

It is a nurse driven program. I feel very privileged to be a part of this program, and I've been a part of this program since 2012. And the nurses really are the heart and soul of this program.

So we take care of the critically ill patient. We also take care of the ECMO machine, and we really are great collaborators. It's a very interesting marriage of a cardiovascular nurse from the cardiovascular intensive care and my role, I'm a medical ICU nurse. And we really are a perfect pairing.

So they bring the components of the cardiovascular knowledge, and we bring the components of taking care of critically ill patients on the ventilator. And it's just such a joy to take care of these patients in their time of need. So it's been one of my proudest moments as an ICU nurse here.

We really work well together. One of the nurses runs the ECMO machine, and one of the nurses takes care of the patient. But really it's a total care approach. We collaborate well. We communicate with the physicians and we really are doing everything for that patient.

It's really been an interesting ride, and I'm so proud to see the evolution of this program. It's gone from just doing maybe 20, 30 patients a year to almost 80 patients last year. We've grown, and we've also learned that through many obstacles, we can grow and get bigger. I'm very proud to say that we are 100% educated by our own. The nurses have an education team that we learn and grow and develop skills for our ECMO specialists.

We have grown into a mobile program. We have grown into so many things here, and I've just been so proud to be a part of that. It's really been a wonderful ride.

Taking care of those patients and developing our tools and really getting a lot of knowledge for our specialist brought us to where we are now with this pandemic. We're able to say this pandemic is our time to help our community and those in other communities. So the mobile team were able to go take these patients on COVID that are too sick to even leave and bring them to our center and really help them out.

We're able to put multiple patients up on this ECMO machine at a time. At this point, we have the most amount of patients here in the Southwest on ECMO at once, and we're able to care for them all at once. That's a very proud moment for me as a critical care nurse. I really feel like I'm helping my community and giving back the best I can.

I can honestly say this is one of the most difficult challenges I've taken on as a critical care nurse. It really has taken our team to the next level in our collaboration, our teamwork, the doctors, the nurses, our ECMO coordinator, our dieticians, physical therapy, all of these people that are usually working in sync 100% on a normal day have really elevated their game. And we are so proud of our team working together.

It is a high stress environment. It is definitely something that takes a toll, but I feel like this is my calling. I feel like this is what I'm put here to do, and I really have been very proud to be in these moments. And we come in every day knowing that these patients are critically ill and anything could change, but we also have the comfort of each other. So when we're together, we're in this together. We truly are.

And we're able to take care of these patients knowing that my teammate, my nurse in the room taking care of my ECMO patient, has my back, and I have theirs. Additionally, a physician or the ECMO coordinator or my backup is one phone call away. So I know that this could be a high stress environment with critically ill patients, but knowing that our team is built for this-- we put 10 years into our program-- and this is really the moment for us to help our community.

Our quick thinking and the ECMO specialists critically thinking their way out of this situation includes a lot. We have to stabilize the patient. We may have to take them for a test. We may have to add additional support on the machine, which means adding a cannula to get a higher flow to achieve their oxygen delivery. It may entail us going down to a CAT scan to evaluate a body part or the lungs or something that may become a problem.

When we do this, time is of the essence. It's very important that we make the right moves at the right time. But those moves are very intricate. It takes time to get those patients stabilized. It takes time to communicate the needs to the physician.

In every single thing we do with these patients, time is of the essence. So moving the patients, little things like repositioning them or giving them medications, cleaning their mouth out, allowing them to go to the bathroom, those tasks take a very long time. Now add the component and the stress of COVID. We have to put on a mask. We have to put on eye protection, a face shield, multiple gowns, gloves, to get into the room, just to actually physically touch the patient.

That's added a layer of stress to our day that is-- before all this, I couldn't even imagine. So we leave very tired. We leave very stressed, but we also leave very rewarded, knowing that we're taking care of these patients the best we possibly can.

It's given us an extra level of support that we can provide sick patients. Traditionally, the ventilator for oxygenation purposes was as high as you could go. Now with the ECMO, it allows us to help patients who a ventilator is no longer working for. When the H1N1 flu was around, we had a lot of people who were on the circuits for that. We also use it to help with the heart failure patients who need mechanical support of their other organs while waiting to see if they were going to get some other long term device or potential transplant.

The patient's lungs are not able to exchange the gas, the carbon dioxide in the oxygen. What the pump does is what the lungs can't do. We take blood from the patient, run it through an oxygenator, which puts oxygen in the bloodstream, removes carbon dioxide, and then we return that blood to the patient, and then their heart pumps it through like it normally would. It acts as an extra lung outside of the body.

We had started off with 22 nurses who could do it. Now we're up to over 80 that can help take care of these patients. We went from a very complicated pump to a really very simple one that's easier to use, and it's just it's been very enjoyable to be part of the whole program growing up to what it is now. The amount of staff and equipment that we have to take care of patients is the largest in the city right now. So we're very proud of that, and we're happy to be able to take care of as many people as we can.

We've been able to help a lot of patients with pneumonias, other lung injuries, and other heart failures, as well as lung failure. We've been able to help a lot of people who have such severe lung and heart injury that they otherwise would not be able to survive without the support. We've been able to help a lot of people with those diseases that you mentioned, like influenza, Valley fever, severe asthma exacerbations, other types of lung injury from aspiration pneumonia, other lung scarring from other bacterial pneumonias. And so even before COVID happened, we were able to give these people ECMO support in order to help them survive, and many of them have survived not only to discharge, but survived to live very great qualities of life.

