Pioneer Perfusionist Interview: Aaron Hill

Mark Kurusz: Well, today is Tuesday, April 14th, 2015. My name is Mark Kurusz. We're in Tampa, Florida at the AmSECT conference, and we're about to interview Aaron Hill, one of the true pioneers in perfusion. Aaron, we've been friends for a long time. We're absolutely delighted that you're here and have consented to tell us a little bit about how you got into perfusion. And we've got a series of questions we're going to go through that have been used before. So, how did you get into perfusion? Because I know you did not start out with any aspirations to be a perfusionist.

Aaron Hill: Oh, no. Well, I was originally a chemist with Eastman Kodak. And then being in the University of Rochester Medical Center area was important. And one of the things that came to me was that I really didn't care if we made a better camera or a better piece of film. And so, I looked at the idea of what would interest me. And my mother was a nurse, and my father had multiple sclerosis. So, I felt being involved in medicine was important. So, I worked over—and previously I had some biomedical experience—I built my own ham radio at 12 years-old. And so, with a biomedical engineering background, I worked with a biomedical engineer, but part of that was a research project involving dogs. So, I was the dog surgeon who isolated a single nerve unit. Anyway, I was in the animal research lab for cardiology. I worked in cardiology at that point, not in cardiac surgery. And it was during that time that I became interested in it. And I always have to tell a story. Initially, we were given a device that they wanted to see how it worked, and this was the forerunner of the balloon pump. It was made by Hamilton Standard. And this was a device that pushed and pulled the blood out. Okay? I was the dog surgeon, so I cannulated the dog. We opened the chest so that they could see the action on the aorta. And then we invited all of the cardiologists up there to have a look at this, along with the Chief of cardiac surgery as well. We started the device up and it was functioning very well. They all gathered in, in close proximity, to see exactly what was going on as this blood was coursing in and out. Now, unfortunately, it was driven by air pressure, which was fairly low, but what happened was there was a valve that failed, and the 1,800-pound tank pressure was ventilated into the aorta. At which point the dog exploded. There was blood everywhere, and everybody in their pretty white coats were all red, and blood was dripping from the ceiling. Anyway, I said, "Boy, this is an interesting area to work in." So, from that point, I actually did a lot more dog surgery work all over the hospital for various groups. And there was an opening that came on the perfusion team. And I had been down in surgical research and had seen it work. And what happened was that the Chief Perfusionist, her name was Bert, was shot and killed, so they were looking for a new Chief. And what they wanted was somebody who was trained outside of the university.

Mark Kurusz: Now, most of the pump team at that point were nurses by background?

Aaron Hill: The entire team were nurses. Yes.

Mark Kurusz: Could we back up just a bit? How did you actually apply for the job at the University of Rochester, Aaron?

Aaron Hill: Which one? The biomedical engineering or…

Mark Kurusz: Yeah. When you left Eastman Kodak, you mentioned that your mother was a nurse, and you obviously had to interview and ended up in cardiology initially, is that right?

Aaron Hill: ... Right. Cardiology, biomedical engineering research, and it was working out of the animal research lab, yes. That's initially how I got there. And then I did cooperative projects with the Department of Surgery down in the dog lab, their surgical dog lab. So, I worked down there, and it was at that point, I was further exposed to the idea of heart surgery. And then I was recruited by the Chief of Cardiac Surgery to come in and be the Chief Perfusionist after some training.

Mark Kurusz: What years are we talking about here?

Aaron Hill: This was approximately 1969 and then 1970, which is when I started with perfusion. At that point I started a perfusion training program of my own, because at that point there were no formal training programs. They were OJT programs at various institutions.

Mark Kurusz: Well, tell us a little bit about how you actually learned how to do perfusion, Aaron.

Aaron Hill: Well, that's interesting. I was concerned about this. I felt I needed to learn from the best. It was fairly obvious there were places that you had to go, which was the Cleveland Clinic, Ohio State University, since it was there. I went as well to Cincinnati Children's because we did pediatrics at the University of Rochester Strong Memorial Hospital. I also went to Dallas, Texas, to Parkland Hospital. I also went to Texas Heart Institute and spent a bunch of time there. And I also went to the University of Alabama, where [Dr.] John Kirklin was practicing and Jarman Baxley [was the Chief Perfusionist]. I contacted all of these people and set up my own itinerary. And where I did the majority of my first hands-on experience was at the Cleveland Clinic.

