



American Society of  
**Anesthesiologists™**

Central Line

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VOICE OVER:

Welcome to ASA's Central Line, the official podcast series of the American Society of Anesthesiologists, edited by Dr. Adam Striker.

DR. ADAM STRIKER:

Welcome back to Central Line. I'm Dr. Adam Striker, your host and editor. Today, Doctors Charles Emala and Vivianne Tawfik from the Anesthesia Research Council have joined me to talk about the anesthesia physician scientist pipeline and the steps the specialty can take to support those physician scientists today and in the future. So Dr. Emala and Dr. Tawfik, welcome to the show.

DR. CHARLES EMALA:

Thank you, Dr. Striker.

DR. VIVIANNE TAWFIK:

Thank you. I'm glad to be here.

DR. STRIKER:

Well, Dr. Emala, let's start with you on this first question. Why don't you tell our listeners a little bit about the Anesthesia Research Council, its origins, purpose, direction, etcetera?

DR. EMALA:

Sure. The origin of the Anesthesia Research Council really began back in 2016 with a conversation among academic leaders of some of our academic foundations, such as FAIR, the IARS and the AUA, in concert with the ASA in seeking to create a unified voice for speaking to issues that are relevant to academic anesthesiology. And this matured in 2019 with the Anesthesia Research Council charter being formally

established, really using a model of the National Research Council for its formulation. These organizations, along with several others, such as the early stage Anesthesia Scholars, the Fair Academy of Research Mentors, the Society of Academic Associations of Anesthesiology and Perioperative Medicine really sought to be a unified voice to speak to the NIH, clinicians, Congress, the FDA, patient students, healthcare executives, and related stakeholders about issues that are relevant to academic anesthesiology. The mission has been really to advance scientific discovery and health care policy through the development and dissemination of research in anesthesiology, perioperative medicine and pain. And the vision is for the Anesthesia Research Council to be the go to resource for state of the art reviews, synthesis and future recommendations in anesthesiology, perioperative medicine, critical care medicine and pain research.

DR. STRIKER:

And I understand that as a result of this collaboration, you've released a white paper addressing the the anesthesiology physician scientist pipeline, which includes recommendations for growth. Dr. Tawfik, why this topic specifically? And let's talk a little bit along with that about what the risk is for the patients, departments, etc., and the broader research community for failing to support physician scientist maturation.

DR. TAWFIK:

Yeah, absolutely. I mean, this is a topic I think near and dear to the hearts of many of us who are on the ARC steering committee and the working group. And the reason is really that we know that research is integral to the practice of clinical medicine, and we really do most of what we do based on somebody having either done a clinical trial or even a basic science experiment to figure out the mechanism and the efficacy or the success of those types of approaches that we use for patient care. And so we're really we're identifying the stature of our specialty by the discoveries and innovations that we're bringing to improve health care. And so I'd say, you know, with that in mind, you know, the easiest example in anesthesiology is, you know, improvements in patient safety and perioperative care. And so the risk to the patients, I think, are clear if we're not continuing to sort of be at the forefront of research and having physician scientists in our pipeline, in our specialty, I think patient care is diminished. I think departments lose stature when we're not the ones at the cutting edge of the science. And I think, as you know, as physicians, we're also missing out because we want to be part of that. We want to be part of the group that is really making discoveries and bringing, you know, important basic and translational and data science to the bedside so that it improves the care of our patients.

DR. STRIKER:

Dr. Emala, you evaluated the research pipeline to better understand the shortage of of the anesthesia physician scientists and compared to other medical specialties. Do you mind talking a little bit more about the scope of the problem and what you've learned within this research?

DR. EMALA:

Sure. We relied on data that we obtained from the Association of American Medical Colleges and the National Residency Matching Program, which allowed us to track research oriented medical students choices of medical specialties over an 11 year period. And we evaluated both the absolute number of research oriented medical students entering 11 different medical specialties. And we also adjusted these numbers for the relative sizes of these different medical specialties. We defined research oriented medical students as those medical students holding a master's or PhD degree in addition to their MD degree or those students with three or more publications prior to residency training. And what we learned is we largely confirmed what has been a long recognized deficiency in anesthesiology, and that research oriented medical students tended to choose other specialties such as pathology, neurology, psychiatry and internal medicine, with a higher frequency than choosing anesthesiology.

DR. STRIKER:

Why do you think that is?

DR. EMALA:

Well, largely because of lack of visibility of anesthesiology and research within anesthesiology to medical students. Less than 50% of medical schools have a required exposure to clinical anesthesiology, let alone any exposure to the research opportunities. So I think one of our recommendations we'll talk about a little bit later and it is germane part of the white paper that we developed is recommendations really to open the eyes of research oriented medical students to the wide diversity of research opportunities within anesthesiology.

