used to describe medical school graduates who are then accepted into The Brigham’s seven year program, where they do what might be called in the non-medical world a “paid internship”: Still learning, but getting on-the-job-experience and reasonable compensation (an annual salary of about \$40-60,000 per year).

Now, as Chief Medical Officer and Senior Vice President for Medical Affairs at The Brigham, Stan looks at things from the administrator’s point of view. In this job, while he might not get to follow the progress of a resident as closely as he used to, he does have a broader perspective—and the view from this perch is mixed.

General surgery training has changed considerably since he went through it. Back then, the general surgeon stood at the apex of the medical field. He was the “complete” doctor—the surgical equivalent to the old general practitioner (what we’d call today the primary care physician)—able not only to manage a patient’s diabetes and heart failure and care for them in the intensive care unit but also to cure the patient’s illness with surgery for often life-threatening conditions like gastrointestinal bleeding, appendicitis, and trauma.

The trainee aspiring to that lofty position faced what would be considered today brutal hours and a long road. But he (and it was mostly “he” back then) was rewarded with the privilege of caring for some of the sickest patients with the very real possibility of making a major difference. Today this paradigm has changed. General surgery is facing an identity crisis. The long training and the demanding schedule are less appealing to the new generation. Today’s students tend to choose more “lifestyle friendly” specialties such as Dermatology and Ophthalmology, where there are fewer emergencies; a young doctor in those areas can have a schedule that would allow for some semblance of a regular home and family life.

Some of the changes are similar to those affecting many other fields, in this era of specialization. There is more to know in medicine today; subspecialties within general surgery, such as colorectal surgery and surgical oncology, all of which require additional training, have flourished. Some trainees today get the sense that general surgery is really only a prep school for further training in their specialized areas. Orthopedists and neurosurgeons now spend little if any time in general surgery, choosing to begin specialty training at an early stage.

Meanwhile, an aging population and changes in health care coverage demand more surgeons than we are able to produce. The Association of American Medical Colleges predicts a shortage of 62,400 doctors by 2020. Among the areas hardest hit? General surgery, where the number of practitioners is expected to fall by 9,000 over the next few years—from 39,100 in 2000 to 30,800 by 2020)— at a time when demand for their services will be increasing.

But there’s good news, too. At the same time the surgeon population is declining, there are great advances being made in the field. Today, surgeons can do things that would have been inconceivable 20 years ago. As a teaching hospital and one affiliated with the pre-eminent brand name in university education, The Brigham prides itself in doing some of the basic science that often leads to these advances. In fact, the residents here are expected to do research as well as learn the surgical skills they’ll need to practice. This kind of innovative spirit is in Brigham’s DNA.

The hospital with its somewhat curious name was established in 1980, as a merger of three long-established Boston institutions: Peter Bent Brigham Hospital, Robert Breck Brigham Hospital and the Boston Hospital for Women. The Brigham and its three antecedents have all been famous for surgical firsts. Blood transfusion was perfected here in the 1940s. It was here that cardiovascular surgeons used, for the first time, an electrical current to restore a heart to normal rhythm. The first organ transplant, a kidney, was performed in 1954. What is believed to have been the first quadruple transplant—harvesting four organs from the same donor—was done at The Brigham in 2000; providing new hope to four patients. Most recently, the nation’s first three full facial transplantations were performed at our hospital. The Brigham counts among its ranks two Nobel Prize winners and eminent surgeons and researchers around the world.

If you have friends or relatives in New England, they probably know The Brigham, too. In fact, there’s a good chance they or their children began life here: 8,000 babies are born annually at BWH, making it the largest birthing center in the region.

As you can probably tell, given its broad range of missions and services, this is a big operation: 793 beds, 63 operating rooms, nearly 53,000 in-patient admissions a year, and an Emergency Room that treats 61,000 cases a year.

While boasting an outstanding team of nurses and support staff, at the heart of all this, are the residents. Whatever their eventual career goals, the ones here today are, in many ways, more skilled and better educated than when Stan was a resident 30 years ago. But as in any profession, there are some things that can only be learned from experience, often hands-on experience, under the supervision of people who have been doing it longer than you. No matter how motivated and how talented there are highs and lows for these young adults. Hours are long (although now capped by national regulations at a “mere” 80 per week). Personal lives are put under great stress. The physical and emotional rigors are enormous.

In this concise e-book, we hope to give you a better sense of what it’s like to be one of these residents; a surgeon in training at one of the most prestigious and pressure-packed teaching hospitals in America. We’ll do this through Stan’s first-person commentary at the beginning of each chapter, followed by the observations of co-author John Hanc—a veteran health writer and narrative journalist, who was given unprecedented access to The Brigham and allowed to shadow the residents throughout the hospital, including the OR. So through two pairs of eyes, we will show you what it’s like; introduce you to some of the young men and women in our program; give you a sense of the making of a surgeon as it is done at Harvard University’s primary teaching hospital.

The first question might be: Why? Why even set out on this arduous road? Sure, surgeons can make a good living, but the truth is you’ll probably make a bigger pay check these days as a hedge fund manager, a partner at a law firm or the inventor of the next killer app. And you’ll be able to start doing it less than 13 years after you graduate from college. That’s the typical timeline for a surgeon: Four years medical school, seven years residency, two years in a fellowship. They’re not really through with their training until their late 30s. By then, their college-educated peers have had a decade-long head start in the work world. And when they finally do set up their own surgical practice, they’re usually in debt from all the years of medical school.

So what is it, then, that motivates a young man or woman to become a surgical resident at a place like The Brigham; facing the prospect of heavy debt, long years in school and sleep-deprived, 12-hour work days that typically start...well, at 5:45 in the morning? Let’s find out by meeting some of the young men and women in the white coats and finding out what it’s like for them, on their rounds, in their classrooms, in the OR. We’ll hear about the routes they followed to get to this point, and where they hope to go from here. Let us start by telling you briefly what compelled a kid to leave his rural home in upstate Cooperstown, New York—a place best known as being the home of the Baseball Hall of Fame—for the halls and wards of a big city hospital.

Chapter 1: Morning Rounds

What motivates a young person to become a physician—and specifically a surgeon? The short answer is that my dad was a doctor. But the route that brought me to his profession was certainly not a direct one; at first I resisted the very idea.

I grew up in Cooperstown, New York. My dad, Charles Ashley was a doctor—a pathologist and an administrator at the Mary Imogene Bassett Hospital, a rural hospital that prides itself on being an academic teaching institution, albeit in a somewhat unlikely

setting. They have students and residents and even do research—the same kind of thing we do here at The Brigham, except on a smaller scale.

Growing up, I had a stormy relationship with Dr. Charles Ashley. These were the late Sixties, a time when it almost seemed as if adolescents were supposed to be fighting with their parents, and disagreeing with them on every issue, every idea. Pursuing the same career, at least for a while, was the antithesis of what I thought I wanted to do.

I went off to Oberlin College—a private college in Ohio, known for its quality education and liberal political orientation. Why Oberlin? Well, during my senior year in high school, I had heard that students there chased a ROTC recruiter off the campus with squirt guns. This sounded like my idea of good, wholesome, anti-authoritarian college fun and even though I never saw a squirt gun (or for that matter a ROTC recruiter) in my four years at Oberlin, I certainly had an enjoyable time.

Like many young men of that generation, I also had pretty romantic ideas about what I wanted to do when I graduated, some fueled by popular culture. There was a popular movie at the time, “Five Easy Pieces,” starring a then-young Jack Nicholson. He played this cool character with a somewhat absurd name—Robert Eroica Dupea—who had rejected a privileged background to go work on an oil rig. He also got all the girls, had all the right lines at the right time. And on top of it, he could play the piano.