Mark Kurusz: Who were some of the perfusionists that you interfaced with at those various places? You mentioned Jarman Baxley at the University of Alabama. Who else did you meet, and who stands out as having really maybe influenced you in the finer practice of perfusion, Aaron? Are there any other personalities that stand out as you traveled around the country?

Aaron Hill: Well, it's interesting, of course, and all of these Chiefs at that point, Rose Litturi was the Chief at the Cleveland Clinic and the assistant was John Tabarossi. And I interfaced more with John, but then one of the basic trainers was John Meserko, so I worked with John Meserko. I did my first case with him, which, she was a Persian princess. Cleveland Clinic used to get people from all over the world, and I think they still do, and I was exposed to a lot of

different cases there. Now, at Ohio State University, and this goes to a question that I know is going to come up later on, I interfaced with Jim Dearing.

Mark Kurusz: Wonderful.

Aaron Hill: And it really was good. And, actually, I was a much better dog surgeon than Jim, because that's what I did all the time was as a dog surgeon. So, I actually did a few animal labs with him. And one of the students was a very outgoing, very smart guy, Jeff Riley.

Mark Kurusz: Really?

Aaron Hill: Yes. Ohio State was filled with impressive people. And then I went to Cincinnati Children's, and that was Dave DeForrest, the most complex heart-lung machine I have ever seen in my life. It took hours for them to prepare it, but he could control every facet. It was very interesting. Not something that you could easily duplicate, which was always one of my great philosophies was that I didn't want to be replaced by the janitor. And in this case, there's no way that the janitor is going to replace you in that situation.

Mark Kurusz: At that time, was it non-disposable equipment?

Aaron Hill: No, there was a mixture, a mixture of disposable, non-disposable. We would use the, and for those of you who may have to look this up, the Brown-Harrison heat exchanger.

Mark Kurusz: Yes.

Aaron Hill: And the Sarns torpedo heat exchanger, these are all reusable. But we used a Travenol oxygenator, the Travenol bag, which was attached to a frame. Let's see, and at Texas Heart, they were also using that at that time. Also, the Cooley oxygenator was there, but unfortunately it tipped the pump over because the heat exchangers were supposed to be contact heat exchangers, and that seemed to have troubles. At Texas Heart, I met Charlie Reed and Diane Clark. Absolutely. Yeah, I mean, the profession to me at that time was full of big personality people now. Absolutely big. At Parkland, it was Stan Fennig. And Stan, just an amazing guy. Crockett English, worked for him, who ultimately became an Academy member, and I think at one point a felon. But anyway, that's another story for another time.

Mark Kurusz: Yes. Let's go back to the University of Rochester now. After you did your tour and became a perfusionist, a very skilled perfusionist, tell us some of the challenges that you might have had managing the team. I'd like to know the size of the team and some of the issues, because as the Chief Perfusionist, you were not a nurse by background.

Aaron Hill: Right. And so, we had to hire some. We hired some and trained some because there actually were only three of us. And then we needed more, because they had hired a new pediatric surgeon from the University of Alabama. And with that surgeon, we needed further technology. So, a bit of challenges to have the folks accept some of the new technologies that I

brought to bear in that situation. And we trained two or three other perfusionists there. And a lab technician I met, and I said, this guy's got a BS degree, he was smart, and I said, "Okay, we're going to make you a perfusionist." I asked him if that sounded good to him. And he said yes. So, we trained Jack Lakoff as one of the perfusionists there, as well.

Mark Kurusz: Wonderful. And how long did you stay at the University of Rochester? Because I know later in your career, you moved into the private practice realm.

Aaron Hill: Yes. I was there probably about five years, almost six, and then had an opportunity to go to Fairfax.

Mark Kurusz: That's Fairfax Hospital in Northern Virginia?

Aaron Hill: In northern Virginia. It had a program where the surgeon, unbeknownst to him, that they had brought in, had a brain tumor. Unfortunately, his surgical skills had declined, and the number of hearses exceeded the number of ambulances that were coming to the hospital because of his bad statistics. So, they finally said it's time to move on to a new program. And so, Jeri Dobbs, who I was good friends with, Jeri recommended to [Dr.] Ed Lefrak, and he'd give me a call after hours, and hours and hours of phone calls and conversations and so forth, which I thought he was the richest man in the world. But I didn't know, the university had a WATS line at the time. And we talked for hours and hours about his concept of what he wanted to do, how he wanted to do it, et cetera.

Mark Kurusz: You're talking about discussing perfusion with Dr. Lefrak, is that right?