DR. STRIKER:

Well Dr. Tawfik, did you get a sense of factors that are associated with the successful launch of physician scientists, or conversely, to identify factors associated with a failure to facilitate early interest?

DR. TAWFIK:

Yeah. So as Dr. Emala mentioned, we had the ACGME survey data and we also sent out surveys to understand better some factors associated with physician scientist success from chairs as well as program directors or directors of National Institute of General Medical Sciences T32 programs, of which there are 16 in the country within anesthesiology departments. And from that survey, I think what became clear is really time is really important in successful launch. And so a lot of the chairs responded that, you know, they give time for unfunded projects to allow physician scientist anesthesiologists time to get data to become funded and then supporting the time once projects are funded with with that academic time so that the researchers can actually get the work done that they're funded to do. And then the other thing was money. I mean, maybe it's obvious, but the majority of chairs said that they do not reduce physician scientist salaries. And I think this is really important because, you know, these are faculty who have now trained for, you know, maybe an additional eight years. A lot of them having done graduate degrees, either master's or PhD level and then postdoctoral degrees after in addition to their anesthesiology physician training. And so having chairs or departments who are supporting them at the same salary as a faculty member who is fully clinical makes a big difference and actually also encourages a diverse group of physician scientists to stay with the science and continue to do research. And we will talk more about diversity. But that was another thing that came up. So that's really important. And then the other factor I'll mention I think is extremely important is mentorship. And we really saw that throughout our survey that having a strong mentor is really important for being able to launch successfully.

DR. STRIKER:

I do want to talk about diversity in just a second, but just to follow up briefly, what was the percentage of department chairs that did not reduce salary for physician scientists?

DR. TAWFIK:

So 72 of the department chairs who responded said that they do not reduce physician scientist salaries. And that was out of a group of 102 chairs. We got 74 who responded. So it's a pretty good number. I mean, it's a large number of our academic departments.

DR. STRIKER:

Yeah. Didn't the survey also look at uncompensated time as well? How many department chairs allowed for uncompensated time to do research for physician scientists?

DR. TAWFIK:

So I think it's sort of, quote, easy to give time to physician scientists who have large grants. Well, it takes time and data to get a large grant. And so we also had a number, 54% of chairs said that they gave protected research time even to those who have yet to get their first research grant. And so that's really important in terms of successful launch is getting that protected time to be able to put in the time to be able to get the data, to be able to write the grant, to then get your protected time that comes with the grant funded grant.

DR. STRIKER:

Right? Yeah. Thanks. Well, let's turn to diversity, Dr. Emala. It's a recurring topic on this show, diversity from different aspects involving health care. Did you learn anything about how to ensure diversity within this physician scientist pipeline?

DR. EMALA:

Yeah, in fact, diversity was one of the four study charges given to our working group by the steering committee. And with the use of the data from the AAMC and the National Resident matching program, we were able to analyze the diversity within the research oriented medical students entering various specialties. And that data allowed us to look at both the sex of the entering residents as well as those who self-identified as underrepresented minorities. Not surprisingly, we illustrated a remarkable dearth of these individuals entering anesthesiology. However, the disparities were not limited to anesthesiology. It really permeated all of clinical medicine. To illustrate just how limited the number of underrepresented individuals entering anesthesiology, I'd like to share a single data point that in 2019, nationally there were only five individuals entering anesthesiology that were urms holding PhD degrees. So I think this highlights how few candidates there are and how much work there is to do in the earlier phases of the pipeline of physician scientists to enrich this population and address this deficiency in diversity.

DR. STRIKER:

Yeah, absolutely. And Dr. Tawfik, you did collect data from AAMC. Did anything stand out as it compared to the different anesthesia departments? Or anything interesting as compared to the rest of the AMC data?

DR. TAWFIK:

Yeah. So as I mentioned, we had the AMC data, which were we pulled out the anesthesiology data from that data set. And then we also had these sort of two primary surveys, one to the chairs and one to the T32 and program directors. And so some of the questions were different. The AMC, we couldn't ask any questions. It was, you know, we got what we got. So there was a lot of demographic data and numbers in terms of entrance into the program, into residencies in general. When the other two surveys, you know, we talked a bit more about the chairs, but speaking about the program directors and T32 program directors, you know, it was interesting. We ended up seeing, you know, I'd say a broad range of approaches to anesthesiology research in different departments. And maybe that's obvious just because there's a sort of a wide variety of of funding mechanisms and time for research at different institutions. And that's sort of what we pulled out. So, for example, you know, we saw that some programs had more than 75% of their research trainees were still conducting mostly research two years later. But then we saw some programs where very few trainees who were in research tracks were still conducting research two years later. So it seems like there wasn't sort of a one size fits all in terms of approach to adding research to residency or faculty level positions. And there also wasn't sort of one single outcome that defined any of the programs, I'd say, except possibly that there are just fewer women and fewer underrepresented minorities in these physician scientist research tracks, which I think the data also spoke to.

