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How did you decide to choose a career in surgery and when did you decide to focus your career on trauma surgery?

Dr. Anna M. Ledgerwood

Well, as a medical student I went to Marquette in Milwaukee in 1963. I was fortunate to be one of three out of 100 women at that school. I was just scared to death and just tried to survive the first two years. It was absolutely wonderful and for sure what I wanted to do. When I got into the clinical years, I liked all of my rotations, but obviously surgery really turned me on. I was on Ellison's service at the County Hospital in Milwaukee. It was called the blue surgery service. What really turned me on was not only taking care of patients but the caliber of the surgical residents and the attendings. But in particular, it was the surgical residents.

I could really identify with them and enjoyed that rotation. Then during my senior year, I spent another month as an elective on that same surgical service. I absolutely loved surgery, but I could sort of sense that I wouldn't be readily accepted, being a female, into surgery.

Next, I worked at the Children's Hospital in Milwaukee doing lab work at night and on weekends. Pediatrics seemed exciting. There were patients with tricuspid atresia, lupus, glomerular nephritis and leukemia. Pediatrics was exciting enough and I thought I should be a pediatrician. I had no money or time and I never interviewed anywhere. So I sent out applications to three places that had busy emergency departments affiliated with a university. They

included the hospitals at L.A. County, Cook County in Chicago and Detroit General. I never interviewed at any of them. I just sent the applications in. And then I got my acceptance for the Detroit General Hospital which I listed as my number one choice.

I was a little leery about moving to Detroit. One of my classmates said to me, "Where are you going?" I said, "I'm going to Detroit General." "Oh, some intern got shot there while working in the emergency department." My response was, "Oh, god. Really?" One of my other colleagues said, "Where are you going?" They said, well, "You know they've got a jail in the emergency room," which is true. So, I was just a little nervous about going to Detroit.

But over the Memorial Day weekend that year as I was matriculating from medical school, I drove to Detroit and looked at the place. After a day or so, I said, "Gosh, everybody seemed pretty reasonable here. This will be all right." So I showed up on July 1st as a rotating intern. Three weeks later, the riot broke out. It was kind of an exciting time.

My first rotation was in the emergency department on the pediatric service and that's where I learned that pediatrics is skin, rash, fever, and diarrhea and it all gets well anyway. Then they sent me to OB/GYN and that was my second choice. I thought, if I don't do Peds, I will do OB/GYN. Well, my god they have abdominal hysterectomy and vaginal hysterectomy. And that's about all they did.

I didn't know what took them so long to learn. Must be obstetrics. Next, I went to OB and they sent me to the homes whenever somebody had a baby at home. I must have done 15–16 home deliveries as an intern. You took a medical student with you and you just wanted to be sure everything was okay. It was a fantastic experience. But I thought, babies fall out no matter who is standing there.

I went on to medicine thinking it was going to be medicine for me. The first day I was on this big ward. There was one 13-bed ward, one 11-bed ward and one 4-bed ward and one surgical intern, me, and one medical resident. I went in early and drew blood for two hours. Then the resident came in and we start these ward rounds. And they get interrupted. We went to X-ray and then got coffee and then lunch and then finally at four o'clock we'd finish these god-awful ward rounds and then we'd start chart rounds.

And honest to god the very first patient we saw that day was an 18-year-old with rheumatic fever. We changed her medications from aspirin to Tylenol and it took 45 minutes. I couldn't stand it.

I did two months on medicine. The second month, I had a wonderful first-year resident. We had a great experience. There were 18 beds on the ward. Whenever we were going to send somebody home, we'd go to the emergency department and pick a patient with a disease we hadn't treated. That's how much pathology there was available.

I cared for the patient who had the first kidney transplant in Detroit. I managed another patient with venous stasis ulcers by placing him on a starvation diet for his morbid obesity. There were patients with a lung cancer, hypothyroidism, lupus and glomerular nephritis, gallstones, and a lung abscess. It was very exciting. So, the two months weren't bad.

My next rotation was emergency surgery. The first morning I went to the recovery room and there was a patient who had a gunshot would to his carotid artery and jugular vein,

a patient with a gunshot wound to his superior mesenteric artery, kidney, duodenum, another patient with acute appendicitis, another patient with a bowel obstruction, a patient with a gunshot wound to the heart, and a patient with a stab to the heart. That was what they had done during the night. I thought, oh, my goodness, this was great.

That's when I learned that, when I needed help as a rotating intern I would go to the emergency department and find a surgical resident. They were able to help me and I could identify with these people. It was just fantastic. I just loved it.