Aaron Hill: That's correct. And the whole cardiac surgery thing. The idea, his approach to cardiac surgery and perfusion. It's a team event, as you know, and there are many members of the team, and certainly two of the people who really need to be pretty intimately known to each other would be the surgeon and the perfusionist—in this case, Edward Lefrak. And he had written a book on valve surgery. He was trained out in Portland, as I say, with Dr. Albert Starr, the big valve guru at the time. And so, he was very well-trained. He was also trained in Texas by [Dr.] Michael DeBakey.

Mark Kurusz: Really?

Aaron Hill: He was very well-trained at the time.

Mark Kurusz: When Dr. Lefrak moved to Fairfax, it was really a two-man team, you and he, is that right? And tell us a little bit about how the surgical group grew and probably in lockstep with that, you had to increase the perfusion team. Is that right?

Aaron Hill: That's correct. Well, we started out, and I'll never forget this, I said, "Well, how do we determine this?" Because I thought he had great judgment. I said, "Who are we going to operate on?" He says, "Whoever will lay down on the table." I said, "Okay." But what he really

meant was that the first 50 patients had to do absolutely perfectly. Because the other program had failed because of the problem. But we were going to take on all comers, more or less. And so, after that, we just continued on, and the practice grew very rapidly, and it was he and I, and we did the last time I did without having someone else was, I did 350 cases by myself. And…

Mark Kurusz: That's in one year's time?

Aaron Hill: ... In one year's time. Yes.

Mark Kurusz: You were essentially on call every night?

Aaron Hill: Every night, every weekend, didn't matter. If he was in town, I was in town. When we figured out that we had to do this, at this point, I'm now on the American Board [of Cardiovascular Perfusion], and it was a meeting I had to go to, and he said, "We've got this Type 1 dissection." And I'm going, "I'm in Houston, Texas." Which he knew. And he told me, he said, "Well, here's what you do. You just go out and rent a Learjet and come home." I said, "Oh, this sounds wonderful. I've never been on a Learjet." Well, the reality was that in order to scramble a crew for the Learjet, that actually a commercial flight was available even quicker. So, then we figured it's time to have other perfusionists besides myself.

Mark Kurusz: Sure. And you did make it back in time to work on that case?

Aaron Hill: I did, with some assistance in that one of the perfusionists from the Hospital Center came over and set up the heart-lung machine, and one of the CP techs was fairly knowledgeable, helped them. One of the problems I encountered when I got there, when they said, "Well, are we ready to go on bypass?" The circuit was full of air, which was not a good plan. At that point, I was able to clear everything, and we continued on, yes. And the case was successful.

Mark Kurusz: Wonderful. Now, how long did you stay at Fairfax, Aaron?

Aaron Hill: Well, I was there 25 years. I went from 1977 to about 2002.

Mark Kurusz: And where did you go after Fairfax?

Aaron Hill: Well, I went to Norfolk General. We moved down to Williamsburg [Virginia], and I said, well, I first tried my hand at being a wine salesman, working for a wine importer, on the road again, here I am traveling around. Decided that wasn't it. I like perfusion. So, I went to work at Norfolk General, [with] Brenda Colbert, being the Chief [Perfusionist] there at that time. So, I was a staff perfusionist there.

Mark Kurusz: You've mentioned Dr. Lefrak, are there any other surgeons that you've worked with during your career that really stand out as perhaps influencing you in your career, Aaron?

Aaron Hill: Well, I'd have to say obviously Jim DeWeese, the guy who was the Chief of Cardiac [Surgery], who allowed me to set up a program to go through all the training that I did and encouraged me at that time. He was very, very important and critical to me. And then…

Mark Kurusz: Dr. DeWeese was at the University of Rochester?

Aaron Hill: ...University of Rochester Medical Center, yes, and he was Chief of Cardiac, an excellent surgeon. And then of course, Ed Lefrak, who set up the program and really gave me a free hand when I needed it, when I needed help. He was always there as far as help with administration and getting ultimately more people hired, et cetera.

Mark Kurusz: Those were certainly the good old days, weren't they?

Aaron Hill: Well, more or less. Yes, yes, yes.

Mark Kurusz: I'm going to shift gears a bit here, Aaron, as we look back on your career. There's obviously been some technological improvements in how we do perfusion. Is there anything that stands out in terms of innovations that really come to mind at this point, as you take this global view of the last 40 years?

