

COVID and Exercise: Pearls from the Experts

Announcer: Welcome to the Mayo Clinic cardiovascular continuing medical education podcast. Join us each week to discuss the most pressing topics in cardiology and gain valuable insights that can be directly applied to your practice.

Dr. Kopecky: Hello, I'm [Stephen L. Kopecky, M.D.](#), a preventive cardiologist at Mayo Clinic. It's a great pleasure today to be speaking with [Thomas G. Allison, Ph.D., M.P.H.](#), who has run our exercise lab and our O₂ consumption stress test lab for years. And we'll talk today about COVID and exercise. So Tom, there's a lot of issues about this when we're doing exercise tests on patients and aerosolizing procedures. Can you just explain to us simply, what is an aerosolizing procedure and what makes aerosol?

Dr. Allison: Yeah. So, aerosolizing procedure, or we call them AGP — aerosol generating procedures. So these are medical procedures in which the patient has some significant and strong ventilation like, that produces coughing, for example. And as a result of that coughing or otherwise high level of ventilation, aerosols, which are of the size that might potentially carry virus, are then spit out into the environment.

Dr. Kopecky: I see. So there's a real concern about this, obviously.

Dr. Allison: Yes. There's a real concern. You're doing a procedure extubation and the patient's coughing into your face. And of course, if that procedure, if that patient is positive then you're receiving, you're getting viruses being forced into your mucus membranes.

Dr. Kopecky: So what if you're just doing an exercise procedure on the treadmill?

Dr. Allison: Well, you know, treadmill was not, exercise tests was not studied, so it wasn't on the list. And that moved us to set up a research lab out at the hospital and we begin to measure aerosol generation during exercise. We have a couple papers that are currently in review at one of the medical journals. And we see that actually exercise produces a lot of aerosols, but mostly at the higher levels of exercise. So when you're exercising above your anaerobic threshold and pushing toward max exercise, you're generating quite a few aerosols.

Dr. Kopecky: So are you doing in your lab exercise tests with masks on the patient?

Dr. Allison: Well, we do two kinds of exercise tests. Of course, when we do cardiopulmonary exercise tests, as you had mentioned earlier, and we're measuring oxygen consumption, the patient is wearing a mask, a special mask during that procedure. But in order to measure the patient's ventilation, we have to actually allow the patient to ventilate. So in essence, they're wearing a mask, but the mask has an opening to the outside world. And to protect the people doing the test, we have placed special devices in the labs. They're called recirculators. And they're basically big fans with HEPA filters that suck in the air that the subject expires and clean all the aerosols out of it.

Dr. Kopecky: So if the patient has a mask on, so they're not aerosolizing forward, do they aerosolize backwards?

Dr. Allison: Well, Steve, first of all, masking the patient or masking the individual is a very effective way of controlling aerosol generation at rest, during normal speech, and during light physical activity. The mask, however, has a certain limit. And when ventilation gets high enough, air gets drawn in around the side of the mask and gets pushed out around the side of the mask. And it no longer becomes a very effective barrier to aerosol generation.

Dr. Kopecky: So at these higher levels of exercise ...

Dr. Allison: At higher levels of exercise, yes. Masks are not designed for that kind of activity.

Dr. Kopecky: Now, do you think that the mask, just a regular mask, not the O₂ consumption mask ...

Dr. Allison: Not a special mask, but the sort of paper surgical mask or a cloth mask is designed for low levels of ventilation. It works very well. It's very effective. But I think anyone who's ever gone out and tried to jog in a mask, or maybe walked up a long flight of stairs, will find that the mask does become restrictive. And that one sort of sucks in air around the mask. And if you wear glasses, you notice that you get sort of, your glasses get fogged, because air comes around that mask and affects your, affects the glass of your lenses.

Dr. Kopecky: So have you studied how much a regular paper mask, or surgical mask, limits a patient's ability to exercise?

