

Melanie Cole, MS: Welcome to the podcast series from the Specialists at Penn Medicine. I'm Melanie Cole. Joining me today is Dr. Asad Ali Usman. He's an anesthesiologist, a critical care specialist, and a physician with Penn Medicine, and we're here to offer an ECMO clinical briefing. Dr. Usman, it's a pleasure to have you join us today, and what we're talking about today isn't really just ECMO, but mobile ECMO. Can you describe first for other providers the mechanics of ECMO itself and the difference between standard in hospital ECMO machines and a mobile ECMO service?

Asad Ali Usman, MD: Thanks so much for having me. I really appreciate you guys taking the time out to meet with me today. ECMO is one of the most powerful tools that we have.

ECMO can be used in hospital, but the real power of ECMO is that it's easily implantable, such that we can do it at the bedside and actually we can do it out in the field. And at Penn we have a very robust mobile ECMO program. Not only do we have ECMO in the hospital, but we go out to other hospitals and place patients on ECMO.

And we do that over 150 times a year. And it's a very strong program. We offer services for both veno-venous (VV) ECMO and veno-arterial (VA) ECMO for pulmonary support and cardiac support.

Melanie Cole, MS: Thank you for that, Dr. Usman, and as you describe the multidisciplinary approach for something like this, tell us a little bit about some of the personnel that are involved, including transport personnel and how are these specialists coordinated because it would seem to be a very complex, comprehensive initiative. And what's your specific role on the team?

Asad Ali Usman, MD: Some outside hospitals, smaller ICUs with less resources really need help. Sometimes they're calling to get advice and oftentimes they're calling because they really, really need cardiac or pulmonary support. And so typically we get called to our transfer center and they link up with one of the ECMO docs, myself being one of them.

If we're on call, we'll field the phone call and listen to the information and go through a number of questions, including what the patient's clinical condition is, what their respiratory status is, what ventilator settings they're on, what vasopressors they're on, if they're deescalating or escalating, what their renal function is, if they have cardiac indications for ECMO or if it's a pulmonary indication for ECMO.

And once we've sort of worked through the console, we then will reach out to a number of different people. We have an ample amount of resources at Penn, which is a blessing for us because we have a lot of ECMO beds in the ICU—we house our patients in the cardiothoracic ICU. We have two ICUs that we can take them to with over 60 beds available to us.

And then once we are secured with a bed, we talk to our in-house ICU team, which includes attending, anesthesiologists, attending surgeons, and also our nurse practitioner team. And then we call our perfusionist team. Our perfusionist team provides 24/7 support for us when we're going out for a mobile retrieval.

After coordinating with the perfusionist, we set a time with our Penn Star team who are a fantastic crew of people who are, either, going to ascertain if we're going to fly, by helicopter or go by ground, depending on the weather and the acuity of the patient needs. It's about 50/50, if we fly on the helicopter, or we go by ground, depending on the distance and the weather.

And then once we coordinate between our Penn Star team who will be a paramedic and or a, flight nurse as well as our perfusionists, then one of the ECMO docs will get on the helicopter, or ambulance and head over to the other hospital as expeditiously as possible. In our bags, we bring a multiple number of cannulas, which are catheters that will go centrally.

For all our cases we do, we use transesophageal echo, for not only the cannulating, but also for diagnosis, because oftentimes in the 30 minutes to two hours that it takes us to get to these hospitals, patients have deteriorated and maybe their cardiac function has worsened. And so that enables us to make on-the-fly decisions as to which mode of ECMO we need. If they need VA ECMO or if they need VV ECMO, or if they need blood or they're hypovolemic and they need resuscitation, that will help guide us at the point of care.

Melanie Cole, MS: This is such a complex situation. How do you decide which patients should receive mobile ECMO? I asked because late last year, the Penn ECMO program chose to treat a rather challenging patient that had been turned down by a number of other programs. Tell us about her and what made this case extraordinary?

Asad Ali Usman, MD: That's a fantastic question. You know, we've been doing mobile ECMO for eight, nine years now. offering this service to not only the local area and regionally, but now, nationally. We get phone calls from Florida, Georgia, Tennessee. we've gone out very far for retrieval to around New York area, West Virginia, and around, Pennsylvania and New Jersey, as well as Delaware. So I think that experience has translated into us being able to select patients and take patients that may be turned down by many, many other hospitals.

So that case that you speak of in particular was a phenomenal case. I mean, this was a woman who had just delivered her baby and was intubated because of COVID ARDS and had never really met her baby at that time. She had just delivered her baby and the resources down in Florida prevented many hospitals from taking this young woman.