Aaron Hill: Wow. So many things have changed. And certainly, maybe first and foremost to us personally, as perfusionists, was the change from the bubble oxygenator to the membrane oxygenator. Now, that was not without its missteps. I unfortunately have to be of the habit of being on the cutting edge. The cutting edge is unfortunately a situation where you may wind up bleeding yourself. And what would happen. Things like the Landé-Edwards, we used that in a case. I set up double the amount of membrane surface that was needed to do that case. And within a minute-and-a-half of being on [cardiopulmonary] bypass, I had the entire circuit open, and I was getting just wonderful pO2s, about 90, 95. Yeah.

Mark Kurusz: That was scary.

Aaron Hill: Very scary, very scary. Then we used the GE Dual Lung oxygenator, and we had a big flu epidemic, and so we put a lot of young guys and people on bypass to try and salvage them because outlying hospitals just exposed them to 100% oxygen for long periods of time. And their lungs were in terrible trouble. One of the problems with the GE Dual Lung was integrity. We had a few of those blow up, which was not real exciting. The early membranes, which we then went to the flow-through hollow fiber membrane, Terumo, at that time. And that really actually changed things.

Mark Kurusz: Sure. Now the newer membranes, the hollow fiber membranes were quite different, much more easier to use than say the Landé-Edwards. As I recall, because it was a true silicone rubber membrane, one had to rinse it before you put a patient on with a Landé-Edwards. Is that right?

Aaron Hill: That's absolutely correct, because it was loaded with salt.

Mark Kurusz: Oh, boy.

Aaron Hill: And so, you absolutely had to flush everything. It was a very complex procedure. And I'll never forget we had a patient on long-term support with a Landé-Edwards membrane assisting them up in the unit and the surgeon comes to me and he says, "Aaron, you've got to cover up the edge of that membrane." I said, "Why is that?" I looked over, and I said, "Oh my heavens, that says animal unit." And so, in those days, we were using things to do whatever we could do to get by. Yeah. So, what…

Mark Kurusz: You really got into ECMO fairly early, before even the University of Michigan experience popularized ECMO.

Aaron Hill: …Oh yeah. We were using membranes much earlier. We used three or four different membranes, including the SciMed oxygenator. We were in ECMO, and [Dr.] Warren Zapol could be the person who would be credited with that. Jerry Richmond and I went to a meeting in New York City, and Warren Zapol was there presenting his information that this is the greatest thing. Well, I'm not so sure greatest. Because when you really push the numbers, aggressive pulmonary therapy and membrane oxygenators, at that time, it was kind of a push.

Mark Kurusz: Yes.

Aaron Hill: Now, there were some other things that I would…

Mark Kurusz: …Yeah. Tell us about other...You're referring to technological innovation?

Aaron Hill:...Yes. Assist devices. We started early with assist devices. Well, [Dr. Harold] Kletchka, as you know, with the centrifugal pump, that became... We had a long series that we actually published with the use of the centrifugal pump as an assist pump. And we had some of the best data that anyone had. And that was knowing when to stop. That was the key. Whereas other surgeons tend to keep going ad infinitum, which meant that you had myocardial failure. But we published a great series on that. Assist devices. The other thing that's changed remarkably is blood management. I remember with, and you being experienced with a Kirklin surgeon, when we're coming off [cardiopulmonary] bypass, he wanted the left atrial pressure up at the 20s. And I said, "Well, we're going to dilute these patients." Oh no, we'd just add more blood, so we'd have this huge amount of blood left at the end of the case. And one of the anesthesiologists used that to fertilize his roses. He would collect the blood at the end of the case. These days we would not do crazy things like that.

Mark Kurusz: Sure. Shifting gears, a bit again, you've obviously interfaced with industry over the years because our field is really technology-driven, and there's been a lot of innovations that have come from company engineers. Just, in general, what are your thoughts about the cardiopulmonary industry, Aaron?

Aaron Hill: Well, I really had taken advantage of it for research purposes. I love research, and I love development of new products and that sort of thing. So, for me, it was a great opportunity, and by large, they were good to deal with. Now, you always had to figure there was something in back of this that they wanted to look at, but we, in fact, discovered that bronchospasms with nylon parts. And this was [Dr. Dennis] Chenoweth's work. And we actually did blood levels and discovered that that was, in fact, the problem, and the company at the time, Shiley, was able to change those products. And so, they went along with it. I had actually a fairly positive [experience], [but] there was one huge negative, unfortunately, and that was we, as young guns and young Turks, got together and wrote a white paper saying that there are certain levels of things that just absolutely cannot happen. Well, the result was that we got this hue and cry from all of the companies, but the companies had very influential people behind them. And there was some question of whether or not we would all get fired. And there was a huge problem at the time.