DR. STRIKER:

Okay. Well, want to ask you both about the recommendations that you're advancing. So if you don't mind, stay with us through a short patient safety break. We'll be right back.

(SOUNDBITE OF MUSIC)

DR. ALEX ARRIAGA:

Hi, this is Dr. Alex Arriaga with the ASA Patient Safety Editorial Board. Perioperative communication is just as vital to safety as it would be in air traffic control, nuclear power plants, or other high stakes environments. These types of organizations incorporate

safety principles into their daily practice and leverage checklists, protocols, and other processes to ensure a systematic approach to safety. Effective perioperative communication is an exchange of information between individuals with the goal of mutually understanding the current situation and the plan for future actions. The complexity of health care systems creates the potential for communication breakdowns that can lead to preventable patient harm. Adherence to best practices in communication can help all members of the health care system share the same goals, thus focusing on coordinated patient care. A reliable organization supports, values and rewards a spirit of teamwork and collaborative communication.

VOICE OVER:

For more information on patient safety, visit [asahq.org/patientsafet22](http://asahq.org/patientsafet22).

DR. STRIKER:

Well, Dr. Emala, you already alluded to the recommendations that you're putting forth for residents and fellows to strengthen their training in research and scientific methodology. What should we know about that?

DR. EMALA:

Yeah. So we saw the recommendations as really the most critical part of our undertaking, and we included a large number of actionable items in our publication that were really largely targeted towards anesthesiology, academic societies and chairs of anesthesiology departments. An area that we felt the specialty has historically done very poorly in was being visible to medical students and illustrating the vast array of research areas available within the specialty. We felt that many medical students have limited exposure to the clinical specialty of anesthesiology and the academic side is even more hidden. A central recommendation was that the specialty must be present and active at national gatherings of MD/PHD students, such as the annual meeting of PhD students in Colorado and the annual meeting of the American Physician Scientists Association in Chicago. Visibility of academic anesthesiology to up and coming research oriented medical students was really seen as one of the priorities for the pipeline in these recommendations. A second area of strategic recommendations was for academic societies within the specialties such as the AUA, to really facilitate annual workshops for departmental chairs and vice chairs with approaches and strategies to allow them to strengthen and expand their own departmental programs and support for the training and retention of early career physician scientists in each. Individual anesthesiology department.

DR. STRIKER:

Okay. Well, what recommendations are there for those who want to incorporate research into their clinical careers?

DR. EMALA:

I think the recommendations at the resident fellow level Dr. Tawfik alluded to earlier is largely driven by identifying those departments that have an established research track but also have passionate and successful mentors. I think all of us who have been in any sort of research realized that the mentors that we've been fortunate enough to inspire us have as much to do with any sort of motivation and success as any research topic per se. So I think the recommendations really to medical students who are seeking research track pathways in anesthesiology is to really look very closely at the success rate of various departments and mentors.

DR. STRIKER:

Well, I do want to start broadening out the discussion just a little bit. And Dr. Tawfik, when you take a bird's eye view of the specialty of anesthesiology, the people that gravitate toward it are strongly interested in clinical work. They might have aptitude for clinical work. It is a specialty that does have a lot of that clinical, you know, really frontline patient care aspects to it. How much of that is probably leading to maybe an issues with the specialty attracting physician scientists?

DR. TAWFIK:

I think like to me that is what makes it so attractive for research. I mean, literally every anesthetic is an end of one experiment, right? I mean, you're there pushing the neo or the epi and you're watching the blood pressure change and, you know, you're essentially generating data through every clinical encounter that you have. And so I think the key is that, you know, not everyone needs to step away from clinical care 100% to be a successful physician scientist. There are ways to do research and advance science by either participating in team science, which is huge right now. You know, data science, which really involves taking those data from the OR and understanding them in sort of a 30,000 foot view and being able to predict, you know, hypertension in advance or perioperative stroke in advance or whatever it is. So I think, you know, that actually makes us all sort of have we have this curiosity, I think, innately as anesthesiologists of like, yes, we're hands on, but also like that hands on nature is a lot of science. So I think it's just that somehow and I think Dr. Emala mentioned anesthesiology is not a required rotation at most medical schools. And so a lot of