At our institution, we have multiple different specialists and experts that are renowned in infectious disease, pulmonology, transplant, surgery, cardiology, and anesthesiologists who are 24/7 available at the bedside to help manage these patients, including their sedation management, how you're going to prone these patients. Do they need cardiac support? What kind of bridge do they have if they're going to exit to heart transplantation or lung transplantation? We have those services, and more recently we've added a new armamentarium of cannulation configurations.

Typically, the standard cannulation for VV ECMO is IJ femoral cannulation, or femoral venous and femoral arterial cannulation for VA ECMO. However, we have added a multiple number of alternative cannulations once they get to our home institution included oxygenated, right ventricular support, VA PA ECMO, or sport-mode ECMO, which was

pioneered by Dr. Bacchetta, including axillary arterial cannulation and neck drainage cannulation. So we have a number of different configurations, surgically and percutaneously, as well as medical interventions that, is the real secret to how we beat the odds and survival of these super sick patients.

Melanie Cole, MS: It really is amazing to me that the Penn Medicine Mobile ECMO program was developed initially to serve the needs of hospitals in the region who didn't have standard ECMO technology, but many hospitals that have since developed ECMO programs are still calling on Penn, which really says a lot about your expertise and specialization. And you mentioned Oxy-RVAD a right-sided ventricular assist device. Tell us a little bit about this. Is this something that's very commonly available?

Asad Ali Usman, MD: No. So like I mentioned earlier, the cannulation configurations is something unique that we offer at Penn, and oftentimes patients who present with ARDS have a concurrent right ventricular failure That occurs 25 to 30% of the time with those patients who have ARDS. And so one of the tools that we can use is a right ventricular assist device, which is a cannula that goes further than the standard VV ECMO configuration and it bypasses half of the heart, the right ventricle, which oftentimes sees high afterload from ARDS. There's typically increased ventilator settings and stiff lungs, which will then subsequently cause the right ventricle to fail.

So, over time we have noticed that patients who are on VV ECMO develop right ventricular failure. And so we can use that in the ARDS setting. But we also offer that technique for patients who have LVAD surgery, patients who have contraindications to VA ECMO or patients who have right coronary artery disease or infarcts of their right coronary artery. So it is just one of the multitude of platforms that we have to offer. But again, I would like to emphasize that the real secret or the real sort of advantage that we have at Penn is that we have the capability of having bedside specialists 24/7 to do some of these ECMO runs that may go on for eight weeks, 12 weeks, maybe six months.

We recently had someone on ECMO for six and a half months before we transplanted him, and he then was seen in clinic recently and living his best life and, sort of on his way. And it's hard to imagine being able to keep somebody on ECMO, doing physical therapy in the ICU, trying to wean their sedation, for six months long, before they get their lung transplant, and really helping these folks in a difficult situation.

Melanie Cole, MS: What an exciting field you are in Dr. Usman. This is absolutely fascinating and it really is what medical technology and advancements are all about. As we wrap up, how and when would clinicians in the community. And beyond reach out to the Penn Mobile ECMO program. When is it you would like them to call on your expertise, call with questions, or reach out to the program?

Asad Ali Usman, MD: We have a transfer center that is available 24/7 at 877-937-7366. There is an ECMO physician available as soon as you call the transfer center. We like to get the consults early. About 20% of the time, we help the outside hospitals medically manage and they're capable of taking care of a lot of the difficulties with patients who are in cardiogenic shock or in respiratory failure. However, it's important to call early at 877-937-7366 because as we open the gates of communication, we'll often find out that patients may de-escalate a day or two later and may be out of the window for ECMO.

So the most important advice I would give today is to call us early. And we will always be available. We are obsessed with this sort of technology and are available to talk on the phone and internally. We communicate over text, every single moment of the day. So if you have any questions, give us a call. And then oftentimes we can even take it offline from the transfer center. And if you have a simple question about. Event management or presser management or what to do, then we can handle that over the phone.

And I think one of the great things is that because of technology, we now are capable of picking up this phone and just sharing video, FaceTime, chat, and sort of guiding other hospitals through the process. And if they need ECMO, that is also available to them.

Melanie Cole, MS: Thank you so much Dr. Usman for joining us today and sharing mobile ECMO clinical briefing with us and telling us about this fascinating technology. Thank you again. To refer your patient to Dr. Usman at Penn Medicine, please call our twenty-four seven provider only line at 877-937-7366. Or you can submit your referral via our secure online referral form by visiting our website at [pennmedicine.org/referyourpatient](https://www.pennmedicine.org/referyourpatient). That concludes this episode from the Specialists at Penn Medicine. I'm Melanie Cole.