Dr. Allison: Yeah, we found that patients could successfully complete 75% of their peak performance with a paper mask. But most patients could not perform to 100%. So there is a between, probably an average of about 15 or 20% reduction in their exercise capacity while wearing the mask.

Dr. Kopecky: Oh, that's very interesting because patients tell me all the time they felt they could have gone farther, and I guess they're right.

Dr. Allison: And I think they were correct. Now the question, Steve, did they go far enough to answer the clinical question? If you said, does this patient have coronary artery disease and they got up to 80, 85 or 90% of what they were able to do. Even though they maybe could have gone further, a little bit further, you probably wouldn't have found much more. But they are correct that their exercise capacity is somewhat impaired by that mask.

Dr. Kopecky: Now, Tom, switching over to the O₂ consumption mask, does it have less aerosolizing potential than a regular paper mask? No benefit?

Dr. Allison: No. It does not reduce it does not reduce the number of aerosols. What it does, it controls the flow of where the aerosols go. And so the aerosols will stream out from the front of the mask, where again, in our practice we are capturing and filtering them out of the air.

Dr. Kopecky: And how about limiting a patient's ability to exercise with an O₂ consumption mask?

Dr. Allison: No. That, now some people get claustrophobic, you know, whenever you put any sort of a mask on them. But we have studied this very well, many people have studied it. And these do not limit a person's ability to exercise.

Dr. Kopecky: Very good. Now how, so you're still doing stress tests. How do you protect your staff? You've mentioned you already have this device that will refilter the air with a HEPA filter.

Dr. Allison: Steve, let me, I'm gonna answer your question second. First, I'm going to very quickly answer a question: How do you protect the patient? A patient cannot infect himself or herself, but could potentially infect the next patient. So we allow adequate time to completely clear the air in the room from the previous test and we clean any surfaces that the patient may have had contact with or that aerosols may have settled out on. So that's how we protect the next patient. How do we protect the staff? Well, we control and enhance the air flow in the room. That's No. 1. No. 2, of course, we do have PPE for the staff. No. 3, we encourage the staff to be vaccinated against COVID and we screen patients for active COVID disease prior to the test.

Dr. Kopecky: And in terms of the room, how long do you find you need to wait between each test to adequately clean the room and filter the room?

Dr. Allison: Yeah. Without our special recirculator devices, it was 28 to 35 minutes. With the devices, 10 to 15 minutes. And so, it takes that long to sort of get one patient out, get the other patient in, so that in our current practice, we don't have to limit the number of patients we can test in order to keep them safe. Otherwise, we would if we didn't add additional special equipment to the laboratory.

Dr. Kopecky: Well, this is excellent information, Tom, and you and your team are to be congratulated on getting these studies done and out and protecting our patients and our staff as you have. To summarize, it sounds like we're continuing to do stress testing as we have before. We're protecting staff. We do know that with a paper mask or a surgical mask, it may limit the patient's ability by 20% or so to perform. But otherwise, we're doing business as usual?

Dr. Allison: Business almost as usual. At least in terms of volume, we have the special procedures in place. And I'll knock on wood and say, we have, despite doing thousands of stress tests in the COVID era, we have not had any staff suffer an infection. We have found out retrospectively that some patients that we thought were negative turned out that it was a false negative, that by the time the patient had the stress test, they were positive, but yet they did not infect anybody because of the procedures we had in place.

Dr. Kopecky: That's great. That's great work, Tom, thank you. Thank you for all your efforts.

Dr. Allison: Yes. And of course, Steve, it's our it's our job to serve you and our other physicians. You know, just because COVID is out there, it doesn't mean that heart disease and lung disease have suddenly disappeared. So patients still need to be evaluated so that they can get the proper treatments to deal with their cardiac or their pulmonary disease. So we've had to make these adjustments to keep the practice going.

Dr. Kopecky: Well said. Thank you for joining us today, Tom.

Dr. Allison: Thank you, Steve.

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