medical students are just not exposed to anesthesiology early on. So I think like once people try it, they're like, well, actually this is really fascinating. And the other thing is that there's such a breadth of what anesthesiology encompasses that really, you know, I always give the example, you know, somebody studying like kidney failure in the ICU is doing anesthesia research. And me and my basic science pain mechanisms lab, I'm doing anesthesia research. So I think, you know, the breadth of our specialty is really attractive. And I think maybe that, you know, that hands on nature is, you know, maybe a pull. But also, we just have to kind of step back and say, well, actually, that allows us to generate our own data. We don't even need to rely on anyone else. We can kind of do it ourselves, but people don't necessarily think like that. And also, I think the gradations of physician scientist involvement, it doesn't have to be sort of all or none. People can participate in research without being necessarily on an NIH grant, for example.

DR. STRIKER:

You know, the reason I was thinking about that was I think Dr. Emala mentioned this right off the top about the specialties that medical students gravitated to that had the penchant for medical science. Based on what Dr. Tawfik was just saying, is it something that if we can just message that somehow to the medical students, we think we have a great selling point about our specialty, or is there something inherent with these other fields that are going to always attract more physician scientists?

DR. EMALA:

Yeah, I think it comes back to exposure to what what medical students are exposed to during medical school and and the researchers they see during that exposure to medical school. And I want to echo what Dr. Tawfik mentioned about sort of the action at the bedside really being an inspiration for understanding why this is working or what drug might be better, or the pharmacology. And it's kind of a cliché in our specialty about choosing it for physiology and pharmacology, but there's a lot of reality to that. I think we're all fascinated as anesthesiologists with the physiology that we manipulate, that we control with pharmacology and that I think that really lends itself to the mind that's that's full of seeking new knowledge. So I think it opens itself to a myriad of questions and stimulated research directions to take.

DR. TAWFIK:

Anesthesiologists exist everywhere, right from the surgery center to the academic tertiary care hospitals. We do need a large clinical workforce and so there's certainly room for all of all of those. You know, the people who want to be 100% clinical all the

way to those who want to be 100% research. You know, one thing I think that was really interesting to both Dr. Emala and I was that there is some negativity and bias against our specialty as really a legitimate academic field. And this is coming from MSTP, which is like MD/PhD program directors, you know? So if an MD PhD student says, Oh, I'm considering anesthesiology as a specialty, we've heard from students that program directors, you know, straight up say, well, there are no physician scientists in anesthesiology. Like, why would you go into that specialty. Go into path like all the rest of us, you know, sort of thing. And so it is something that we do need to do is communicate, change the messaging, and be present and show up at some of these like MSTP heavy conferences. Like there's the Colorado MD PhD conference every year that the two of us were at last summer. So just being present, being out there and showing them that, no, we do exist. This is a great specialty for physician scientists and not just to the students, but also meeting the program directors of these programs so that they know how great it is to recommend this specialty to students who are interested.

DR. STRIKER:

Wonderful. It sounds like some really solid work that needs to be done. I continue to encourage more students down this path. Or more clinicians that have an interest in research. Dr. Emala, turning back to the the study, were their findings that worried you or conversely gave you hope, what were some of the unexpected takeaways that you found?

DR. EMALA:

Yeah. So I guess there were two points that raised concern, but then a super bright light that we discovered as well. I think the findings that worried me the most was that the percentage of research oriented medical students choosing anesthesiology really hasn't changed over the 11 year period that we surveyed, and I think historically likely goes back several more decades as the specialty has been concerned about this problem for a long time. And I was I was really totally astounded by the small numbers of underrepresented individuals entering research tracks in general, let alone anesthesiology. I knew the numbers were small, but to see those actual raw numbers was concerning. However, we discovered some very exciting findings. Really since 2015 when we looked at NIH funding to anesthesiology departments and to the awarding of K awards to young physician scientists in anesthesiology, since 2015, we saw about a 70% increase in both of these metrics. I was astounded to see that, delighted to see that. It's a trend that's continued into 2023. So this dramatic and sustained uptick that was apparent in the NIH funding data from 2015 onward is really a great prediction of the future and suggests that we're really in an ideal time period to

harness this increased interest and growth to further spurn growth in academic anesthesiology.

DR. STRIKER:

Wonderful. Well, Dr. Tawfik, what do you feel those of us out there that may not be engaging in research very often want to support this endeavor? You know, it may not be the researcher per se, but, boy, I certainly believe in this. And I want to encourage more students and other faculty to get involved in research. What can I do if I'm not a department chair?