Mark Kurusz: And you're referring to the AmSECT white paper. Was that done under the auspices of AmSECT at the time?

Aaron Hill: Actually, I think Charlie was more in...Charlie Reed, who I think was one of the true pioneers, he was actually the guy who was behind that whole white paper. Yes.

Mark Kurusz: Well, you were active on several committees within AmSECT, as well. Can you elaborate on some of your volunteer activities over the years, both within AmSECT, the American Board [of Cardiovascular Perfusion], and the American Academy [of Cardiovascular Perfusion], Aaron?

Aaron Hill: Well, yeah, I spent a lot of time, much to the detriment of my home life. But I was involved with continuing education. That was a big thing for me. And Guy Prater and I actually co-chaired the Continuing Education committees. And that was a very good, very exciting time. It was very good. I was also involved in the Quality Assurance committee, as you know, and that to me was exciting because we're able to make some recommendations to perfusionists to say, "These are things that we recognize that you should do." In that American Board experience, I was involved in setting up the accreditation programs for the schools, for the first schools, before we moved that process over to the AMA. With that, that was very exciting. That was very exciting because this is to get the schools going, and we wanted to formalize the whole process. Now, with the Academy, which I was a charter member for, the American Academy was really looking at scientific papers and did not want to get into politics—so they said, but unfortunately that always drifted into perfusion conversations. Yeah.

Mark Kurusz: Sure.

Aaron Hill: One of my failures in that, looking back at the Quality Committee, was I made a recommendation that we standardize somewhat the perfusion record. Oh, my Lord, that was just awful. I mean, nothing got voted down any more quickly by the membership. I think what that uncovered to me was that we have a lot of different people who wanted to do it a lot of

different ways. And they're very set in what they were doing was the right way to do it. And who am I to tell them, or even suggest to them, that we do things a different way.

Mark Kurusz: Well, as I recall, and I certainly am familiar with that episode, even though the AmSECT Board voted it down, it was published in the journal and could be considered the first perfusion standard. It was just a short one-page example of what should be documented on the perfusion record. Isn't that right?

Aaron Hill: That's true. It did get published, even though the [AmSECT] Board, who was under pressure from its membership to say, "Come on. I mean, you guys can't set these standards like this." So, there were issues, but it was the first published record.

Mark Kurusz: Let's fast forward 20 or 30 years—has there been an evolution in perfusionists' thinking now regarding guidelines and standards? I know that there is a more extensive perfusion document that was generated by the Perfusion Quality committee.

Aaron Hill: Well, yeah, to me, I think that's some real landmark work to help perfusionists standardize, somewhat standardize their practices. Because one of the things is that we've seen is that some of these outliers don't always work. Some of these strange techniques and lack of organization, shall we say, and so the things like a checklist. Now, you would never consider flying a plane without a checklist. Although the parallels with aviation and perfusion get a little bit muddled, but you would never consider flying a plane without a checklist and having various checklists. And there have been many times when the checklist has, I'm sure, saved a potential accident.

Mark Kurusz: Sure. Well, I'd like now to refocus from the broad outline that we've just been discussing and ask you if there are any cases, Aaron, that stand out in your mind as particularly memorable, whether that was a good outcome or a bad outcome, but certainly there are, I think if you probe every perfusionist, there are cases that will never be forgotten. Do any stand out in your mind?

Aaron Hill: Unfortunately, when they stand out in your mind, there was usually a problem of some sort. And sometimes it ends well and sometimes it doesn't. The first one was [redacted]. We operated on [redacted] at the University of Rochester Medical Center, and he had the worst possible disease I have ever seen in my life. It was unbelievable.

Mark Kurusz: Cardiovascular disease?

Aaron Hill: Cardiovascular disease. His arteries were just like potato chips. This man's only 40 years-old, smoking, I don't know, what, three, four packs a day. But he had very bad genes, very bad genes. Anyway, the net result of this case was Dr. DeWeese did some very creative surgery, which I could go on about, but just to say it was just something that was just amazing to me, the surgery he did. Unfortunately, after we came off [cardiopulmonary] bypass, the patient crashed with protamine [administration], and we had to try and go back on. We couldn't get a

balloon pump in because his vessels were so bad. At this point, we moved to the next line of defense, and he said, “Aaron, what can you do?” And I said, “We can put him on a membrane.” And we put him on a GE Dual Lung membrane, and I got him out of the operating room on a GE Dual Lung membrane and went up to the ICU. The first night, believe it or not, I got the flow down to a couple hundred ccs a minute, which is like nothing. Then I’d have to creep back up again. Well, unfortunately we were never able to really wean him from the ECMO setup. And ultimately the family came in and said goodbye. And we turned the machine off.