We have been able to transform hope into people surviving. So even if we just have that little bit of hope that we are able to put somebody on ECMO and help those patients and those families continue that hope, many people who have had the odds against them are surviving to live wonderful lives. And we see that every day.

Last year, we saw that in over 70 people, so it's something that we feel lucky that we're able to provide for such a large number of people every year. We've been able to help many people here at this hospital with ECMO and without ECMO. There's still a percentage of people that are dying no matter what we do, but we've been able to take some very severely ill people from other parts of the city and state, and they've been able to survive on ECMO with COVID.

Anybody with severe pneumonia from COVID is on a ventilator. Often, that is enough, where the ventilator is able to give the lungs oxygen that then the oxygen can get into the bloodstream. But occasionally, the ventilator is not enough because of how severe the lung injury is, so the ECMO is a lung bypass machine where we're able to put oxygen straight into the blood and return it to the patient.

We're finding that COVID patients with pneumonia and lung injury are needing to be in the hospital and often on the ventilator for a very long time. So we are finding now that the patients that we need to put on ECMO because of COVID are also needing that lung bypass support for a long time. So far, we know at least a few weeks and probably longer, so we just know that it's a very long and difficult illness to get over.

It does not discriminate. So everybody is at risk not only just to get COVID, but to get a very serious illness from COVID. So we are all very protective, as you can see, of our own health, as well as the health of our patients when we're treating this disease.

The lung injury that we're seeing with COVID is because of our body's own inflammation. Something that it's programmed to do, but something that we see in overdrive, and that takes a long time then to settle down, much longer than it takes to just get rid of the virus. Then we have to wait for the body to heal itself and get rid of its own inflammation.

It is like a third lung in that when we do put somebody on the lung bypass machine, they have usually been on the ventilator for a short time. And we can see that the work of the ventilator itself, not only is it not providing enough support, but that the lungs are suffering from being on the ventilator because of the pressures we have to use on the ventilator and the volumes that we have to use on the ventilator. So once we're able to put somebody up on that lung bypass machine, we can put somebody on more of a resting ventilator mode where we give them less pressure and less volume, and the lungs have a chance to rest and recuperate. And then once they do, someone is able to come off the ECMO machine and go back to the ventilator.

What keeps the patient alive minute to minute is the nursing care that they get. And we have such amazing educated nurses who put in so much of their own time to making sure that they are skilled at running the machine and that they know the latest literature and that they can care for the patient. Even as equipment changes and new research changes, they know it.

I think that one area that will grow is our mobile ECMO program where we can actually go to the patient and get them started on the lung bypass machine right there where the patient is instead of them having to undergo the risks of being transported to us before they're able to go up on ECMO. So I think programs that do ECMO will become more skilled and staffed at going to the patient no matter where they are. And hopefully, we can even expand that to places like Tuba City and other outlying areas that definitely need that kind of support for their patients.

Most of the time, the kids need the lung bypass machine just like we see with our adults. More often, the adults need heart bypass, whereas the children don't usually use the heart bypass machine. But they're very, very similar. And in fact, we have nurses and physicians who are skilled in taking care of both.

You have two of these consoles hooked up trying to blow enough, and sometimes it's still not enough. You see saturations in the 80s and 70s. You touch your patient, and they desaturate, so it's sometimes difficult to take care of these patients when they're so sick. The act of turning them, the act of lifting their arm can cause them to desaturate, so we depend on the ECMO circuit to kind of bridge us through those moments, to just take care of them.

We call the team. That involves calling our surgeon, our surgical team, and myself, an ECMO specialists, as well as another ECMO specialist, because these patients are exceptionally sick. We want to always have the hands and the support that we need to care for them because as I said, just as little as a touch is enough for their body to be overwhelmed.

It's very much, let's go. Let's try to do our best for this patient and think about every if then what scenario and troubleshoot it. And we have to troubleshoot it fast.

We would try to get them on pump, and we would try to get them on as much flow, as we say. So that means we want to be able to flow through the circuit as fast with as much oxygen as we can. Heavily dependent on their access, so that means sometimes it's a mixture of cannulas, one in the neck, some of the groin. So we pull that blood out, and the faster you can pull it in through the circuit, the more oxygen you're getting for the patient so that we can let those lungs rest.

Everything has to be catered individually to a patient. So if you're an asthmatic, and we're doing all the work for you, we can sometimes even extubate you and do other therapies of oxygenation. And sometimes with all of the other therapies, it's a matter of-- you're doing the same bones foundation, but you're just adding on the pump. And you're relieving some of their work that they're doing, so everything is a matter of managing the patient individually and then managing the pump and the blood thinners that are associated with that.

We typically say that we are, at minimum, a two week run, but it's been taking so much longer for our COVID patients to recover. Down here, we have our water cooler heater just from the bottom up. That allows us to cool or heat the patient because as you pull the blood out of the body, you are cooling it. It enters our ambient air depending how the room is, how the temperature can be, and we want the body to be as normothermic, as normal temperature. So that enters down here underneath the housing of the oxygenator, the Quadrox oxygenator.