What self-respecting 21-year old male didn’t want to be like this guy?

So when I graduated, I got a job on an oil rig in Texas. It was hard and dangerous work, and frankly, it got old fast. After about six months on rigs in the Gulf of Mexico, I knew I was ready for something else, or I’d risk spending the rest of my life with a few less fingers (that’s a common hazard in oil rig work, which often made me wonder how Dupea could have continued to play the piano, but I digress). So I got a job as part of the ski patrol at a resort in Vermont. That was fun, and they liked me enough to keep me on when the winter season ended, to help maintain the golf course. But after mowing that very large lawn a few times, I knew it was time to start choosing a direction...a real direction in life.

At Oberlin, I had completed the minimal pre-med requirements and so I decided to apply to medical school. Ironically, when I finally made that decision, it was my dad who tried to discourage me. “Medicine’s changing,” he told me. “It’s not what I grew up with.” Dad was right, but guess what? It’s still changing, and will continue to change. Nevertheless, and despite our earlier differences, I think Charles Ashley did feel a sense of pride when, in 1977, I entered his alma mater, Cornell Medical School, located in Manhattan.

Medical school’s a funny transition from college. You spend most of your first two years in the classroom, the workload is intense, and everybody is stressed out; worried that any fact, any anatomical detail, any side effect of any medication that you don’t properly learn now is going to cost someone their life later on. In truth, there’s a lot of redundancy in what you learn; no one absorbs everything; and as in anything else, a lot of the most valuable knowledge is gained only through experience.

Your next two years are spent on the hospital ward, where you sort of play doctor. Meaning that you have to act like a doctor, but nobody gives you any real responsibility. I didn’t do well with that role.

At that point, you also do your rotations and get a chance to think about what you want to do for your residency. You spend some time in pediatrics, in internal medicine, in obstetrics...all the major specialties. Although I liked just about everything, I felt there was

nothing more exciting than what a surgeon does. I still feel that way. There is no greater opportunity to really resolve a medical problem and no greater privilege than when someone lets you operate on them. As we said earlier, you are the “complete” doctor. Plus, it’s a lot of action. There is no “take two aspirin and call me in the morning” in surgery. We intervene; we make things happen. We attempt to repair and save people’s lives in the most direct way possible—and often, we succeed.

Surgical training in the 1980s was very tough. There was a lot of pressure and very little sleep (an issue that we are still dealing with today). But there was a satisfaction that I had never felt and still don’t think I could have felt in any other specialty or profession.

Today, as someone involved in the training of surgeons, I get to see that same satisfaction in the faces of our interns and residents. They’re a big part of the change I was referring to earlier. These young physicians grew up in a different world than I did. They’re far more diverse than my mostly male, mostly white medical school colleagues. Their backgrounds, their motivations—also different. Many only know Jack Nicholson as the Joker in the 1989 movie edition of “Batman” (that is, if they even know there was a 1989 Batman movie; some of our interns were still in diapers when it came out.)

As for “Five Easy Pieces”? The generation gap? Students protesting ROTC on campus? That’s all ancient history to them.

Still, I do know that for most of them, as it was for me, the effort of becoming that “complete doctor” is worth every sleep-deprived moment. Even if they might not realize that while they’re in the midst of it. Let’s rejoin our residents at The Brigham in the midst of their morning rounds, and you’ll see what I mean.

Their brief hallway conference concluded, the surgeons in training go speed-walking down the hall for morning rounds. They are led by their boss, 32-year old chief resident Lawrence Lee.

The group is going to attempt to visit 25 patients in 60 minutes. Including time to walk from each ward to another, and to confer, this works out to a little over 45 seconds per patient.

Why the need for speed? Lee has to confer with all seven of the attending physicians whose patients he is visiting. He has to update them on any changes among their patients over night; and he has to do it by 7:30 a.m., which is when the day’s surgeries start at the hospital. The conversations with “the attendings” (as they’re referred to) can take, in total, up to 45 minutes, which means they need to move—and move fast—during rounds, so that Lawrence can start his calls by 6:30 a.m., and still be in pre-op by 7:15.

While he needs to glean some essential information during each visit and assess the status of each patient, there will be little time to linger with any of these people, all of whom have surgery for some kind of cancer. It’s a brisk visit, with the goal of not being brusque, and Lawrence has mastered the art. “Good morning, sir,” he says as the group storms into the first room. “How are you?”

A slightly bewildered grey-haired man lifts his head off the pillow and looks around groggily. “Uhhh...kinda hungry, doc.”

"You can have solids and toast today," says Lee cheerfully, as he reviews the patient's notes.

"Great," says the man. While aware that he only has less than a minute to speak with each patient, Lee listens as best he can to all their complaints and concerns. He is never rude, and manages not to cut off any of them in mid-sentence. Especially when they all ask the same question, a variation of which is posed by this patient:

"What are the chances of me leaving by the weekend?"

Lee furrows his brow as he looks at the numbers. "Hmmm. What's today, Thursday? I'd say maybe late weekend."

"Okay, great thanks Doc."

The group stampedes out again following the long strides of their six foot, one inch tall chief resident. The next patient is an elderly woman whose progress from surgery has been slow. In a weak voice, she asks why this is and what they're doing about it.

"It's frustrating to us and to you," Lee admits. "We're going to give you a higher dose of Coumadin today. That may help."

Clomp, clomp, clomp. They vanish from the room as suddenly as they arrived, continuing on their rounds. The team is assigned certain patients, not all, so there is a bit of paper shuffling as they figure out the room number of the next patient they're supposed to visit. It's another elderly man, and he is asleep when they enter.

"Good morning," says Lawrence, gently but firmly enough to wake him.

He opens his eyes and smiles. Some people wake up with a sweet disposition no matter where they are, and this gent is clearly one of them.

"Good morning doc," he says warmly, recognizing Lawrence in the light. Then he looks around at the semi-circle of residents and interns that have formed around his bed, and smiles. "Oh, everybody's here!"

After a brief exchange, Lawrence and the group start to move out, but the patient has something to say. "Doc?" he asks, raising himself up on elbow. Lawrence screeches to a halt and turns around. "Yes?"

"When you come in tomorrow, wear a birthday hat," says the man. "Tomorrow's my birthday."

Lawrence laughs. "Okay," he says. "Happy early birthday."

The race continues. The next group of patients is on a separate floor. An exit door is flung open and the group goes thundering down the stairs. Their urgency makes it seem as if morning rounds were a competitive event in some Surgical Olympics and unseen judges are evaluating their progress. They fling open the door two floors below, to the sounds of shouting. In the middle of the corridor, a disheveled man is sitting in a wheelchair, surrounded by beefy security guards. "Get off me," he yells at one of the guards. "Don't touch me."

An internist and a group of nurse and orderlies stand by. The doctor begins to speak softly to him, but the man in the wheelchair cuts him off.

"I just want a cigarette, man," he says, glaring at the young physician. "That's all. Just one damn cigarette." The man's voice cracks and he begins to sob.

Lee and the others take a quick look, but hurry on past the confrontation. While violent outbreaks are relatively rare in The Brigham, the hospital has a long-standing mission to serve the entire community, regardless of class, income, ethnic background or criminal record. Not every patient is patient; or even cordial. One man Lee and his retinue visits is

angry, and complains that he's been getting conflicting information about when he will be released. ("I'll check with your attending surgeon," Lee says, "so we can get you a definitive answer.") Another man's wife is sitting beside him—has she been here all night?—and complains about the food ("We'll get him on solids today," he promises). Yet another is frustrated by the fact that he isn't getting better. ("If there was a magic medicine we could give you, believe me, we would. It's just going to take time.")

