

REGIONALIZED CARDIAC ARREST CARE

By John Freese, MD

HOW FDNY IMPLEMENTED A
REGIONAL HYPOTHERMIA
PROTOCOL FOR CARDIAC
ARREST CARE



Recent studies have highlighted the benefits of therapeutic hypothermia for cardiac arrest care. FDNY successfully incorporated therapeutic hypothermia as a regional standard for post-resuscitation management.

Several systems have successfully incorporated therapeutic hypothermia into their resuscitation efforts as part of many significant efforts made in recent years to improve cardiac arrest outcomes. But across the country, the use of hypothermia has not yet become an accepted standard; regionalization of cardiac arrest management remains the subject of discussions in the literature.¹⁻⁵

In 2008, the New York City 9-1-1 System provided nearly 1.4 million EMS responses, including 7,357 cardiac arrest patients for whom resuscitation was attempted. As a result of advancements in cardiac arrest care, these patients were more likely to achieve return of spontaneous circulation (ROSC) than ever before, including a 75% increase in ROSC among witnessed arrests of cardiac etiology.

But the lack of a regional approach to cardiac arrest management meant that patients were transported to all 68 hospitals within the five boroughs of New York City, few of which were actively utilizing hypothermia, and even fewer of which had protocols recommending its use for a wide range of patients.

From Need to Reality

In late 2007, FDNY led discussions to facilitate the development of a system for regionalized cardiac arrest care. These initial meetings were inclusive, allowing the participation of any interested hospital with the goal of ensuring the incorporation of therapeutic hypothermia as a regional standard for post-resuscitation management. Hospitals interested in becoming Cardiac Arrest Centers needed to meet the following qualifications:

- An ICU to which patients may be admitted;
- The ability to have the emergency medicine and critical care departments work together with EMS to ensure a continuum of care within the hospital;
- The ability to achieve target temperature (32–34°C) within four hours of patient arrival; and
- An agreement to participate with FDNY in a

bidirectional sharing of patient data.

Over the next 12 months, FDNY joined with NYC Health and Hospitals Corporation and the Greater New York Hospital Association in stakeholder meetings, sent written communications to hospital administrations, received IRB approval for oversight of the regional data registry, and worked with local and international experts to develop a regional hypothermia protocol.

Recognizing the varying needs of the hospitals in the region, the process allowed for entry into or self-initiated withdrawal from the program at any time after its initiation. This allowed facilities to develop the internal protocols, educational programs and inter-departmental agreements necessary to ensure high-quality patient care with respect to hypothermia.

Today, we have 60 approved 9-1-1-receiving hospitals within the five boroughs. These include 19 Cardiac Arrest Centers/PCI facilities, 19 Cardiac Arrest Centers, four PCI facilities and 18 hospitals that are neither Cardiac Arrest Centers nor PCI facilities.

Successes & Challenges

Although we're still in the midst of a formal analysis of the data from the first six months of this program, a number of items highlight the project's early successes:

- More than 1,000 patients have already been transported to Cardiac Arrest Centers after achieving ROSC in the prehospital setting. These patients ranged from 18–105 years; some presented in VF and others in non-shockable rhythms, and some experienced arrests not of cardiac etiology.
- Of those known to have survived to hospital admission, nearly 40% qualified for and received therapeutic hypothermia based on the regional protocol criteria including VF and non-VF arrests, cardiac and non-cardiac etiologies, and patients within a wide age range (25–88 years).
- It would be premature to discuss survival data at this stage; a formal release of this data is expected

in a few weeks. What can be said is that we have already witnessed neurologically intact survivors from VF and non-VF rhythms, as well as patients up to age 83 and those with arrests of non-cardiac etiology.

As with any new program, we also face challenges; one of the most significant results from our state's public reporting structure, which documents mortality statistics of individual cardiologists. Performing even a few additional procedures for patients who have a high baseline mortality rate (e.g., post-arrest patients, even with demonstrated ST-segment elevation) can give the false appearance of a high mortality rate for a particular physician or institution. As a result, we continue to push for the adoption of exemptions in the reporting.

