

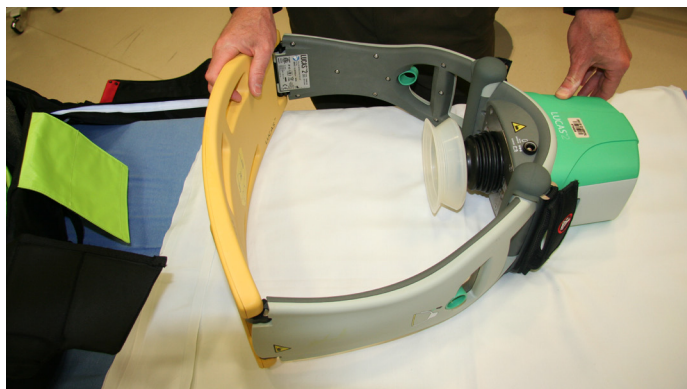
LUCAS delivers non-stop compressions

CPR Dynamo Transforms Care in the ED

By Tyler Smith

A cardiac arrest provides one of the great tests of grace under pressure. As precious seconds tick by, an individual is responsible for delivering the steady, rhythmic chest compressions that can be the difference between life and death.

But cardiopulmonary resuscitation (CPR) is also often an endurance test. No matter how deep his or her physical reserves, eventually every rescuer reaches the limits of endurance, and as the compressions become weaker, they also become less effective.



LUCAS 2 delivers rhythmic chest compressions via a plastic plunger.

Providers in the Emergency Department at University of Colorado Hospital have found a reliable way to keep CPR compressions constant in the controlled chaos of a lifesaving drama: Let LUCAS do it.

LUCAS ([Lund Hospital Cardiac Arrest System](#)) is an automated mechanism that delivers CPR via a plunger-like device positioned above the patient's sternum. The ED acquired the system – LUCAS 2, or son of LUCAS – thanks to a donation of nearly \$15,000 from the University of Colorado Hospital Foundation. The device methodically delivers 100 compressions a minute, plus or minus

two, at a depth of 2.1 inches. Unlike its human counterparts, LUCAS 2 doesn't reach physical exhaustion – at least until the battery runs out.



Third-year resident Marc Quinlan, MD, demonstrates how LUCAS is positioned on a patient.

Not that a single person is responsible for CPR in the ED setting – providers trade off as long as it's needed, said [Sarah Perman](#), MD, an ED physician and assistant professor of Emergency Medicine with the CU School of Medicine. But merely summoning the manpower to maintain CPR can stretch resources in lifesaving situations with little margin for error, Perman said.

"LUCAS changes the focus of the room," said Perman, who used it during her resuscitation fellowship at the University of Pennsylvania's Center for Resuscitation Science. "Providers can focus more on the medicine of resuscitation rather than the mechanics."

Keep the beat. At slightly more than 17 pounds of molded plastic, cloth, and Velcro, LUCAS doesn't immediately fit the image of a health care hero. But Perman said its lack of flash is its greatest strength.

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"The quality of compression is the same at minute one as at minute 45," she said. "And one thing we know improves outcomes in cardiac arrest is high-quality CPR."

It's also relatively simple to get LUCAS ready for work, as Perman demonstrated one afternoon in the ED last week, using third-year emergency medicine resident Marc Quinlan, MD, as a mock patient.

With Quinlan lying on a gurney, Perman slipped a backboard beneath him, locked LUCAS's two braces in place, and strapped Quinlan's wrists to the braces. She then maneuvered the plastic plunger over his sternum. She could have activated the plunger with the push of a button, but at that point released Quinlan from his role play.



ED physicians Sarah Perman and Chris McStay say LUCAS frees emergency providers to focus on medical decision making for patients who need to be resuscitated.

Perman said the ED received the device in February and trained all its nurses and techs, as well as faculty, physician assistants, and residents. The preparation included a simulated patient code scripted by the hospital's WELLS (Work, Education and Lifelong Learning Simulation) Center. Using a high-fidelity mannequin from the WELLS Center, ED staff and providers practiced the "choreography" of bringing a patient who coded in the hospital to the ED, transferring him to LUCAS, positioning the device, and beginning mechanical CPR, Perman said.

Reliable partner. The ED began using LUCAS for all medical and cardiac arrests April 1; they deployed it nine times in April and twice as of the first week in May, Perman said.

Chris McStay, MD, the ED's chief of clinical operations, used it in late April on a patient brought in by EMS workers on a gurney.

Once LUCAS began its work, the patient was intubated, and McStay and a senior resident turned to medical decision making and identifying the cause of the arrest.

"The situation turned into utter calm," McStay said. "We concentrated on what we could fix."

McStay said the hospital might also look at using LUCAS in other settings, a possibility sharpened by an incident in April when a patient coded while getting a CT scan. LUCAS, he said, could provide reliable CPR in other settings, such as the intensive care units.

Meanwhile, Perman said she plans to evaluate the pre- and post-LUCAS outcomes of arrest patients.

"It's a novel approach and obviously translates to the medical literature," she said. "We'll review all the cases and look for trends to see whether other aspects of our care improved."