So, I'm just a rotating intern and I didn't have a job for the next year. One day the surgery attending brought an application down for me to fill out for the surgery residency. So then I sort of knew that at least somebody thought maybe I could get a job.

Then one day Dr. Robert Wilson saw me and said, "Somebody told me you wanted to do surgery." And I said, "Yes." He said, "Well, you know, you've got to see Dr. Walt." So I made an appointment. We visited about ten minutes and he accepted me into the residency. That's how I ended up in surgery.

Luchette

What an amazing story, Anna. And how is it that you then decided on trauma surgery?

Ledgerwood

That was really Dr. Lucas who tricked me. Of course, there were a couple of attendings that would regularly scrub in the operating room. Many of the senior residents would be helping the junior resident do the operations without an attending scrubbed. But, Dr. Lucas and Dr. Ike Rosenberg were pretty good about scrubbing and we rotated through two hospitals: the VA and the Detroit General.

When I was finishing my residency, Dr. Lucas called me. One of the residents that was scheduled for the emergency surgery rotation did not want to cover the service so Dr. Lucas asked me if I would. So instead of spending a couple of months on the shock unit with Dr. Wilson, I got to spend two additional months on emergency surgery. And the only other resident on the service was a second-year resident or a PGY-3 which was great for me.

Dr. Lucas called me one day when I was a finishing the residency. He said, "You know, I really enjoyed these months." I was happy because he had such a high standard for patient care.

In the last year of my residency he called me after he finished teaching the medical students. There were 256 third-year students at Wayne State. He had been doing a patient management problem 16 times a year. He lectured each Monday for an hour and a half and each Friday for an hour and a half. The format was on Monday you give them the problem and then Friday they presented the results of what they wanted to do and Dr. Lucas would give them some more information.

He was kind of tired of doing that and he wanted to make a movie to do it and there was some money available from the medical school for that. He had this harebrained idea about making this movie on teaching priorities of care of the injured patients to third-year

medical students. He had met with two educators from the medical school. They wanted certain things and that wasn't what he wanted.

I was working on emergency surgery at night when he called me and wanted to know if I could meet a four o'clock. He got me and a fourth-year medical student that was doing an elective on emergency surgery. So, now it was three to two and he could get whatever he wanted. He made this movie of priorities of care. Then I wanted to stick around and see what came of it. So that's how I ended up staying on as faculty. That was the main reason that I practiced trauma surgery.

That's how I got started in trauma surgery. But always we did acute care which was emergency surgery then. Emergency surgery not only included trauma but it included hand surgery. We repaired all the hand injuries including tendon and nerve repairs. We did thoracic, neck, vascular, whatever!

Luchette

Could you expand on how difficult it was as a woman going into surgery the '60s?

Ledgerwood

Yes. Late '60s. Actually, that just came naturally. In other words, when I was a medical student at Milwaukee the surgical residents treated me wonderfully. I had absolutely no qualms. Now, of course, I worked very hard. I really liked what I was doing. They learned to trust me.

At Marquette University, you had either an intern or a fourth-year student on-call for your service. And the chief would come and make rounds every night at eight o'clock. We made rounds three times a day. The chiefs were able to rely on me to take care of things so they were very happy with that. I did think they were happy to have me on their service.

The same thing happened when I was a rotating intern. They were very happy to have me on their service. I then went on to the elective division as a rotating intern for a month of surgery. Well, I knew all the people on the medical service and so I would go find all of the thyroids and, they loved me, loved what I was doing and taking care of these patients and it really came very easily. Everyone treated me absolutely spectacularly.

I had absolutely no problems anywhere. Even the attending, Mike Denny, who brought that application down for me to fill out, he didn't have to do that.

Then I said that I was only going to stay for a year because I was afraid. There was a female fourth-year medical student at Wayne State who wanted to do surgery when I was a rotating intern. She was working with Bob Wilson doing research. But she was a real pest. She would see something that the resident did in the ICU and go tell Dr. Wilson. Then Dr. Wilson would come down to the ICU and say, "What are you doing running blood in the CVP line?" The medical students in her year told Dr. Walt that if he takes her as a surgery resident they wouldn't come here.

He wouldn't take her as a surgery resident and she did a mixed medicine/surgery residency and ended up eventually going into radiology. But you know, it all had to do with how you treated other people.

I had absolutely no problems. Everybody treated me wonderfully. In the second month of my first year they asked me "You are staying, aren't you?" I lucked out because at that time there were far more positions available than there were people to fill them.

Luchette

During your training, there was a lot of specialties in their infancy, like pediatric surgery, vascular surgery, cardiac surgery, and trauma surgery. How did your peers and mentors feel about you deciding to pursue trauma surgery?

