

Discussion

Presenter: Dr Lauren Barron



Dr Mara Antonoff (*Houston, Tex*). As experts in cardiothoracic physiology and pathophysiology, this topic is highly relevant to all of our practices. As educators, these issues highlight important considerations in our trainee learning environment as well as our culture of wellness. As you described,

you evaluated 7 trainees using a broad range of metrics, correlating physiologic data, burnout survey results, and milestone-based performance data. I have to say that this topic, as I mentioned to you, struck a personal note for me because it gave me the opportunity to recall that when I was a trainee in the institution from which these data were derived, during morning rounds one day, I actually went into really rapid supraventricular tachycardia and had to be treated for it. So, of course, I was curious to see your results and how that might have applied. In the study of your current trainees, you found that high levels of emotional exhaustion and depersonalization were common, although I did note in your presentation and in your article that 5 of the 7 study subjects were women, and most of them had kids, while the study was conducted in a peri-pandemic period. I suspect that there are a lot of contributing factors for the findings, potentially not all related to the fact that they were going through different aspects of their training. I was surprised to see that there's no significant relationship between gender and number of children, amount of sleep, or training track with the measurements of burnout. I think, as we've discussed, the small sample size can certainly be a limitation. Regardless, you suggested that dynamic measurements of HRV can serve as an objective measure and important surrogate for burnout in cardiothoracic surgical fellows. Although we might not have reached statistical significance on some of those other aspects that you've discussed, this proof-of-concept project is valuable, touching on a prevalent problem in our work environment.

As you highlight in your presentation, emotional exhaustion, depersonalization, and other symptoms of burnout have been shown to impact the majority of trainees in almost half of the practicing surgeons in our specialty. It's associated with negative health consequences and potential detriments to physical and emotional well-being. Burnout impacts our colleagues, our friends, ourselves, and the patients whom we all aim to serve. We are living in a modern and technology-rooted world that allows us to keep track of our sleep-wake cycles, our HRV, our steps, our body composition, and so much more. Our watches now are essentially Holter monitors. This study does a great job setting a foundation for suggestions that we may use such novel sources of data to get clarity on what's going on with our trainees and the

members of our workforce. The current study may be limited, again, by sample size, but it really does set the stage where we might be able to conduct future studies looking at different objective variables and understanding our responses to the day-to-day stresses that we encounter at work. As a specialty, we're understanding more and more about how important it is to consider wellness. As we contemplate strategies to improve trainee wellness, one thought is that perhaps we should be more focused on HRV than 80 hours per week. Maybe we should care more about emotional exhaustion than 1 day off in 28. There are certainly different ways to think about it. I do have a few questions for you. You talked about how we can use these results to optimize performance for our trainees. Do you have any thoughts about how we can also use data generated from this type of novel technology to guide resident wellness initiatives?



Dr Lauren Barron (*St Louis, Mo*). I think the first step will be establishing what a normative value looks like in our population. From there, we will have to consider the many different metrics of performance in a trainee. Training requires developing both our technical and professional skill sets,

as well as teaching us how to recover from high stress demands so that we can take on the next set of challenges. Otherwise, we will get to the attending level, experience stress at an intensity different from our previous experience, and fail to progress. We have to continue to make progress. I think having the ability to monitor real time gives us the capability to take a trainee who may be flagging in one aspect, but has significant potential for progress in another and redirect their training focus. In doing this, we essentially cross-train them. When you've worn someone out technically, maybe you flip them over and challenge them with a leadership position. In that way, I think you're right. Maybe 80 hours a week or 1 in 7 is not the right way to train somebody who's supposed to be a dynamic performer.

Dr Antonoff. That's a great idea, and I'm looking forward to see what you're going to be doing with all of these metrics going forward. Surprisingly, I think to many of us, you showed increased emotional exhaustion that significantly correlated with higher resident performance scores. I'm wondering to what you attribute those findings—and which do you think is the chicken, and which is the egg?