At present, adult patients who achieve ROSC after non-traumatic cardiac arrests qualify for transport to a Cardiac Arrest Center. As we move toward the next phase of this project and initiate hypothermia during prehospital resuscitations, we will face a number of additional challenges: We will need to address the question of obligated transport of all arrests, irrespective of ROSC. We will work with hospitals to address the issue of discontinuing hypothermia despite survival to admission for select patients. And to that end, as our registry begins to identify patients who are universally excluded from hypothermia treatment in this present phase (DNR, dementia, severe comorbidities), we may need to develop more selective treatment criteria so as not to initiate hypothermia that Cardiac Arrest Centers would not continue.

Finally, studies in other systems have suggested a volume-outcome relationship among facilities that care for a large number of post-resuscitation cases.⁶ Put simply, facilities that receive and manage large numbers of post-arrest patients have better outcomes among those patients. So in the future, we may need to reassess our attempt to be inclusive of all hospitals interested in participating and ensure that hospitals meet a minimum case volume to participate.

Recommendations

Our experience demonstrates that efforts to regionalize cardiac arrest care, even in a large system, can be successfully led from within the EMS community. Regions considering such an approach to cardiac arrest management should consider our lessons learned:

- There are significant political and economic implications in developing such a system that must be recognized. But as an effort to ensure quality care, it's critical to keep the patient at the forefront of the discussion at all times.
- Involve both clinicians and hospital administrators (CEOs, CMOs) in the process. Although we initially focused on the emergency medicine, cardiology

and critical care leaders, we soon realized that their ability to speak for a hospital or system was often lacking.

- Ensure that facilities not already providing hypothermia are aware of how important their nursing staff is to obtaining success.
- Maintain two-way communication with participating agencies. Frequent data sharing, individual meetings, joint oversight committees and regional reviews are essential to maintaining participation.



Philips InnerCool surface and endovascular temperature management systems can rapidly induce therapeutic hypothermia in the ED and ICU, continuing cooling that was initiated prehospital.

Conclusion

The use of therapeutic hypothermia in post-resuscitation management and the regionalization of cardiac arrest care have been developed in only a few select cities across the nation. The NYC Project Hypothermia is our effort to provide such care to city residents and visitors. As the project progresses, we look forward to reporting on additional successes and lessons learned, and we encourage other regions to consider developing a system to ensure this level of care for their patients.

John Freese, MD, serves as FDNY's medical director of training and on-line medical control, as well as director of prehospital research. He is the principal investigator for NYC Project Hypothermia, and he maintains an active clinical practice with the Department of Emergency Medicine at St. Vincent's Hospital, a Level I trauma center in lower Manhattan.

Disclosure: The author has reported receiving honoraria and/or research support, either directly or indirectly, from the sponsor of this supplement. FDNY receives grant funding from Philips Healthcare for other research for which Dr. Freese is also the principal investigator.

References

1. Merchant RM, Soar J, Skrifvars MB, et al: "Therapeutic hypothermia utilization among physicians after resuscitation from cardiac arrest." *Critical Care Medicine*. 34(7):1935-1940, 2006.
2. Kahn JM, Branas CC, Schwab CW, et al: "Regionalization of medical critical care: What can we learn from the trauma experience?" *Critical Care Medicine*. 36(11):3085-3088, 2008.
3. Seder D, Scholl M: "Regionalization of cardiac arrest care." *Critical Care Medicine*. 37(4):1534, 2009.
4. Kleinman ME: "Regionalization of critical care: Not just for kids." *Critical Care Medicine*. 37(7):2303-2304, 2009.
5. Kahn JM, Asch RJ, Iwashyna TJ, et al: "Physician attitudes toward regionalization of adult critical care: A national survey." *Critical Care Medicine*. 37(7):2149-2154, 2009.
6. Carr BG, Kahn JM, Merchant RM, et al: "Inter-hospital variability in post-cardiac arrest mortality." *Resuscitation*. 80(1):30-34, 2009.