Ledgerwood

Actually, vascular surgery was just beginning to take off. And the pediatric thing had already existed. Quite honestly, it wasn't trauma, it was more emergency surgery. Dr. Lucas has always said, "Trauma can't be your wife; she is your mistress, can't be your wife. You have to have something else." Emergency surgery was really what I was interested in as much as the trauma. The trauma had some advantages to it but, it wasn't just trauma that I was doing. It was emergency surgery and always has been.

Before Dr. Walt asked me to stay on staff, Dr. Lucas called me and said, "I had gotten a call from this person who I know who is up around Grand Rapids, and that he is looking for a partner and I gave him your name but I hope you don't go." And that was the first time he had ever said anything to me about staying.

And then Dr. Walt asked if I would stay as staff on the emergency surgery service. Now, at the time emergency surgery staffing was done year-round by Dr. Lucas, and he had been covering the service for about a year and a half. The other staff was somebody who rotated on for two months. Most of them really were not too fond of doing it. They did it because it was a requirement of the department and hospital. But they would rather staff the elective divisions. But the emergency division was a little more stressful and harder work.

And of course your coverage was daytime coverage. And the weekend coverage and the night coverage was done by a full-time faculty for that day. The night-time coverage was done by the community surgeons who came back and did their one night for the department. So that's how the service was staffed.

Luchette

Tell me who were instrumental mentors in launching your career and in helping develop your career.

Ledgerwood

Well, I suppose you know the one that first intrigued me was the general practitioner back in my hometown. Then the one that has been most important has been Dr. Lucas. I mean we worked together as partners for 40 years. Partners in terms of we share patients. One of us rounds at one hospital for three days and the other at the other hospital. We switch midweek.

We are in the office the same days. We steal patients from each other, even if it's a per-

irectal abscess. I just stole a colon resection from him yesterday, kind of wished I hadn't done it. I thought it was diverticulitis. It was colon cancer, perforated colon. He has obviously been the most important one.

Dr. Walt was very influential. The one thing about Dr. Walt was that he accepted you for what you were. He was intrigued by everybody. He wanted to know more about everybody as a person. He cared about everybody as a person: medical students, residents, attendings, whoever. He did give me a residency position and he gave me a job. Dr. Walt did whatever he could do to help you along with your career.

I can remember working on papers with Dr. Lucas. That was the other thing he did. It wasn't just taking care of patients. You had to be writing something. Every weekend something was being written. He would do one draft and give it to me. I was supposed to do a draft and give it back to him. This went on, always one of us had a draft of something that we were working on. He was very insistent on that.

Luchette

Tell me about some of your proudest scientific contributions in the field of trauma care.

Ledgerwood

One of my first papers dealt with the exposed vascular graft and covering them with pigskin to get them to granulate (*Am J Surg.* 1973;125(6):690–5). I presented that study at the Central Surgical as a five-minute presentation. The thoracotomy prior to laparotomy for patients with hypotension and penetrating wound to the abdomen (*J Trauma.* 1976;16(08):610-5). I think the albumin work has been class and really got us into looking at patient resuscitation and the three phases of resuscitation. The three phases of resuscitation is the study that I am proudest of (*JAMA Surg.* 2013;148(3):239-44).

Luchette

Is there anything that when you look back on your career that you were passionate about that today we know is not beneficial to patients?

Ledgerwood

Well, I think when you look back at earlier ages where everybody got a laparotomy, a little penetrating wound to the abdomen got a laparotomy, a little hole in the colon got a colostomy, I think those things that you know we thought were just holy and righteous turned out to not necessarily need to be done.

Luchette

As you look back over your illustrious career, what do you view as the two or three greatest advances in trauma care science that have occurred during your career?

Ledgerwood

Well, as I just mentioned, the management of colon injuries is a big one. I think the ability to have CT scan be able to help us decide what to do is another one.

Quite honestly I think the verification review process has contributed more to care of injured patients than almost anything else because it is really forcing places to meet certain criteria. So you know I think when you look at all of trauma care that's a major influence on improving care.

Luchette

What do you feel are some major changes in practice patterns that occurred during your career?

Ledgerwood

Well, when I was coming through as a resident I was the one who was taking care of the patients. I was the one who went to the clinic. I was the one who did the operation—as a resident. As time has evolved and I'm still the one that sees the patient at the office, and I'm the one that does the operation.