Dr Barron. I think we are similar to professional athletes with our performance response to stress. In a professional athlete, training programs are actually designed to over-train, reach a max, then recover and start again because the next time they reach their maximum, it's going to be higher. I think that is how we should be looking at training. Although the word burnout implies that a person is no longer capable of doing their job well, our data show that

this is not true in thoracic surgery residents. It may be true in other types of physicians, but in this cohort, and likely in the attendings, it's not the case.

Dr Antonoff. I suspect there are a lot of potential confounders. What do you think the impact might be about from people who potentially work out a lot or people who are on different medications, or those who have thyroid disorders, are pregnant, or are breastfeeding? How do you think those contribute? Do you think any of those characteristics could have masked or overstated any of your findings?

Dr Barron. I absolutely think that not knowing gives us the potential for masking or overstating the findings. I think a large cohort is necessary for us to be able to start drilling down on the active issues allowing us to individualize our wellness plans. Once we have the data to show what happens in trainees with uncommon circumstances, for example, trainees who are breastfeeding, it's going to be easier for us to help support them.

Dr Antonoff. Terrific. Thank you so much.

Dr Marc Moon (*Houston, Tex*). Thank you, Dr Antonoff, for a very insightful discussion. Can we ask Dr Goldstone to also discuss this article?



Dr Andrew Goldstone (*New York, NY*). A great presentation, really provocative and goes along with the theme of the meeting. Trying to do new things is really interesting. Your parallel of surgical training to athletic training, I think, is not unique. I think it's very tough training. It's tough outside of training, I can tell you that. As a first-year attending, it's stressful. Anyway, from my understanding, HRV varies substantially between individuals. So, from athletic training, they've learned that HRV can't really be compared between individuals but really is used more as a change from baseline or within-person metric. This study, although prospective, is effectively cross-sectional in design. So, what is your next step, and what's your next study for this?

Dr Barron. That is an excellent question, and yes to that observation. We designed the study prospectively, but when we got our data from the subject-driven methods, it looked more like cross-sectional data with many data points. We decided to proceed based on the findings from the Dresden Burnout Study. This group also applied HRV in a similar manner in a much larger population and were able to show that there's something there. In the next study, like you mentioned, we plan to have repeated measures on

each subject. After all, that's the next step in being able to target an intervention and measure its effectiveness. Because with the data we have right now, targeting an intervention is still just an idea.

Dr Goldstone. Excellent. It was surprising to me that only emotional exhaustion correlated with resident performance but not the other components for assessing burnout. Why do you think that's the case? Is the definition of burnout not significant enough, or?

Dr Barron. I think this happens because the definition of burnout is nebulous. We're really looking at the response of many contributing factors, and we're measuring one, then calling it burnout. It's a bit like saying someone has hypertension and not knowing why they have hypertension. We have a plethora of drugs that allow us to target different causes of hypertension. If you give someone a drug that does not target the etiology of their hypertension, it's ineffective. I think in that way, burnout has 3 dimensions, and sometimes the potential target that we're aiming for is the wrong one for an individual.

Dr Goldstone. Approximately 90% of the trainees were burned out by definition, 86%, but all of them performed well. I think their normalized scores were over 1. From my understanding, they're overperforming, right? So, WashU just beating down the residents well enough, putting them into supraventricular tachycardia or whatever? And is that helpful? Or is burnout just not a good metric here? Maybe you should just see if HRV or other metrics are just correlated straight to performance and get rid of the burnout assessment.

Dr Barron. Those 2 observations may be correct, but I suspect what we're seeing is only the first half of a performance curve because the data were not collected. There are not enough data to show the other half of the performance curve. The next step for us is to look at our entire general surgery population's ACGME milestones and MBI to try and define that performance curve. Either we're going to get to the top of it and see that we actually do peak and then fall off or it's just going to keep going up, and we have to figure out at what point do we stop and that the milestones are not measuring critical aspects of what it means to be both well trained and human.

Dr Goldstone. Congratulations on the article for everyone. It's available for publication today, right?

Dr Barron. *JTCVS Open*.

Dr Moon. Right. So please join me in thanking Drs Barron, Antonoff, and Goldstone for this innovative work and the creative variability in your discussion.