

# Treatment for heart attacks can be reversed to help hypothermia patients

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An ambulance pulls into the hospital parking lot, and paramedics bring a patient into the emergency room - suffering from a dangerously low body temperature but bundled in blankets and dry after being pulled from icy water after a car accident.

Today it's a theoretical, but very possible, scenario. And it's more likely today that the patient will be warmed back to health using a machine hooked up to a catheter that transfers heat to the patient's blood.

The technology has been used at Allegheny General Hospital for about eight years, said John O'Neill, an AGH emergency physician who champions its usefulness. Called intravascular temperature management, there are various companies that make similar machines, but they all came out of research that found cooling a patient's blood after trauma could save their lives. The late Peter J. Safar was an early proponent of induced hypothermia to minimize brain damage after heart stoppage at UPMC. In 2002 European and Australian studies found treatments that were safe and effective.

Cooling treatments were then used on cardiac arrest [patients](#) to give their brains a chance to recover by reducing the brain's need for oxygen and slowing the process that kills brain cells. Today, Dr. O'Neill says there have been a few patients treated at AGH with a warming technique. Using Zoll's CoolGard machine, doctors place a catheter into the femoral vein and extend it to just below the patient's heart. Then heat from balloons within the catheter, which are filled with temperature-

controlled saline fluid, warms the blood. The blood doesn't leave the body, and the fluid doesn't enter the bloodstream.

One patient had an abnormally low body temperature after an injury, another was hypothermic after an operation and another was transferred to AGH from another hospital. During a cold snap in November, one elderly woman who suffered hypothermia from exposure was treated with the CoolGard machine and recovered. Hypothermia is a body temperature below 95 degrees Fahrenheit; 98.6 degrees is considered normal.

"The machine is able to get people to a normal temperature quickly and safely," Dr. O'Neill said.

A new version of the CoolGard, the Thermogard XP console, sells for \$38,000. Dr. O'Neill said the machine is used about twice a week at AGH.

"We use temperature management in a variety of ways ... most common is when someone has [cardiac arrest](#). If someone gets a heart attack, they're brought in by ambulance. We try to keep them cool, to give the brain a chance to heal."

He said preventing a fever is important during this time of "reperfusion," a medical treatment that restores blood flow through blocked arteries.

"We were not designed to have a lack of oxygen to our brain and come back from that. There is no mechanism for the return of blood flow," Dr. O'Neill said.

The patient's temperature is kept at 91.4 to 96.8 degrees to mitigate any damage to the brain that might have occurred after a heart attack, he said. The improved outcomes were documented more than 10 years ago;

now it's the standard of care.

In addition to the temperature-controlled catheter, some methods use a combination of intravenous fluids and blankets to affect body temperature. A forced-air warming blanket, known as the Bair hugger, inflates a bag that covers the entire body with temperature-controlled air.

"The thing I like about the machine is it runs through the blood vessels," Dr. O'Neill said. "You're not putting anything on the patient's skin. If they have an external injury, a cut or broken leg, there are no blankets." Intravenous medications and other fluids can be given through additional openings on the catheter already in place.

To reverse the effect of hypothermia, the patient first gets an intravenous dose of warm salt water, then the CoolGard fills the [catheter](#) with warm fluid.

"It's one puncture, one device into the vein," Dr. O'Neill said.

Dr. O'Neill said patients who need the CoolGard are treated for one day, possibly for an additional day or two, if needed. AGH and West Penn hospitals each have two machines, Dr. O'Neill said, adding that they also have the warming blankets. Temperatures of 86 and 87 degrees pose a danger of heart rhythm problems in a patient, so doctors try to bring patients as quickly as possible to the "safe zone" of 89.6 degrees.

Critically ill patients who need more heart and lung support are treated with a machine known as ECMO (extracorporeal membrane oxygenation).

Sometimes a patient recovers with little intervention.

"We had (an 87.8 degrees Fahrenheit) patient the other day; took their

wet clothes off and looked for other reasons for what was wrong," Dr. O'Neill said. "We had a warmer temperature in the room, gave him warm saline." No other method was needed, and the patient's body took over to restore a normal temperature.

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