Mark Kurusz: Terrible, terrible.

Aaron Hill: It was terrible. That was, if you look at it as a standout case, gave me a lot of motivation to say we could do something better with ECMO.

Mark Kurusz: Sure.

Aaron Hill: There was another case at the University of Rochester. I’ll make these quicker—so, they don’t bore you to death. Scott Stewart, our pediatric surgeon was down doing an older PDA, well, not real old, but an older PDA. And repairing a patent ductus sometimes in an older person can be an issue. So, I asked him, I said, “Do you want me to set up the heart-lung [machine]?” “No, no, no. You don't even need to be around.” I said, “Okay.” So, I was up in the dog lab doing something, and I get a page to come down instantly to the operating room. I walk in the operating room, and what I see there, he has a Gott shunt cut in half. And he’s saying, “What can you do with this?” And I said, “Oh, my God.” I had to set up a heart-lung machine. We hooked up to the Gott shunt. He got the PDA repaired. Successful story. And that turned out well. But that was one of the scarier ones. I think probably [my] heart rate probably hit 180 at that point. I mean, it was…

Mark Kurusz: Sure. A case that would stand out in your memory.

Aaron Hill:...One of the other patients, which we published, was one of the largest patients we ever did. And I published, it was a perfusion in a massive patient. This guy was a former linebacker for the New York Giants. He was six-foot-seven, 360 pounds. And he had a lot of muscle. And I said, “Oh boy, this is going be exciting.” It was the first time I ever used a half-inch line as an aortic line. Yeah. It was just absolutely amazing. That was an interesting case. And probably one of the other interesting cases was the fact that we were... And this is with a bubble oxygenator now, a bubble oxygenator at Fairfax, which we started out with the bubble oxygenator at Fairfax. And the patient, we’re off [cardiopulmonary] bypass, protamine is given, everything's looking fine. All of a sudden, the patient starts crashing. Well, Dr. Lefrak says to re-heparinize, so they give the syringe, he injects it. And then I open the clamps to run the venous blood back down and nothing happens. I had to figure out what the hell was going on. And so, what I theorized, and instantly, was that my venous line was clotted, because they had given saline instead of heparin. I ripped the line off, cleared the line, they gave heparin, we went on, and that turned out to be a successful case.

Mark Kurusz: Another great save.

Aaron Hill: Well, yeah, it was way too exciting. And I probably got a little bit luckier than I ever would've been.

Mark Kurusz: Sure. Going back to the ECMO case, you essentially managed that all by yourself. Could you talk a little bit about the aspect of teamwork, again, in a broad sense, Aaron?

Aaron Hill: Sure. Well, first of all, you have to recognize that open-heart surgery, as every perfusionist knows, is a team effort. And the relationship between the surgeon and the perfusionist is critical, but the relationship with anesthesia is critical. The relationship with the nurses. The whole communication structure within the operating room, and outside the operating room, because these days we are using assist devices in the Intensive Care Units. This is a whole team concept. And most people don't really understand that, and they say, "Well, there's a perfusion team." Yes. But the idea is that the construct should be that we have a team, which includes anesthesia, surgery, nursing, along with the perfusionist.

Mark Kurusz: Sure. And as a follow-up to that, as the caseload escalated at Fairfax, you and your team, the entire team, surgery, anesthesia, perfusion, became very, very busy. Tell us what a typical day was like when the schedule was just loaded up. How did you turn over rooms? How did you maintain an espirit de corps?

Aaron Hill: Well, because we knew the turnover was a very important thing, because we had three cases in a day was not unusual. And we'd start first thing in the morning, and, of course, have the pump all set up, ready to go. Patient comes in the room, and I would do and assist for things that I would never do today. I would never do them today, but…

Mark Kurusz: Such as?

Aaron Hill: ... Such as, I would always put the NG tube in. Okay? I got to the point where I was putting the arterial line in. I got to the point where I was putting the Swan-Ganz catheter in. When I put the Swan-Ganz catheter in, I still hold the record at Fairfax from the time the needle touched the skin until the Swan was in wedge position was 45 seconds.

Mark Kurusz: Amazing.

Aaron Hill: Things that I never should have been doing. We finally figured out, and we looked at it and said the liability is just tremendously high, and there's no way that I could get involved in that. Now, to turn over rooms? What I would do is I'd mop the floor. And in order to get the people moving in, turn around, we played some rock music at a very fast pace, things like ABBA and so forth at the time. And those were things that I would do just to help expedite the case.