Ah yes, time. A quantity in such short supply here. And yet, Lee is unflappable—and he's not just limited to asking yes or no questions and dispensing bromides, literal or medicinal. He always makes sure to end each visit by asking the patient if *they* have any questions. And if the case warrants it, he'll get hands-on.

"Dorothy," he says to an older woman who has had a tumor removed and is having a slow and painful recovery. "Let's take a look at your belly."

He tenderly parts her gown and inspects the incision.

"Have you had a bowel movement?"

"Yes."

"Surgery is all about bowels," whispers one of the residents to a visitor as they watch.

Lee seems to gaze off in the distance, as his hands explore the woman's wound and the contours of her abdomen. He's feeling to see if it's flat or distended. He eyes the wound to make sure it's healing properly. "Well this looks great, feels great," he pronounces. "And you had no more fevers. That's great, too! Today let's try some regular food. And we'll get you off this pain pump."

Her eyes widen with joy at the thought of sustenance and comfort. "Oh, thank you, doctor."

Lee smiles back. It's 6:30 a.m. and with morning rounds concluded, he must now begin his calls with the various attending physicians who will want to know how each of these patients is progressing.

It's the start of another day.

Where does such motivation and drive—not to mention unflappability—come from? Unlike Stan Ashley, Lee had no doctors in his family. He grew up in Palos Verdes, California, the son of Korean immigrants who owned small businesses. Unlike the stereotype of an Asian-American family, Lee says, "no one pushed me into medicine. I just thought it sounded cool." From the time he was a kid, becoming a doctor was his goal; although he admits, it was a toss-up between a stethoscope and a Stealth jet. "My other option was fighter pilot," he says, with a laugh. "I loved *Top Gun* growing up. But I'm near-sighted so that ruled out that option."

Also unlike Ashley, there was no wandering, no excursions into other fields before finding his true calling. This may be a generational difference. Unlike the children of the Sixties who were forever running around trying to "find themselves," young men and women in medicine today seem to have a clearer and more direct path towards their chosen profession.

Lee came east for college, attending Haverford in Pennsylvania where he was pre-med. At that point, he realized he wanted to be become a surgeon. "It just seemed like the epitome of being a doctor," he says. His college grades were good although he admits with an embarrassed chuckle, "not good enough to get into Harvard." Instead, he went to the University of Pennsylvania Medical School, where he further narrowed his focus to cardiothoracic (heart and lung) surgery. When it came time to apply for a residency, Lee's

mentors at Penn offered him simple advice. “They told me, ‘if you’re not going to stay here, you should go to The Brigham,’ period. I replied ‘what’s The Brigham?’ I had never heard of it.”

But he visited Boston, applied and was accepted. He began his seven year residency in June, 2005. What impressed him most was the collegiality between residents and staff surgeon. “The residents were down to earth, the surgeons were down to earth,” he said. “It’s not like that everywhere.” Surgery has traditionally been a hierarchal profession and in certain hospitals, chief surgeons barely acknowledge a lowly intern. “You see this on TV, and it might be one aspect of hospital life they get right,” Lawrence says. “The interns don’t speak until spoken to.”

While Brigham interns aren’t treated like lowly recruits in boot camp, they still must follow orders. Considering that so many surgical trainees are usually driven young men and women used to letting their brilliance and personalities shine unimpeded, that’s a tricky balance; and it’s not for everybody. “There’s a certain personality that does well in surgery,” says Lee, who like the junior residents is paid a modest annual salary (about \$60,000 a year) by the hospital during his training. “It’s somebody who is smart, but who can also put their head down and do as they’re told.”

In other words, you need to keep your ego in check to become a surgeon.

Eventually, that compliance will pay off when, after seven years, you attain the exulted rank of chief resident. Lee explains the hierarchy in comparable military terms:

The “attendings” are the generals; responsible for the grand strategies involving a patient care.

The chief residents are the officers in the field. They lead the troops and make tactical decisions, based on the overall strategic direction set by the brass.

The interns are the privates.

Chief resident is not an appointed position. No one stands outside Brigham and Women’s Hospital each June, waiting for white smoke to appear, and the announcement that “We have a new Chief Resident!” Every surgical trainee who enters his or her seventh year becomes one; there are currently eight at The Brigham. But while it is the top of the pyramid among interns and residents, the pressure doesn’t let up. If anything it’s worse. Chief residents continue their familiar pattern of 12 hours a day, six days a week. But unlike their junior colleagues, they can now expect calls at any time regarding a problem with one of the many patients under their supervision. “Almost every night I get woken up a couple of times by calls from the hospital,” Lee says. “The bucks stop with you. But it’s worth it. It’s so far the most satisfying part of my training.”

In a year, July, 2013, Lee will finish his residency. But he’s still not ready to operate independently yet. Next stop: A fellowship, probably at The Brigham, where he will finish his training as a heart surgeon before entering the work force at about age 36.

“A lot of my friends from college are already partners in firms or running their own businesses,” he says. “And I’m still three years away from my first real, full-time job!”

As Dr. Lee was preparing to wrap up his morning rounds and head into surgery, Dr. Melissa Mallory was heading home. She had been at the hospital since 5 o’clock the previous afternoon.

One of the six who participated in the “speed rounds” that morning with Lee, Mallory is on the other end of the hierarchy. She’s an intern—a first year resident—and as such she’s

the one stuck working nights at The Brigham. “I said ‘good morning’ to someone yesterday at 6 o’clock at night,” she says with a laugh. “That’s what this schedule does to you.”

Each night Mallory is responsible for anywhere from 30-50 patients. “I get to know them, especially the ones having problems,” says the perky 27-year old.

During morning rounds, part of Mallory’s job is to “drive the bus”—meaning that she is responsible for mapping out the route the group takes through the hospital as they visited patients, to make sure no time was wasted. “I hate driving the bus, as I still don’t know the hospital that well,” she admits. “Sometimes I’ve driven the bus into the wall. But I’m getting better at it.”

Mallory has a positive, pleasant bedside manner, as is evident when the group reaches the surgical waiting room, concluding their rounds. There are patients here, waiting for surgeries with their family. By this evening, many of them will be occupying some of the same beds in the same wards that the interns and residents have just visited. The tension among these newcomers is palpable.

“Hi there,” she says, to a middle aged man lying on a gurney. “I’m Melissa. How’s it going this morning?”

“Good, considering the circumstances,” says the man glumly.

“Hey I like those glasses,” she says to the man’s stylishly-dressed wife, who is sporting a snazzy pair of red spectacles.

“Thanks,” she says.

Mallory thumbs through some papers. “You’ve been visited by a bunch of people already, right?”

“Yes.”

“Hmmm...well for some reason your name is not on my list of patients.” She looks up and smiles. “That’s okay. We got to say hello, anyway!”

“Yes, we did,” says the woman of red glasses. “And we appreciate you being so nice.”

Mallory laughs as she exits the screened-off pre-op suite. “You want to run, but sometimes you don’t know where to run to.”

Mallory is the kind of high-energy young lady who started running as a youth soccer player and doesn’t seem to have slowed down since. Growing up in the town of Forest, Virginia, she was a star athlete and straight “A” student. She wanted to major in English—maybe to become a writer—but her parents dissuaded her. “They told me I needed to major in something practical,” she said.

If nothing else, medicine is practical. But there has to be some passion behind it, as well. Two summer trips, one to a camp in California for developmentally disabled adults and children; the second, a visit to South Africa, convinced Mallory that this was the path for her. At the camp, she was a caregiver to people who couldn’t care for themselves. “It made me feel fortunate,” she said. “I also realized that I needed to do something worthwhile in my life. Just making a living, even a good living, wasn’t going to cut it.”

