



Ed Rocco '84 adjusts a heart-lung machine that oxygenates blood for a cardiac patient during surgery.

band the beat goes on

Perfusionists are at the heart
of the cardiothoracic surgical team

BY ALEJANDRA NAVARRO
PHOTOS BY ROBERT LISAK

Ed Rocco '84 has a heart-stopping career. As a cardiovascular perfusionist, Rocco stops a patient's heart from beating during surgery to keep the heart and lungs motionless so repairs can be made. He diverts the blood away from the body and into a heart-lung machine, circulating oxygen-rich blood back into the patient.

In the operating room, he's the one who has a pulse on the patient, monitoring the digital display of the patient's heart rate, body temperature, oxygen levels and electrolytes. He administers vapor anesthesia, and when necessary, other medications directly into the blood.

"We're constantly sweeping a variety of readings," says Rocco, chief perfusionist at Yale-New Haven Hospital. He alerts the cardiothoracic surgical team—which usually includes a nurse, physician assistant, an anesthesiologist and a surgeon—to changes that could be signs of trouble. A procedure can become dangerous for the patient within minutes. Brain damage can happen after just four minutes without oxygen.

"Timing is everything," says Rocco, who was a respiratory therapist before returning to Quinnipiac to change careers. He graduated from the cardiovascular perfusion certificate program in 1990.

He remembers having to jump into action and begin manually cranking the heart-lung machine (prior to battery backups) when the operating room lost power after someone accidentally cut the line during a renovation. The generator feed also was lost.

Most of Rocco's patients are children with congenital heart defects. These are some of the most challenging cases, as surgeons often uncover additional problems not diagnosed, Rocco explains. "You never know what you're going to find."

To help mend the tiny hearts and lungs of his youngest patients, Rocco collaborated with surgeons and neonatologists to bring the ECMO (extracorporeal membrane oxygenation) program to Yale-New Haven Hospital in 1992. Most often used on infants, ECMO machines help oxygenate the blood—similar to what a heart-lung machine does during surgery—giving the heart and lungs a chance to heal.

New technologies have made surgeries less invasive, but have placed more responsibilities on Rocco's already high-stress and high-stakes job. Surgeons who use robotic hands and small cameras in the body to repair organs without opening up the body, for example, can only see what is on the camera's screen. Rocco becomes their eyes. A spike in blood pressure, for example, could be the surgeon putting too much pressure on the heart.

"We're intimately involved in patient care beyond the operating room," says Sean O'Brien. That was one of the reasons O'Brien was



Ed Rocco '84 checks the lines of the ECMO machine that will help the heart and lungs of a newborn baby.

attracted to the profession. A former emergency medical technician from East Hampton, Conn., O'Brien is one of the first students in Quinnipiac's new MHS program in cardiovascular perfusion.

Perfusionists also monitor patients supported by ventricular assist devices, known as VADs. This device helps the heart pump blood through the body. VADs are used by patients waiting for a heart transplant or for those whose hearts cannot pump on their own. O'Brien now is serving on a national task force developing guidelines on how to use and manage VADs in hospitals. The group also is developing educational guidelines for university programs.

Perfusionists like Rocco are not limited to helping cardiac patients. They can isolate the circulation of blood in a specific body part. This enables a doctor to give a higher dose of chemotherapy to a cancer patient, for example, without damaging the rest of the body. Rocco remembers a patient with a case of hypothermia who came in early one winter morning. The man was near death, having stayed out all night in the cold. Rocco and the surgeon at Yale-New Haven Hospital were able to warm the blood gradually by circulating the man's blood through the heart-lung machine.

Perfusionists' expertise also may be used in different areas of science in the future, such as stem cell research and patient-specific organ growth. "It's not a stale field," says Rocco of the exciting developments on the horizon.

Karen Bendel, RN, remembers the field when it was in its infancy. As was customary in the 1970s, a doctor trained her to use the heart-lung machine.

"In the old days, you held your breath half the time," explains Bendel, who eventually served as the chief cardiovascular perfusionist at Westchester Medical Center until she retired in 1999. "We always said you couldn't do a case without bone wax or umbilical tape." The wax stopped leaks on the equipment and the tape held back any awkwardly dangling tubing. At that time, hospitals didn't have digital monitors. "We'd look at the color of the blood and feel the tube to sense the blood flow," says Bendel.

Bendel assisted Professor Ron Beckett and former Dean of the School of Health Sciences Joe Woods in forming Quinnipiac's cardiovascular perfusion certificate program in the 1980s when hospitals were facing a shortage of trained and certified perfusionists. Today, a third of the state's certified perfusionists are Quinnipiac graduates. Bendel, who supervised Quinnipiac students during their clinical rotations, also helped get students placed in her hospital and was always pleased with their abilities.

"Quinnipiac prepares students very well," Bendel says. "They know what they are doing. You know what you're getting when you get a Quinnipiac student."

When her daughter, Marci Bendel, RN, CCP, wanted to enter the field, she advised her to attend Quinnipiac. A pediatric critical care nurse at New York-Presbyterian Hospital/Columbia University, Marci witnessed the important role of a perfusionist in the operating room. She was impressed with the perfusionists' knowledge, their rapport with the surgeon and the surgical team and their ability to react quickly to the emergencies that arise during surgery. They had an

KEEPING PACE WITH CHANGE

Quinnipiac replaced its certificate program with a master of health science in cardiovascular perfusion degree program to keep up with the changes and new demands of the field.

"We have a huge responsibility to essentially keep the person alive while the surgery is going on and it's kind of an awesome responsibility. The technology in perfusion has increased ten-fold over the years," says Sean O'Brien of New Britain. He is a member of the new program's first class. The master's program provides the time and instruction to gain knowledge and the experience needed for the diverse roles perfusionists have in hospitals, O'Brien says.

Twenty-one perfusion programs exist in the country, but only eight offer master's degrees. Quinnipiac has the only master's program in the Northeast.

The program boasts partnerships with several prominent cardiac hospitals both in and out of the state, including Yale-New Haven Hospital and Duke University Medical Center, where students can do their clinical rotations. The annual starting salary for these medical professionals is approximately \$86,000.

"One of the strengths of the program is that we have students interacting with many perfusionists and anesthesiologists," explains Professor Michael Smith, director of the cardiovascular perfusion program and a certified perfusionist. Students get a taste of how different medical professionals work and the techniques and equipment used in these hospitals.

"We're becoming a more intricate part of the surgical team," O'Brien says of perfusionists. "The program provides us with a diverse overview of the entire field."

ability to know "what we needed to do at that moment, as well as what we needed to do next," explains Marci, who graduated from Quinnipiac's cardiovascular perfusion program in 2002. She credits Professor Michael Smith, program director and certified perfusionist, with the success of Quinnipiac's program that she says prepared her well for this career.

"This is an emotionally and physically demanding job. It's life or death for these patients," she adds.

Marci recalls the time she stayed through the night with a cardiac patient struggling to stay alive. He was using a new model VAD and she wanted to make sure it worked properly. As he came in and out of consciousness, she remained by his side. When he woke up the next morning, he said to her, "I know you. You're my guardian angel. Every time I opened my eyes, you were there."

Saving lives and helping people live a better life are the most fulfilling things about the profession, both Marci Bendel and Rocco say.

"Sometimes, I think, this patient probably has a family just like mine," says Rocco, who, with his wife Donna, has three daughters Elaina, 13, Krista, 21, and Dina, 23. "Without knowing us, they put their lives in our hands."