Mark Kurusz: And on a busy day, you essentially have to go through the entire schedule. And it was certainly probably a rare occasion to finish at 2:00 or 3:00 in the afternoon. How long was a typical day on a busy caseload day at Fairfax? Aaron?

Aaron Hill: Well, for me, for personally, as a perfusionist, now it was longer for the surgeon, because he had to take care of them postoperatively. We did have a PA at that point that would help from 6:00 to 6:00. Twelve-hour days were fairly routine at that point, because you had to get ready, you had to get your set-up, and you had to be ready for the next day. So, you had to have your equipment ready.

Mark Kurusz: Sure. Well, for the last part of this interview, I'd like to... First of all, I want to ask you before we finish, if there's anything that we've not covered? But, as I just mentioned, I'd like to get a little philosophical now and have you reflect on things such as what you consider some of the personal attributes are for a good perfusionist?

Aaron Hill: Well, to me, there's a wide variety of people who will make excellent perfusionists. One of the things that would be is attention to detail. You cannot have a give-up attitude. If there's a problem or an issue, there's got to be an answer. And one of my favorite sayings is that if there are problems with technology, you can solve it with technology. And so, I think that perfusionists have to be a little bit innovative. And when they do that, they have to also look at every possible detail. And they have to be true professionals, true professionals. And what that means is you have to have respect for each other and for the patient obviously. And as the medical edict says, first do no harm. And I think that's one of the things that you focus on, that every case... I mean, an anesthesiologist once told me that his practice day said, "Well, what's anesthesia like to you?" And he says, "Well, it's hours of the mundane filled with moments of terror." And I think perfusion can actually be that way as well. Yeah.

Mark Kurusz: Sure.

Aaron Hill: No question.

Mark Kurusz: Well, we're 46 years and counting, by my estimation, from when you first started, and you're still practicing. This is a really philosophical question, Aaron, but what has it meant to you to have been a perfusionist for so many years? You certainly have exceeded the bell curve for practicing perfusionists, but what has it meant to you personally to have been a perfusionist?

Aaron Hill: Well, to me, one of the reasons I got involved in medicine, generally, was to help people and to have an impact. Now, I can't tell you that I would have the impact of other people, but the idea was that I did have some impact, if nothing more than a gadfly at times, to question what people were doing and to swim upstream. For me, perfusion has been a very satisfying career. Now, I have to understand, at this point, I'm not doing those 12-, 16-hour days. I'm doing part-time perfusion. And so, at this point, I would tell you that, looking back on

it, it has been one of the most fulfilling things that I could have ever possibly done. I never realized it when I started. I mean, that was not the start.

Mark Kurusz: Unlike a lot of private practice perfusionists, and you were in private practice for the majority of your career, you also took an active role in participating professionally at various meetings. I think at one time you were one of the most highly published perfusionists in the country. How did that all come about? Were you driven or suggested to do that by the surgeons? Or is that something of your own initiative?

Aaron Hill: No, and that's interesting you should mention that, because the surgeons, we had a team of, gosh, at one point, six, seven surgeons, and I said, “Well, who do I put on the...” And, of course, I reported to Dr. Lefrak. So, I put everybody on, and there would be four perfusionists. There were ten authors on a paper. Well, it was ridiculous. It was academically cumbersome. So, what we decided was that, if they’re directly involved, that’s what we’d do. See, now in cardiology, unfortunately, my experience was that you would have this incredible research project involving 3,000 patients and one author. One author. Give me a break. I mean, this is just not the way it is. And so, what I found was surgeons were more magnanimous in that. The research I think was good because they saw good outcomes from the research. We changed techniques, we improved what we were doing. Now, that’s what drove me, because I could see that we learned every time that we did a research project, whether it was a good outcome or a bad outcome, we learned something. And that was the whole goal.

Mark Kurusz: Sure. Well, as we come to near the end of our interview, Aaron, I’d like you to talk a little bit about the role of AmSECT as a professional society. And certainly, there are other societies out there, but what has AmSECT meant to you, again, in a broad sense for the profession?