Like a lot of people in her generation, Mallory was thinking globally. Not surprisingly, she ended up getting involved with the University of Virginia’s Center for Global Health, which provides guidance and funding for 50 students a year to conduct service learning projects addressing global health issues. It was through the Center that, after her junior year at UVA, Mallory got funding to go to the Republic of South Africa. She and two grad students ended up doing health care work in poor, rural villages. “People would ask me if I was a doctor from America,” she recalled. “This one elderly woman asked if I had come to

cure her blindness. I said, 'I can't cure you, but I can listen to you and hear your story and I can go back and try to do something about this.'"

She came home from South Africa, she says, "totally rejuvenated about medicine." But it wasn't until near the end of her third year in medical school that she chose surgery as her specialty. "I had no idea what I wanted to do," she says. "Surgery was my last rotation, and I loved it. I realized that in surgery, you can fix things as opposed to just talking about fixing them."

At the end of medical school, she endured the ritual known as Match Day, when graduates are told which residency program they've been accepted to. The culmination of a long interviewing and selection process by both the applicants and the hospitals, the announcements are made the third Friday in March at ceremonies held at 155 medical schools around the country. Long a hallowed event in the life of a young doctor, the pomp, circumstance and mystique of it didn't sit well with Mallory. "You rank a bunch of different places you'd like to work at, they rank you, and you sit in a room and wait to find out. It's like the Sorting Hats in Harry Potter," says Mallory, referring to a famous scene in the book and the movie, in which new students at Hogwarts wizard school are sorted into one of the school's four different houses, by donning an enormous, talking hat that instantly assesses their talents and character and selects accordingly.

On Match Day, it's not giant, floppy hats, but white coated administrators making the call. So on Match Day 2012, Mallory says with a laugh, "instead of Gryffindor, they told me... Boston. You're going to Brigham and Women's in Boston! And here I am."

Chapter 2: Learning

You learn to become a surgeon by immersing yourself in the surgeon's world.

You eat, drink, breath and (occasionally) sleep surgery.

You practically live in the hospital.

You go on rounds. You assist in the OR. And you are, or were, supposed to be continuing with the rote, book learning that you had been doing through four years of medical school, because there's still so much to absorb.

The thinking was that after five years of this; five years of countless hours of immersion, you should be ready to practice as a surgeon, on your own.

The process still takes the same length of time; but exactly what you're doing during your training and how often has changed.

In part this is because of the new limitations on hours for residents. But it's also part of a generational change. Young people today, whether they're in middle school or medical school, learn differently than they did 30 years ago. Surgical residents—who, let's not forget, are still students, even though they have the initials M.D. after their names—need to master a certain body of knowledge beyond what they learned in their anatomy and physiology classes as medical students. How is that knowledge acquired? In the past, it was just assumed that when you had a spare minute, you read.

I can recall many nights during my residency I'd curl up with a copy of Sabiston's Textbook of Surgery. All 1200 pages of it.

Although a classic surgical text, escapist reading it isn't!

By comparison, I think it's fair to say that most of our students today don't go home and read textbooks. But they all have laptops, and know how to use them. Instead of surfing the

web in search of general knowledge about surgery, what they'll often do is what we call "point of care" learning. That is, they go to the web at the point they need to care about something, or know about something specific. You're about to assist on laparoscopic gallbladder surgery? Google it!

In response to this, The Brigham and other teaching hospitals have built a bigger didactic program: meaning, more lectures and more classroom time that becomes integrated into their training, to help ensure that some of this foundational knowledge is learned. So instead of assuming that our students will do this on their own, we have now made it a more formal part of their residency.

Although, as we shall see, the actual format of these classes is often anything but formal.

At 6:40 a.m. on a weekday, the streets around The Brigham are alive with people.

Wander out on to, say, Copley Square in Boston at this time, and it's like a ghost town. That's the heart of the Back Bay area, home to many students and people with 9-5 jobs in insurance, or retailing or education. Things get busy there later in the day.

The area in which The Brigham is located—the so-called Longwood Medical Area—operates on a different clock. Here, a half-dozen, world-renowned medical centers are located within a roughly 20-square block area, as well as a half dozen colleges and universities. Besides The Brigham, Harvard Medical School, Boston Children's Hospital, Dana-Farber Cancer Institute, Beth Israel Deaconess Medical Center and the Joslin Diabetes Center are all a stone's throw apart.

Almost everyone out and about in the early hours is related somehow to one of these or other major local medical facilities, which together employ roughly 43,000 people. Out on the streets, surgical scrubs are as common as jeans; the swing of lanyards and official hospital IDs draped around necks provide a silent rhythm to the movements of passers-by; dispensers of antibacterial hand lotion are ubiquitous on walls and by doorways. So are the anxious faces of patients, often accompanied by loved ones and families, on their way for procedures and tests.

The entire area is geared towards the healthcare industry. As the 24/7 hospital world is fueled by caffeine, there are coffee-shops at every corner and one suspects the Longwood Dunkin Donuts and Starbucks outlets must be gold-mines. Even the local gym knows exactly who it's catering to. Its advertising slogan: "Where Surgeons Get Cut."

At 7 a.m., a trickle of people is making their way into the Bornstein Amphitheater at the Brigham. Most are clad in the white coat uniform of the physician; most are young; many sipping on coffee and juice, nibbling on bagels and rolls laid out on a table near the entrance. "Care for some carbs?" a visitor is asked by one of the organizers of the session—the glamorous, dark-haired instructor Dr. Jen Irani.

As the associate program director for general surgery residency (as well as a surgeon herself), part of Irani's job involves organizing the weekly sessions called "M & M's." That stands for Morbidity and Mortality. Despite the grim sounding title, it's actually a coming-together of residents and senior staff who examine recent cases, and the complications and mistakes that might have been made, with a view towards avoiding them in the future.

Although the format is believed to have been developed at Johns Hopkins a century ago, it has become a cornerstone of a surgeon's education at The Brigham. Here, M & M's are designed to help residents understand what went right, what went wrong, and what could have been prevented, in even the most commonplace procedures they might have performed.

But when mistakes are identified, no punishment is meted out, no points deducted from some imaginary report card.

"It's very collegial," Irani says.

"The goal is to raise the level of care in the whole department," says Doug Smink, the program director for Brigham's surgical training. "I suspect at some other institutions it's a little more accusatory."

Still, as the room fills up, the hierarchy of the hospital is evident. The grey-haired white coats sit in the front row. Behind them are the chief residents, like Lawrence Lee. Higher up still, the younger residents and interns, such as sleep-challenged Melissa Mallory.

A gallery of portraits of physicians looks down over the proceedings. These are the images of Brigham medical and surgical chiefs and other luminaries, dating back to the 1800s. Again, one is reminded of Hogwarts, as these oil-painted sawbones resemble the huge paintings that hang—and occasionally speak—from the walls of Harry Potter's wizard school. One can only imagine some bewhiskered, 19th century sawbones, sticking his head out of the frame to comment on a case being presented ("in my day we would have applied leeches!")

Almost all of the 50 portraits on the wall are white males. That is hardly the case in this diverse audience, of which about half are women and among whom appear represented every ethnic group on earth.

In a typical M & M session, three cases are presented in an hour. The speakers explain the scenario: who the patient was, what was done and why, using evidence gathered through research. Then, the audience—mostly the faculty—comment on how the case was handled. One expecting to hear a catalog of catastrophes will be disappointed. In most of the cases presented, the patient went home and healed up. Still, there may have been some complication, some aspect of the operation that could have been done better.