I think that aspect of resident training has changed dramatically. I can remember the time when you didn't have to have an attending in the operating room, and now I'm in the operating room for every case I do, including tracheostomies. I can remember, as a senior resident, one of the patients we were filming for the movie was a patient with a gunshot wound to the abdomen. We thought he was dead. But he moved and we intubated him and took him to the OR. He had a gunshot wound to his iliac artery, just about a half a centimeter beyond the bifurcation. We got control of it, but I couldn't help the PGY-4 resident who was with me repair it and I had to call an attending down to help me. The attending happened to be a transplant surgeon. He showed me how to do it. He was very helpful. But that was one of the few times I ever called an attending to help me.

Luchette

Tell me specifically what brings you the most joy about your career at the end of the day?

Ledgerwood

Oh, I think there are three aspects. One is seeing the patients do well because the agony of defeat when you lose a patient is so painful. The other thing is teaching the residents and students to be able to do this and to have them so wide-eyed and happy to be able to do practice surgery. To see them do well and to have them do well as they leave and go out into practice, I think that's probably the most enjoyable aspect of my career.

Luchette

What do you find most challenging in modern medicine right now? What keeps you up at night?

Ledgerwood

The brokenness of health care and how difficult it is to be able to do what you need to do in order to take care of a patient.

And then some of what I consider just absolutely stupid things that we end up doing that, you know, don't necessarily help patients but harm them. When you have to apply pneumatic pumps to a lady's legs and then she tries to get up and falls and breaks her hip and all we're trying to do is prevent DVT. That probably isn't doing anything anyway with the compression stockings. So it's that you have these outside people telling you how to do things I think is just crazy.

Luchette

You've trained and mentored a lot of general surgeons and trauma surgeons and acute care surgeons. What advice would you offer to a young academic trauma/critical care surgeon for a successful career?

Ledgerwood

I think the most important thing is you have to have a surgical practice where you are taking care of patients of some kind and operating. People who don't operate lose their skills. Trauma is becoming very much a non-operative field and so you have to do something that allows you to operate. And they have to keep writing. If you're not going to write, you might as well go into private practice.

Luchette

Let's talk about the future of trauma and acute care surgery.

Ledgerwood

Well, I have a whole general surgery practice, too. I do breast. I don't like breast, but, you know, there are some people that send me all their breast patients. Some of it is a bit of a nuisance, but you know you go ahead and you deal with it. I see patients of any kind in the office, elective hernias and elective gall bladders. I do those in addition to whatever comes in acutely.

Luchette

Well, as you look at the future of trauma and specifically acute care surgery, what do you view are the challenges and the opportunities for acute care surgery?

Ledgerwood

The challenges are going to be the ability to maintain one's operative skills and the challenges are going to be how to determine how one is going to work with, you know, multiple people dealing with the same patient clientele.

When I go out and do site visits, I don't see many people who do things the way I do. I see people who cover for a week at a time and then they're off a week doing something else.

What I enjoy is the rapport with the patients and taking care of patients and seeing them on a regular basis. I sense the attraction to acute care surgery is the work hours more than the patients. That's what I'm afraid of.

Luchette

What do you see are the opportunities for acute care surgery?

Ledgerwood

I think there is a tremendous amount of opportunity. I just did a site visit. There are two general surgeons working there. One guy lives in Chicago and they're doing all of the general surgery. They are taking 25–26 calls a month and paid $2,500 a session. One guy lives in Chicago. He drives up and stays at the hospital three or four days and then goes back to Chicago.

The other guy lives there in Jamesville but, gosh, he can't find anybody to come and work with him and yet he is doing 300–400 cases a year, most of it is acute care surgery.

He only did about 20 trauma operations, but it's a busy place. So I think there is a tremendous opportunity but you have to be willing to work and take care of a lot of patients.

Luchette

What is your prediction for trauma surgery 20 years into the future?

Ledgerwood

My guess would be that someday we're going to see emergency medicine doing all of it, except when we need to go to the operating room or admit the patient.

Luchette

Emergency medicine or hospitalist doing the non-operative care? And that's the only prediction you see for the next 20 years?

Ledgerwood

Yes, I think that's probably going to happen. Hospitals can't afford to pay for this.

Luchette

Well, as you look back on your professional career, is there anything you would have changed?

Ledgerwood

I don't think so. I don't know what it would be. It's been great.

Luchette

How about your life outside the hospital. Is there anything you would do different?

Ledgerwood

I suppose the one thing I would have done, Fred, I would have kept a better diary of these things because someday I could write a pretty good book from the stories some of the patients tell you.

Luchette

What are your future plans both personally and professionally for the next 5–10 years?

Ledgerwood

I'm probably going to keep working. I've got my farm out west where we raise wheat and barley. I get out there four times a year or so and go fishing. There is lots of things to do if I had time to do it. I've got to cook for a party next week. All the residents and students rotated with us for six months come.