Aaron Hill: Well, AmSECT to me really gave some structure and foundation to the profession. Remember, before AmSECT was really rolling, we weren’t perfusionists, we were pump techs. And there was a lot of negative connotations to the term pump tech. And I always felt that when we became perfusionists, we had moved up a level, and this was something that we were a little more professional. I think AmSECT helped us get there. There’s no question. I think there were a lot of driving people in the profession of whom we’ve named some, not all certainly, Maddie Massengale, obviously, LeRoy Ferries, Jim Dearing. I mean, there are so many people who were involved in the initial phases and really worked very, very hard to come up with this. Now, I think AmSECT set up a mentoring situation, which allowed perfusionists with more experience to interact with perfusionists with less experience. And what is the outcome of this is that hopefully you didn’t wind up making the same mistakes that someone else did. So even when you made a mistake, you absolutely learned something. To me, the mentoring from AmSECT, and I was involved with mentoring some people—I can’t go without mentioning that. Certainly, I mentioned Jeff [Riley], I’m not sure I’d be a mentor, but I was certainly involved at one point with Jeff at Ohio State for a brief time. But Robert Groom, who was a CP tech, and I said, “Let’s see, Bob, you want to be a perfusionist?” I said, “You go to Texas Heart. Because you know as much about physiology as any of them do, but you’ve got to have the cases.” And,

of course, the people who worked for me, Justin Resley, who became a Chief in his own right and then came down to Augusta. Joe Marino from the Cleveland Clinic. Justin Resley, by the way, was a music major. He was involved in the Cleveland Orchestra [and] still is an absolutely wonderful cellist. But you have to be able to see with people that he had all of the ingredients. And as I say, Dave Fitzgerald, who I think is one of the finest perfusionists going. Dave has just really carried on things at Fairfax Hospital and obviously been involved nationally, as he should have been. And I think it is appropriate.

Mark Kurusz: Well, Aaron, this has been a wonderful hour. We're coming up on the 60-minute marker. Are there any other thoughts that you'd like to share with the AmSECT audience? The thought is that we're going to take excerpts from these interviews and perhaps post them on the AmSECT website. Do you have any areas that we did not cover that you would like to say something about?

Aaron Hill: Well, to me, my experiences as a perfusionist, [are] something I'll always treasure. I think the pursuit of excellence is something that we cannot ignore, and there always is a better way to do it. There's always a better way to do it. Now. I don't think we need to get crazy, and I could name a million examples... no, not a million, but I could name many examples where we get a little overboard. So, I think you have to be cautious. And that's why this whole idea of evidence-based perfusion, I think, is a very, very valid point. And what you need to do is look at the evidence. Is the evidence there? There are so many myths that we have exposed over the years, but there are more myths. Because the one thing that I think is... What really amazes me as I learn more, I discover how little I really know. And I'm not joking. I mean, you look at it, you say, "Oh, my gosh, do I really know the basis for all of this that I'm doing?" We're taking a lot on faith. But I think that perfusion can become safer, better for the patient. And our blood management techniques have gone light years, light years. And I think that many of our perfusion practices will get better and better as time goes on.

Mark Kurusz: Well, that's very optimistic and good to hear, Aaron. On a personal note, I just want to put on the record that I've enjoyed a great friendship with you over the years. I think in some instances we may have been in competition, and it probably spurred us both on to notch things up even higher. But we've collaborated on many, many projects together, papers together, and organizing meetings. And I really value that relationship immensely. And I wanted to just let you know that.

Aaron Hill: Oh, well, thank you, Mark. And let me tell you, I would say the competition spurred us on. And it was not unusual to see us on one side or another of a debate, but that was perfect because what we did was push each other, which was good. Our collaborative projects, and I never mentioned the whole PREF foundation stuff, which I think was totally your idea. I mean, I climbed on board, but you had the train running down the tracks. And it was a great, great, great effort.

Mark Kurusz: Well, thank you Aaron. One last chance, is there anything else you'd like to get on the record? No pressure here. But this has been a wonderful conversation. You've given so much to the field and we're just thrilled now to have it on the record and videotaped.

Aaron Hill: Oh, well, as long as you don't quote me too much. But no, I'm just kidding. I really feel that the future looks very bright. Unfortunately, we're going to go through a shortfall of perfusionists, because there's those like yourself and myself who are not going to be involved clinically soon. And when that is the case, there's got to be other people to fill our places. And so, we're looking for the young people to stand up and to get involved. I think that's the real key. The real key is to be involved in your profession. If you really believe that what you're doing is right, then you have to get involved in your profession. And I don't care what organization it is, it's just the idea of putting forth that effort.

Mark Kurusz: Well said. Well, thank you again, Aaron, this has been terrific. We want to thank you on behalf of AmSECT and on behalf of the whole profession for all that you've given over the years. Thank you.

Aaron Hill: Thank you. Thank you very much, Mark.