Future patients of these residents will be relieved to hear that none of those in the audience were texting, doodling or snoozing during the presentations—although occasionally, beepers would go off, and a young white-coat would spring out of their seat and hurry into the lobby; a reminder that all of these surgeons-in-training are on call, and have patients to care for, even while they're still learning.

Chief resident Lawrence Lee, the Brigham's rising star, was the first speaker.

"I'll be presenting a complication of bleeding in a post-op patient," Lee said. He then went on to recount his case, involving a 76-year-old man with a groin hernia and a previous heart valve replacement, who after undergoing repair of his hernia, had to be taken back to the OR several hours later for bleeding from his surgical site. The discussion revolved around medications given, particularly the blood thinner heparin (administered because of the patient's mechanical heart valve), and the pros and cons of how much should have been given and when. As part of his presentation, Lee cited several studies from the surgical literature that discussed the optimal treatment strategy for administering blood thinners in patients with a mechanical heart valve. Based on this, it appeared that Lee's patient had received appropriate care that was well within expert consensus guidelines.

In other words, Lawrence had not screwed up.

The patient recovered quickly after the second procedure to stop the bleeding and went home the next day.

“Very good summary, Lawrence,” says one of the gray-haired surgeons at the conclusion of Lee’s presentation. Then there were comments from the surgical staff, most of whom are seated in the front row of the amphitheater. The discussion revolved around whether this type of bleeding could have been prevented even though it appeared that there had been no deviation from the standard of care, and whether any changes needed to be made when treating similar patients in the future to avert such bleeding complications. The residents and interns in the upper rows of the auditorium listened intently—some scribbling notes.

They were learning.

Next up is another bright star in The Brigham firmament: Antonia Henry, a 32-year old, Chief Resident from Grand Rapids, Michigan.

Antonia is one of those individuals who seem to have known they wanted to be a doctor when they were in elementary school. “I was in a science class in 4th grade when we began to learn about the human body,” she recalls. “That’s where I decided I wanted to go into medicine.”

By high school, she had narrowed her focus to obstetrics and gynecology.

Like Lee, her friend and colleague, Antonia had no doctors in her immediate family. Her father worked for State of Michigan as a food service director; her mom worked in human resources. More important than a connection to medicine, Henry says, was that “they were very supportive.” After four years at the University of Michigan in Ann Arbor, she applied and was accepted to Harvard Medical School. “I was ecstatic, overjoyed,” she recalled. That is, until she first came face to face with the imposing quadrangle of the medical school, located (by design) next to The Brigham. “All that marble,” she says, laughing. “I was so intimidated!”

She excelled at the medical school and after a rotation at Mass. General Hospital her third year, she found her interests in medicine moving in a different direction. “I knew that general surgery was for me,” she said. “Surgeons are able to offer our patients a very tangible solution. I liked that.”

Still, the adjustment to The Brigham was a challenge. “When you graduate from medical school and get accepted to this residency, people tell you how smart you are. But when you actually get there, *everyone* is smart...and you’re at the bottom of the totem pole.”

But Henry fought her way through. One thing she learned was to spend her precious time off wisely; to use it to escape what she called “the medical bubble” of The Brigham and the Longwood Medical Area. “I tried to become more engaged with the general community,” she said. She began to explore Boston beyond a 20-block radius. She made new friends outside of the hospital; attended concerts, went out to dinner and socialized, visited Cape Cod. “It helped me feel like a normal person,” she says.

Yet, the truth is that Lee and Henry are not like everyone else. They are extremely intelligent, extraordinarily motivated, and driven to work hard in a field where the training period seems endless. They are also very different, as individuals: Lee is outgoing, ebullient. Henry is warm, friendly, but more reserved. Both are well liked by their colleagues, the administrators and perhaps most importantly, by their patients.

In a few years, Antonia will be working a new boss: Uncle Sam. At Michigan, she earned a Navy scholarship that paid for medical school. When her residency is finished at The

Brigham, she will fulfill her part of the bargain and become a naval surgeon for four years. “I think it’ll be an exciting opportunity to see new places and participate in humanitarian missions,” said Antonia, who currently holds the rank of lieutenant.

In the meantime, she continues on her voyage at The Brigham.

Antonia’s M & M presentation was about a 22-year-old male with acute appendicitis. He was taken to the operating room for laparoscopic appendectomy. Unfortunately he had a post-operative hemorrhage and had to undergo a second operation. He received medication that can increase the risk of bleeding. The young man healed up and went home, but the conversation afterwards evolved around the diagnosis and management of post-operative bleeding; an important issue.

The last presenter was chief resident Alvin Kwok, whose opening lines would have had most outsiders sitting bolt upright in their seats.

“This case involves a 23-year-old male who was shot in the flank,” Kwok said. “He had recently been shot in the right arm, as well.”

To the residents or surgeons, this was not only unremarkable—Brigham has long served what was once called the “indigent” community—but not even relevant. Patients are patients, and surgeons are not their judges.

There was no comment or question on the identity of this patient, his livelihood, or the circumstances that might have caused him to end up in the ER with two gunshot wounds in almost as many weeks. The attitude of those in the amphitheater seemed to be: not our business. Not our concern. He needed to be fixed.

And in fact, he was.

“An excellent save!” says Dr. Jonathan Gates, a trauma surgeon at The Brigham after Kwok explained the steps he had taken to keep the patient alive. This sparked a long discussion among those in attendance on the history of blood transfusion. Gates explained how it started in World War I with whole blood transfusions to battlefield casualties; then moved in World War II to blood components (platelets, plasma, red blood cells). Now, the thinking appears to be moving back towards the transfusion of whole blood, citing what even to a layperson sounds like some inarguable logic.

“You’re bleeding whole blood,” observes Gates. “Makes sense you should be receiving whole blood.”

Gates, who is clad in scrubs, has a soothing presence and an easy smile. He clearly loves the give and take of M & M and working with the students. When asked about his passion for his work, he laughed. “What other job lets you wear your pajamas all day?” Seriously, he adds, “we’re constantly looking for better ways to do things.” The M & M’s help surgeons young and old step up their game. “It’s good for everybody. When you stop learning, it’s time to retire.”

During his presentation, Gates throws out questions. One student, sitting in the front row, always seems to have the right answer. He is John Scott, a third year resident, whose background and profile is atypical of today’s resident.

Scott grew up in South Carolina; his father, Brad, coached Division I football for 30 years at Florida State, University of South Carolina, and Clemson, where he was offensive coordinator. Coach Scott instilled in his son not only a reverence for God, but for the game that is practically a religion in the South. Like many good coaches, he also preached the values of discipline and hard work, which his son adopted as his own. In fact, John believes that it was his work ethic—not necessarily his scholarly abilities—that propelled him to

Harvard (where he played football) and The Brigham. “My board scores were average,” he says, in his soft Carolina drawl. “People here don’t have average board scores.”

Scott is also on a mission. His wife Kirstin is studying for her Ph.D. in health policy at Harvard. Once their training is done, John and Kirstin plan to go to Rwanda and help do the research and lay the ground work needed to improve trauma care in that impoverished African nation. He calls this kind of global outreach a “new horizon” for surgery. Clearly, it’s another goal for a goal-oriented young man, who believes that for him, the best preparation for his training at The Brigham were the two-a-day summer football practices he endured as a high school and college player. “The surgeon’s mentality is actually very consistent with football,” he says. “No excuses, be flexible, be available. Also, the regimented schedule, the discipline, the mental and physical endurance required...this is all stuff I learned during my playing days.”

