



CASE STUDY

Redefining the Future of Emergency Medicine

Implementation of 24/7 mobile life support for sudden cardiac arrest patients in the Minneapolis/St. Paul Area

THE CHALLENGE:

Cardiac resuscitation has been fundamentally unchanged over the last 50 years. But over the last decade, we have learned some fundamental core principles that, if implemented, hold potential to transform SCA outcomes. These include:

1. Good CPR perfusion during resuscitation and transport
2. Early delivery to the hospital for complete circulatory support (ECLS)
3. Identifying and treating reversible causes
4. Specialized care to treat the metabolic effects of circulatory arrest

These principles provide a promising strategy to improve resuscitation.

THE RESPONSE:

The mobile ECMO project at the Center for Resuscitation Medicine (CRM) unifies these four principles. When a SCA patient cannot be delivered to an ECLS hospital site in a timely fashion, the ECLS capability is delivered to them: How It Worked:

- The program dynamically expedites ECLS delivery to patients by using advanced models that receive real-time input including:
 - Geographic location of the arrest
 - Emergency department availability
 - Advanced ambulance station location
 - Nearest ECMO-capable facility
 - Current road and traffic conditions
- By using a central dispatch, requests for ECMO services can activate the ECMO team (two physicians and a critical care paramedic or nurse) and notify the spoke hospital of an incoming patient. Patients are cannulated in the emergency department by the ECMO team supported by ED staff. Successfully cannulated patients undergo cardiac catheterization and are subsequently transitioned to an ECMO-capable ICU unit.

- The program aims to place patients with refractory VF/VT cardiac arrest on ECLS in <40 minutes from the 911 call because oxidative stress and acidosis from poor blood flow often reaches a threshold after this time window.
- Operational excellence is required to assure timely treatment using ECLS. Minutes appear to make an important life-and-death difference. In the pilot experience, survivors had an average 911 to cath lab time of 54 minutes compared to 66 minutes among non-survivors.

THE RESULTS:

- Investigators from Minnesota collaborated with EMS systems to evaluate the potential impacts of the ECMO strategy for resuscitation.
- A total of 58 OHCA patients, most with refractory VF/V, were evaluated. These patients received mechanical CPR and rapid transport by EMS to an ECMO hospital.
- All ECMO-eligible cannulations were successful without complications.
- The mean duration of professional CPR to the start of ECMO was 52.2 minutes (benchmark < 60 min.).
- **Nearly half (27/58) were discharged alive and 43% (25/58) were discharged neurologically intact with a CPC of 1 or 2.**

As a result of successful program outcomes, a specialized ECMO truck will go into service in 2022, and cannulation will be performed in the truck.



Learn more about the [Center for Resuscitation Medicine at the University of Minnesota here.](#)