DR. TAWFIK:

I mean, I think it's a lot just like I said, about keeping up the standard in the specialty that is an excitement about inquiry. So it doesn't need to be that you're the one doing the research. But, you know, if you have a trainee with you in the OR one day and you're like, Oh, there was this great study that just came out in ANA and they showed that this approach was different or did better, patients did better with this approach. And, you know, just starting conversations about topics that are relevant to patient care or mentioning it to students or even just like talking to them about like, well, what can we do differently here? And what do you think the basis is of that that drug? So I think a lot of the conversations that we have day to day with our trainees are really important. And if they see that faculty are talking about science or talking about research, are using guidelines to guide their practice, that in and of itself just sort of creates a really positive environment towards research and sort of highlights the importance of that work in the specialty. You know, I mentioned data science earlier and I think this is a real area of growth for our specialty because, you know, there are all these large databases now like mpog. And, you know, we're looking at outcomes of thousands of anesthesiologists doing somewhat similar anesthetics and what are the outcomes for our patients. And so departments starting to incorporate those types of data in their in their practice, then each individual anesthesiologist looking to improve their practice using data science. I think you don't have to be necessarily the one driving it forward, but that type of interest in process improvement QI based on data studies, guidelines. I think all of that just sort of raises the stature of the specialty, you know, and again, it really separates us and saying this is like a rigorous, scientifically driven specialty that, you know, is really pushing the envelope in terms of patient safety and care.

DR. STRIKER:

Yeah. And, you know, it's one of those things where I think it's real easy for someone outside of the field to look at the specialty of anesthesiology and think that it's pretty

straightforward. Assume that there's not much left to investigate. A lot of the efforts should be more at throughput and getting surgeries done. But whether it's administrators or other physicians or patients or the public or policymakers, whatever, you say it does underscore that this is a very highly technical, well researched field of medicine and needs to be nurtured accordingly.

Well, for the last question I'd like to ask both of you, this project was years in the making. What did you both personally get out of this? Dr. Emala, let's start with you.

DR. EMALA:

Yeah, well, personally, it was really an honor to work with like-minded academic anesthesiologists from around the country who served with our working group and were guided by the steering committee. And this group of individuals really has a passion for advancing the academic side of our specialty. I mean, our working group consisted of some of the most successful academic chairs in our specialty. And the experience really further motivated me personally to want to be an ongoing part of implementing the recommendations that our committee came forth with, particularly for me, the outreach of visibility to our specialty, to research oriented medical students pursuing Md-phd degrees. So for as many future years as they'll allow me, I intend to be at the Mstp Conference and the American Physician Scientists Association meetings where these up and coming medical students are making choices about specialties.

DR. STRIKER:

And Dr. topic.

DR. TAWFIK:

I mean would echo what Dr. Emala said. It was wonderful to have the opportunity to work with so many anesthesiologists, physician scientists and really feel like, you know, we could put our heads together and think about how to improve the pipeline because ultimately that's what it really is, is we want the specialty to thrive and we want to continue to attract bright young physician scientists to continue to do this really important work and elevate the specialty. So I think that was great.

The other thing that was really important was the issues and the difficulties are similar across institutions and thinking about how my own institution, we could structure things differently to try to really take away some of the pain points for trainees. There are so many different pressures now, the hospital level trying to keep the hours running. As you mentioned, throughput, it's really a different landscape. And so trying to figure out

how we can support individuals within that changing clinical world is really important. And so hearing about that through the surveys of the chairs and the program directors and then also just at the table as we were discussing these ideas, I think brings up that there are some institution, but also specialty level things that we need to think about in order to keep the pipeline nice and strong. So but it was just a pleasure working on this project.

DR. STRIKER:

Well, excellent. Well, thank you both for joining me. Very interesting conversation and certainly a topic that we probably don't spend nearly as much time as we should discussing. Thank you.

DR. TAWFIK:

Thanks for hosting. This is great.

DR. STRIKER:

And where can our listeners find the whitepaper if they're interested in reading more about it?

DR. EMALA:

So the whitepaper has been accepted for publication in Anesthesia and Analgesia and should be out early this spring.

(SOUNDBITE OF MUSIC)

DR. STRIKER:

All right. Fantastic. And if you do want to learn more about the Anesthesia Research Council, check out the website at [arc-anesthesia.org](http://arc-anesthesia.org). Thanks again for joining me. And to our listeners thank you for joining us on this episode of Central Line. Please tell a colleague about the podcast. Feel free to leave a review or some suggestions on your favorite podcast platform. We will talk again soon. Take care.

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