To extend that analogy, the M & M’s are like the post-game film sessions, when teams review their performance in the previous weekend’s contest and break down the actions they took or should have taken.

One gets the sense that this model of learning might be useful in other professions. Could teachers, accountants, journalists profit from interaction between practitioners and students; the mix of evidence-based, formal presentation and animated, collegial conversation? It certainly seems preferable to a creaky professor droning on for hours in front of a chalkboard.

At the end of the 60-minute session, Irani was asked how these three cases were chosen for presentation. “We had a theme for today,” she explained. “Can you guess what it was?”

A visitor is unsure: Could it be gunshot wounds, appendectomies...pajamas?

“Nope,” she says. “The theme today was...blood!”

Chapter 3: Operating Costs

Not long ago, we went through a process of curriculum development for general surgery nationally. In the process we actually identified surgical procedures that we felt residents should know how to do by the time they completed their training.

We came up with a total of one hundred and thirty nine: 76 of them were classified as essential and common; 63, essential but uncommon.

In the old days, we never counted the procedures or organized them based on how frequently they were performed. It was felt that over the course of five years in the hospital, you’d see just about every kind of surgery, and if you hadn’t, well, then you’d figured it out on your own if you ever faced one in your practice.

Today, our trainees follow a more carefully written script. They begin at a surgical boot camp, where under the direction of my colleague Dr. Doug Smink, they learn the basics: Tying knots, suturing, general operating room procedure. To teach them, we have a mock operating theater, complete with high tech mannequins that can be manipulated in a control booth to simulate respiratory and heart rates. And we use low tech models too. Some of them available in your local supermarket.

A recent National Public Radio story on surgical training was titled “What Clementine’s Can Teach Surgeons.” It was about a University of Michigan medical school educator who was looking for a simulation to teach students how to remove lymph nodes in the pelvis. “She considered the fact that through the pelvic anatomy, there is a mix of substantial and

delicate tissue,” reported NPR’s Andrea Hsu. “And then she thought about a Clementine. It has a sturdy outer peel, but also the more fragile pith, the white spongy layer under the skin.”

The instructor, Pamela Andreatta, set up an opaque box with holes in it through which you could insert a camera, scissors and grasper. Residents were then given two hours to take off the peel in as few pieces as possible, remove the pith, separate the segments then put everything back whole.

I salute Dr. Andreatta for her creativity; and would add that this is not atypical of some of the methods we use at The Brigham, as well. For example, our “bleeding model” is a plum, stuck in a bowl of Jell-O. Pierce that, you have a rough approximation of the bleeding in a real surgery.

The point is that, as good as our computerized simulations are, there are sometimes cases in which a low tech solution is best. And, I might add, one that is more in keeping with the times. When I was honing my basic surgical skills, for example, we worked on animals. We don’t do that anymore.

Of course, when it comes to training surgeons, nothing—not computers, not animals, not an entire produce aisle from Whole Foods—can replace the real thing. As soon as they’re ready we aim to get our residents into the OR, where they can work next to an attending surgeon and through observation and participation, begin the long process of checking off those 139 surgeries.


Here again, a difference between my training and the way we do things now: As a junior resident back in the day, you spent a lot of time holding retractors. Today, in part because we don’t have enough residents to do that, they have to get involved in surgery right way.

We give them appropriate cases for every level. As an intern you perform, say, skin grafts, and hernias and gall bladders. As a second year resident, you might do more ventral hernias, and maybe some right colons, and in your third year, you’ll do left colons (the left colon is more difficult because it extends into the pelvis). As a chief resident, you’ll do almost anything.

You will also be expected to deal with the part of surgery that is perhaps most difficult to simulate in a skills lab, or anywhere: uncertainty and human emotion. Sometimes you have to make a critical decision with less than adequate data. Likewise, a resident will sometimes have to deliver bad news to patients and families; and, inevitably, as it happens in the course of every surgeon’s career, you will have to look in the mirror and know that something you did or didn’t do caused the death of a patient. It might have been through no fault or your own, or if it could have been because you made the wrong decision. This is one of the hardest things about being a surgeon; and one of the hardest aspects to teach.

The most striking aspect of the OR at The Brigham is not just its brightness, its whiteness, its cleanliness.

It’s the Hospital Surgical Safety Checklist posted on the wall of the OR. The instructions are spelled out almost like stage directions in a school play. Even the speaking parts are noted:

*BRIGHAM AND WOMEN'S HOSPITAL SURGICAL SAFETY CHECKLIST
Before skin incision (Surgeon reads out loud)
TIME OUT 
Has Everyone introduced themselves by name and role?
Entire team confirms SAFETY PAUSE: <ul style="list-style-type: none"> <input type="checkbox"/> Correct patient <input type="checkbox"/> Correct procedure/site/side <input type="checkbox"/> Correct position <input type="checkbox"/> Correct equipment and implants available <input type="checkbox"/> Need for fluids for irrigation
Has antibiotic prophylaxis been given within the last 60 minutes? <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable
Has venous thromboembolism prophylaxis been provided? <ul style="list-style-type: none"> <input type="checkbox"/> Yes <input type="checkbox"/> Not applicable
Anticipated Critical Events To surgeon: How long will the case take and how much blood loss is anticipated? <ul style="list-style-type: none"> <input type="checkbox"/> Are there critical or unexpected steps you want the team to know about? To anesthesiologist: <ul style="list-style-type: none"> <input type="checkbox"/> Are there any patient-specific concerns? To nursing team:

🍏 Are there any concerns about sterility or other issue?

*Based on the WHO Surgical Safety Checklist developed by The World Health Organization

Little red “Stop” signs indicate when the surgeon stops speaking, and it’s then the nurse’s or anesthesiologist’s turn to read out loud their part of the readiness script.

It may sound almost juvenile, but The Brigham—like many other hospitals—takes it very seriously. Use of the surgical safety checklist, developed for the World Health Organization by Atul Gawande, a former surgical resident at the Brigham, is now pervasive. According to a 2009 article in the *New England Journal of Medicine*, significant reductions in OR-related deaths and postoperative complications have been attributed to the use of the checklist. Since then, it has been adopted by more than 3,900 hospitals in 122 countries.

The Brigham is one of those hospitals, although one gets the sense that among some of the senior staff, there is still eye-rolling over the idea that medical school graduates must read a sign that seems like it could have been designed for third graders.

No matter. If the evidence shows it works, The Brigham will use it.

And yet, while it is effective, there is no doubting that it takes more than the ability to follow a checklist to perform successfully in the OR. It takes someone who has been trained for five years; someone who has diligently done the rounds, completed the work in the skills lab, cracked the books, and spent time watching others perform surgery. It takes someone like Antonia Henry, the chief resident who is now striding confidently into the operating room with the ease of someone who is quite at home here.

It is mid-afternoon, and she is about to assist on a procedure that involves removing a tumor from the colon of a 70-year-old woman, who at this moment, lies on the table, anesthetized with her legs indelicately spread, her inner thighs coated brown with an iodine-based disinfectant. Antonia is already at work, adjusting foot clamps and helping prep the woman.

As befitting the stage-like instructions posted on the wall, everyone has a role in this drama. And each cast member introduces themselves.

Anesthesiologist attending.

Anesthesiologist resident.

Circulating nurse.

Scrub nurse and tech.

Surgical Attending.

Surgical Resident.

Befitting his billing as the star of the show, the attending surgeon arrives last, and with a bit of flair, from stage right. A wiry man, who walks with the confident gait of someone who has been here before, the first thing he does when he enters is plug in his I-pod.

