Regions Hospital / St. Paul Fire

CASE STUDY

Nearly 3 hours of chest compressions by LUCAS buys time to save patient.

Tim Franko is alive today thanks to the chain of survival and a hospital team that wouldn't give up. The team's confidence that the patient could survive neurologically intact kept them going through 32 defibrillation shocks, removal of a left main artery occlusion, and two hours and 45 minutes of chest compressions delivered by the LUCAS® 2 Chest Compression System.

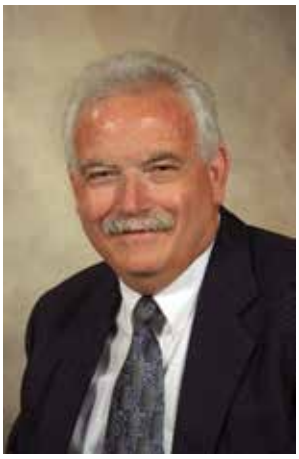
Why didn't hospital staff give up on this patient? "They had a pretty good idea his brain was still intact," explains R.J. Frascone, MD, FACEP, medical director of Regions Hospital Emergency Medical Services and professor of Emergency Medicine at the University of Minnesota. LUCAS was doing such an effective job of circulating the patient's blood even without his heart pumping, that he was able to move his limbs and respond to questions by blinking.

"LUCAS works so well, the parameters that we typically use (30 minutes of ACLS) don't seem valid anymore," Frascone says. "It's much more difficult to know when to stop and on who to stop resuscitation efforts. With LUCAS we often have good oxygen saturation numbers, good end-tidal CO_2 numbers, good BP's and pink skin. When do you stop? It's a good problem to have."

The patient, a 56-year-old Wisconsin maintenance mechanic, is back to normal and back to work despite the ordeal, which began when he suffered cardiac arrest after clearing brush in 90-degree heat in August, 2013.

Maintained Coronary Perfusion Pressure

Throughout the heroic rescue, CPR kept the patient's blood circulating, maintaining coronary perfusion pressure and delivering oxygen to his organs. After Franko collapsed, a bystander almost immediately started CPR. Paramedics who arrived within minutes continued CPR and began other resuscitation efforts. LUCAS 2 was strapped on to the patient to deliver uninterrupted chest compressions during transport to Regions Hospital in St. Paul (MN), a nearby Level One Heart Center. The LUCAS 2 device continued chest compressions while doctors provided lifesaving care, from the Emergency Department to the cardiac catheterization lab.



R.J. Frascone, MD, FACEP, Medical Director of Regions Hospital Emergency Medical Services and Professor of Emergency Medicine at the University of Minnesota

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- Dr. R.J. Frascone

The LUCAS device has been widely adopted by EMS and hospital systems in St. Paul and Minneapolis, according to Frascone. He provides medical direction to many of the fire and EMS agencies that serve the St. Paul metropolitan area and five adjacent counties in Minnesota and western Wisconsin.

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Like having an extra team member

Frascone is enthusiastic about LUCAS, both for EMS and hospital teams, for these reasons:

1. Chest compressions can be delivered consistently to AHA guidelines for long periods, which research shows is not possible with manual chest compressions, even with the best training and intentions.
2. CPR can be performed on patients in ambulances and helicopters without endangering EMS crew safety.
3. During a code, a team member is freed up and stress is reduced because the machine handles chest compressions duties, delivering high-quality chest compressions without interruption.
4. Staff have better access to the patient and can focus on performing lifesaving procedures such as defibrillation and heart catheterization without having to do manual chest compressions.

New protocols reflect the LUCAS advantage

Regions Hospital EMS protocols call for immediate, high-quality, manual CPR and placement of the LUCAS 2 device as soon as possible to allow quick transport to the hospital, if medics believe there's a good chance of patient survival. This approach is taken so patients are already on their way to the cath lab in case they experience ROSC and their ECG indicates a STEMI. Frascone believes this approach can shorten time to heart catheterization and save heart muscle. "The fact that we can now safely move patients undergoing active CPR with LUCAS, has resulted in our approaching arrested patients more like trauma cases than medical cases. In other words, in appropriate patients, we try and keep the scene time to around 10 minutes," Frascone says.

Frascone is also the medical director for Life Link III, which operates five helicopters in Minnesota and Wisconsin. "It is extremely difficult to do standard CPR inside most EMS helicopters," he says. For that reason, LUCAS 2 is pre-placed before lift-off on all patients who are likely to re-arrest (e.g., peri-arrest and STEMI patients).

At the hospital, the patient was moving and obviously neurologically responding. His admission blood pressure was 140 with LUCAS compressions. Franko's heart did not re-establish a regular rhythm for hours despite repeated shocks from a defibrillator. During that time, LUCAS 2 continued circulating blood to the patient's brain and other vital organs, freeing the medical team to focus on other lifesaving tasks. A cardiologist assessed Franko in the Emergency Department, where the ED team worked on him for nearly two hours before he had a heartbeat long enough to get an ECG, which revealed a STEMI. The patient was moved to the cath lab, a short distance from the ER. On the cath lab table, Franko re-arrested. LUCAS 2, still in position, was turned on again and operated the entire time the cardiologist performed angioplasty.

"As we saw in this case, you can actually perform the heart catheterization while the machine is running," says Frascone. "You don't have to stop CPR. If you do wish to stop or restart the machine, all you have to do is push a button and staff can remain clear of the radiologic field."

Knowing when to stop resuscitation and when to keep going

With the advent of mechanical chest compression devices, rescue medicine has moved beyond what emergency medicine and cardiology specialists thought was possible, Frascone says. During the past two years the Twin Cities area has seen at least 12 cases of prolonged resuscitation (longer than one hour), and about half of the patients survived with their brain function preserved, he believes. Frascone and other physicians in the Twin Cities intend to publish a case series on these patients.

Frascone has this advice for emergency medicine teams that want to attempt longer codes: Use an automated chest compression device. Don't stop if the patient is responding. To help convince colleagues, show them the research on good neurological outcomes in patients who receive CPR. "Research has shown that if we can get these patients discharged from the hospital," he says, "they almost all do well neurologically."

At Region's Hospital there are no hard and fast rules on when to end a code or when it's worth attempting angioplasty in cardiac arrest. The team is focused on how to identify patients who will not only survive, but who will recover to live a good life, even if the resuscitation effort is a long one.

Regions Hospital EMS will be conducting research to help determine when prolonged resuscitation efforts are warranted. "LUCAS has changed the rules. We need to have a better idea of when to stop and when to keep going and it is all dependent on the condition of the brain. We want to bring back patients who will go back to their jobs and to their families. With further research, we are convinced we can do that," he sums up.

Statements attributed to individuals in this case study reflect the opinion of the individual and do not necessarily reflect the opinion of Physio-Control. For information about specific product claims and labeling, refer to the device operating instructions.

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Physio-Control Headquarters
Redmond, WA 98052
www.physio-control.com

Customer Support
P. O. Box 97006
Redmond, WA 98073
Toll free 800 442 1142
Fax 800 426 8049

Physio-Control Canada
Physio-Control Canada Sales, Ltd.
7111 Syntex Drive, 3rd Floor
Mississauga, ON
L5N 8C3
Canada
Toll free 800 895 5896
Fax 866 430 6115

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