The opening chords of the Grateful Dead’s “Sugar Magnolia” rumble through the speakers.

“Saw my baby down by the river...knew she’d have to come up soon for air...”

The patient’s chest rises rhythmically, up and down.

The anesthesiologist and her resident—who are a separate team, and might as well have been in another room for all the interaction they had with the surgical team—confer on their side of the patient.

The nurses stand at the ready.

The surgeon nods to Antonia, who looking up a large screen set up next to the patient begins the laparoscopic procedure.

Using a scalpel, she makes the incision as the attending stands watching arms folded and offers comment.

“Yes, that’ll do it, well done.”

With her hands manipulating what look like a giant pair of scissors (and indeed are called laparoscopic scissors), Antonia now begins cutting away what appear on the screen as long white ribbons: this is the fibrous tissue that attaches the colon to the pelvis.

“Nice job,” says the attending, eyes fixed on the screen.

Next, she makes new incisions so that the left colon—with the tumor inside—is clearly visible from every angle.

Essentially, what Antonia is doing is clearing away the underbrush, exposing the left colon, so that the tumor inside it can be removed. A hand port—which looks like a large suction cup—is then inserted into the abdomen. Now, the screen becomes secondary, as the attending sticks his hand into the port. His lower arm articulates briefly, before he removes it and invites Antonia to do the same. “Feel it?” he asks. She nods.

“A lot of surgery is tactile,” Antonia would say later. “This is part of my training. As a surgeon you need to be able to trust your feeling. With laparoscopic surgery, you can rely on the tension you feel in instrument as well as what you see on the screen. But with the hand port, it’s a bit like groping in the dark unless you’ve practiced it.”

Once the attending is satisfied that Antonia has gotten the feel of the colon and the tumor embedded inside it, he then reaches in to pull the colon out through the incision she made. Since Antonia has already cut through the tissues, arteries and veins that attach the colon to the pelvic wall and supply blood to the organ, the colon is free—or in surgical speak “mobilized.”

“You just pull it out with your hand,” Antonia said.

That’s all! You’ve essentially disemboweled someone; removed a part of one of the body’s essential organs. You are now removing—by hand—a segment of the colon with a cancerous growth within. You will excise the tumor and then put the organ back where you found it. And a few weeks from now, thanks to your skill and the healing power of the body, the woman will walk and breathe and live normally again (as, in this case, she did).

Is it any wonder that some surgeons end up with a God complex?

“I went into surgery because I could be in complete control,” admits Dr. Robert Osteen, a respected surgeon emeritus at The Brigham, who has retired from operating but still teaches. “Some of the surgeons I knew back then were real cowboys.” Meaning that they relished the chance to ride in, save the day through some impressive display of surgical derring-do, and ride back off into the sunset. They were confident in their skills and didn’t need any stinking procedural chart to tell them what to say or do.

That’s changed in today’s culture. Even surgery is not immune to generational change. Today’s young surgeons are more representative of their millennial cohorts.

“They’re very smart, more diverse, fewer cowboys,” says Osteen.

They also stick to the script and work well as a team—just as this generation has since they were kids. And as a result, they may be less likely to come into a surgery with guns blazing. But they will be far more likely to carefully marshal their resources, both technological and human, follow the playbook, go with the percentages and in as many if not more cases than the cowboys, fix the problem.

Even-keeled, mild-mannered Antonia epitomizes this. Her proficiency is masked by her modesty, as she demonstrates again in this procedure. She sews everything back up again neatly, showing the ability in knot-tying that she learned years ago in the skills lab at The Brigham. All this is done, again to the nodding approval of the Attending, whose music has moved on to Neil Young by the time the three and half hour procedure is complete.

Antonia has performed most of it.

That's exactly how it should be. "Antonia's at a pretty advanced stage," says Doug Smink. "The expectation is that you get increasing responsibility over time, and by the time they're chief residents, the faculty is just trying to guide them through."

Even those on the other end of the training ladder—the interns—get time in the OR. And while they may not be performing most or even much of the procedure, they still get a taste of surgery; and the thrill.

Cowboys or no, the big OR show, the dramatic removal of a tumor is, after all, what attracted these young men and women in the first place. And it is here, in the bright whiteness of the Brigham OR, where all the skills and classes and testing and sticking of pins in plums pays off.

"You put on your gown, put on the goggles, wash up and you enter into this sacred world," says intern Melissa Mallory. "It's your time to interact with the patient in a new way, and you're the one opening them up and curing them. They trust you to do the right thing. All else outside the operating room stands still. There are no windows, you don't know what time of day it is. The light is same, the smell is same. People always look the same. You enter in there and time stands still. That's what so great about surgery and I realized that in the OR...you can fix problems."

Except sometimes you can't.

It's a fact of life that sometimes people die in surgery no matter who well trained, how skilled, how bold the surgeon.

Equally inevitable is that the time will come in the career of every surgeon, when he or she must deliver the proverbial bad news to anxious patients and their families.

A day after her successful procedure removing the elderly woman's tumor, Antonia is summoned to a meeting where she must speak to the family about an unsuccessful outcome.

The patient is a developmentally-disabled man in his twenties with an aggressive cancer. By the time he arrived in The Brigham for the third time, his prospects for recovery were grim. Antonia was assigned his case, and got to know the young man and his family; it was a large and clearly close-knit New England clan. On the afternoon that Antonia entered a conference room, they are subdued and quiet. The father—a man whose calloused hands and lined face looked like he had known hard work for many years--held tight to his wife, whose quick smile and laughter belied the tension in the room. Other family members held back tears as they listened to a palliative care specialist methodically recite their options. Other Brigham staffers were there, too; part of the vast but necessary medical team that rolls into action in such cases.

When Antonia enters, the meeting is already in progress. The mother's face beams. "Hi, Dr. Henry," she chirps. Even the father seems relieved to see her.

The young surgeon takes her place quietly as the palliative care coordinator continues.

"So I think at this point, our options are most likely hospice care," the coordinator says, gently.

Someone begins to sob.

The circumstances under which their son would enter the hospice are discussed with the family. They listen, but body language suggests that they are uncomfortable with the option, almost unable to look at the coordinator as she goes into the details, except for the mother, who listens attentively. Finally she turns to Antonia, who has been silent during the meeting and addresses her as she would a friend, using her first name.

"What do you think, Antonia?" the mother asks the surgeon, using her first name.

"He's been through a lot," Antonia replies. "I wouldn't want to have him go through more surgery, more pain, if it's not going to accomplish anything."

The mother nods.

"Okay," she says firmly, glancing around at the rest of the family to let them know that, as far as she's concerned, the decision has been made. "I think we should go with the hospice."

There are deep breaths; a tension in the room seems to have been lifted at the rendering of a sad but humane life and death decision.

Afterwards, Antonia reflects on the meeting. "I think you have to be very humble about what you can accomplish," she says. "Even surgeons, with all our modern medical training and technology, can't fix everything. At some point, you have to say 'we've done what we can, it's time to accept the inevitable.'"

Especially when, as in this case, the inevitable would have meant more pain, more suffering, an erosion of quality of life. The young man's family knew it; and Antonia knew that they knew it. She had become familiar with them over several weeks of supervising their son's care, in the most intimate of ways. But she saw more than fibrous tissue and skin. She saw a family that ultimately did not want him to suffer any more; to live the rest of his life on a respirator. She discussed it with her supervisor—the attending physician in this case—who agreed, wisely deferring to the resident closest to the situation. "I'd been with the family for weeks, I'd gotten to know them, I had observed them together with their son," said Antonia. "I had a feeling for what their wishes were. They just had to be at a point when they were ready to hear it."

Knowing exactly when that point was, and helping them reach that kind of life-and-death decision requires a sensitivity, empathy and human touch that you don't learn carving Clementine's in a skills lab, or by following the instructions on a wall chart. Surgical educators and hospital administrators must be humble too: That kind of education started a long time before Antonia Henry entered The Brigham.

The meeting adjourns. The family—with mom and dad holding hands—walks into the corridor. By then Antonia is already on her way to another ward. She would have liked to have stayed a while longer, offering a shoulder and some sympathy to the family that had obviously grown to trust and admire her. But as always, there's very little time, and many patients to see. "I've got to go do afternoon rounds," she says with a smile, vanishing around a corner of The Brigham.

Postscript: On the Future of Surgical Education

The making of a surgeon at The Brigham is a process that has changed over time, and will continue to change. Although I believe the products of our program—the young men and women you have met in this book—are among the best in the profession, we are in the midst of a period of rapid change in medicine. This requires that we rethink ways our traditional ways of doing things—and surgical education is no exception.

As you've read in my comments, through the observations of my co-author and the words of our residents and other colleagues, our traditional model of education has changed drastically in just the last few decades. It's going to change again. Here are a few reasons why:

- Patient care needs have changed and become increasingly complex: Historically, general surgery residents learned operative skills on patients with trauma, diseases of the stomach, gall bladder, colon and vascular system. Not only are we seeing fewer traumas but increasingly they are managed without surgery. Ulcer disease and stomach cancer, the major reasons for operating on the stomach, have declined markedly in their incidence. Gall bladder, colon surgery, and vascular surgery today are most often done using minimally invasive techniques and many of these skills today are obtained in fellowship requiring further training beyond residency.
- Work hour regulations, although certainly appropriate, have significantly limited the experience. Residents see less, they are often unable to follow patients through the full course of their illnesses, and there is less opportunity for autonomy which was most often possible in the middle of the night, caring for emergencies.
- Issues of patient safety and transparency, malpractice, and billing compliance have mandated the presence of the attending surgeon, limiting the opportunity for autonomy. Even the most skilled and advanced of our residents complete training having never made an independent decision or operated alone.

In response to all this, virtually all of our graduates seek further training, usually in a subspecialty. The downside is that few become general surgeons, who are desperately needed for our work force particularly in smaller and rural communities.

I'm not going to bore you with the financial issues that we administrators worry about, but let me just give you one example. With the current climate in Washington, there is strong reason to believe that the dollars that flow to us through Medicare payments for resident education will be significantly reduced if not eliminated. This combined with the work hour regulation makes it far more cost efficient for hospitals to hire a huge cadre of physician "extenders," Physicians Assistants and Nurse Practitioners, to complete what were historically resident tasks. While PA's and NP's certainly have an important role to play in the modern healthcare system, I am concerned whenever our residents are not getting the kind of experience I feel they should.

The Brigham is in the forefront of the efforts to address these issues. The development of a national curriculum, clearly defining what a resident should be competent to do at the end of training, is a first step. We are beginning to incorporate a series of milestones into the course of training; hurdles that the resident would have to pass to progress. For example, a first year resident would have to get a minimum score on a standardized exam

and demonstrate competence in some minor operations, such as draining a boil or fixing a hernia, before he or she could progress to the second year of training.

Despite the challenges, there is still nothing like being a surgeon. As you've read in this book, the ability to make a dramatic impact on the health of our patients is still a powerful motivating force; one that continues to attract some of the best young minds in the country to The Brigham and other fine programs. I am proud to work with these young surgeons and for those who feel the calling, and think they have what it takes, I encourage you to pursue your dream of joining our ranks. Yes, there are challenges, yes the medical world and health care environment is changing. But the need for The Complete Physician will always remain.

Stan Ashley, M.D.

November, 2012

About the Author

Stanley W. Ashley, MD is Chief Medical Officer and Senior Vice President for Medical Affairs at Brigham and Women's Hospital as well as the Frank Sawyer Professor of Surgery at Harvard Medical School.

A graduate of Oberlin College and Cornell University Medical College, he completed a residency in General Surgery and joined the faculty at Washington University in St. Louis. He subsequently spent 7 years at the University of California at Los Angeles until 1997 where he assumed the position of Vice Chairman of the Department of Surgery and Program Director of the General Surgery Residency at Brigham and Women's Hospital as well as his current position at Harvard Medical School.

Dr. Ashley is a gastrointestinal surgeon whose primary interests are diseases of the pancreas and inflammatory bowel disease. His research, which has been funded by both the Department of Veterans Affairs and the National Institute of Health, has examined the pathophysiology of the small bowel and pancreas. His focus recently is on practical aspects of measurement of surgical quality and how these can be applied to improve outcomes, particularly for the individual caregivers. Closely related to this, he has an interest in physician education, both at the graduate and postgraduate (MOC) levels, and its integration into a certification/recertification process that ensures quality of care.

He is the author of more than 300 publications. He serves on numerous editorial boards, including the Journal of Gastrointestinal Surgery, the Journal of the American College of Surgeons, Current Problems in Surgery, and ACS Surgery. He is a former Chair of the American Board of Surgery and currently Secretary of the Society for Surgery of the Alimentary Tract and serves on the Board of Directors of the Accreditation Council for Graduate Medical Education (ACGME).

John Hanc is the author of ten books, including two award-winning memoirs, *The Coolest Race on Earth* (Chicago Review Press, 2009) about his experience running the Antarctica Marathon and *Not Dead Yet* (Thomas Dunne/St. Martin's Press) written with bike racer Phil Southerland, founder of Team Type 1.

A long-time contributor to *Newsday* in New York, and a contributing editor to *Runner's World* magazine, John Hanc's work also appears in *The New York Times*, *Family Circle*, *Smithsonian* and *Yoga Journal*.

Previous books include *Jones Beach: An Illustrated History* (Globe Pequot Press, 2007) with a cover blurb from Donald Trump, who called it a book that "any New Yorker would be proud to have in their collection"; *Racing For Recovery: From Addict to Ironman* co-authored with Todd Crandell (Breakaway Books, 2006), *Running for Dummies* (co-authored with the late Florence Griffith Joyner, IDG Books, 1999) and the best-selling running primer, *The Essential Runner*, (Lyons & Burford, 1994).

Hanc has lectured extensively on his books about Jones Beach—the iconic Long Island, New York oceanfront park—and his experience in the Antarctica Marathon. He has appeared in both large chain and independent bookstores, where his talks have drawn up to 100 people. He has also been interviewed on NPR and ABC radio networks.

Hanc is an associate professor at the New York Institute of Technology in Old Westbury, where he teaches classes in journalism, writing and communications.

A graduate of Emerson College in Boston, he received his master's degree at the journalism school at the University of Wisconsin-Madison.

Acknowledgements

The authors would like to thank the staff, faculty and residents of Brigham and Women's Hospital for their cooperation and participation in this project. In particular, we thank Drs. Lawrence Lee, Antonia Henry, John Scott, Melissa Mallory and Alvin Kwok for allowing us to share some of your experience, research and insights. Also thanks to educators Dr. Doug Smink, Jen Irani, Jonathan Gates, and Robert Osteen, and all the other surgeons, nurses and staff who accommodated us during our reporting. Special thanks to Colleen Larkin, assistant to Stan Ashley, whose assistance was invaluable.

Also thanks to Julie Silver, M.D., editor of Harvard Health books, who conceived of this project and brought us together and our literary agent Linda Konner.

A final note: In order to respect the privacy of patients, who didn't ask to be in the hospital during the time of our visits writing this work, names and descriptions have been masked in our narrative.