Improving Neurologic Function After Cardiac Arrest Through Therapeutic Hypothermia

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PROBLEM/ INQUIRY

Problem Statement

Will therapeutic hypothermia improve outcomes in patients after resuscitation from out-of-hospital cardiac arrest?

Background and Significance

- About 164,600 out-of-hospital cardiac arrests occur annually in the United States (American Heart Association, 2007).
- The mortality rate among cardiac arrest patient remains a staggering 65-95% (Bailitz, Hansen, & Nelson, 2009). Only few are discharged with good neurologic outcome.
- Survival outcome following out-of-hospital cardiac arrest is low. Nichol et al. (2008) reported a survival rate of 7.7% to 39.9% in out-of-hospital cardiac arrests in the U.S.
- Cardiac arrest patients are vulnerable to complications such as multi-organ failure, infections, and neurologic disabilities.

Purpose

- To implement and evaluate the effectiveness of therapeutic hypothermia in adult patients following cardiac arrest.

Setting

- 400-bed community hospital (Torrance Memorial Medical Center)
- Emergency Department, Cath Lab and Intensive Care Unit

Search Strategy

- A comprehensive web based and electronic search of scholarly and peer reviewed articles
- Key words used during literature search:
  - Therapeutic Hypothermia
  - Cardiac Arrest
  - Induced Hypothermia and Outcomes

Sources of Evidence

- American Heart Association (2010). Highlights of the 2010 American Heart Association Guidelines for CPR and ECC. Retrieved from http://static.heart.org/eccguidelines/index.html
- Arrich, J., Holzer, M., Herkner, H., & Mullner, M. (2009). Hypothermia for Neuroprotection in Adults after Cardiopulmonary Resuscitation. *The Cochrane Collaboration, Issue 4*
- Bernard, S., Gray, T., Buist, M., Jones, B., Silvester, W., Gutteridge, G. et al. (2002). Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. *New England Journal of Medicine*. 346(8), 557-563.

APPRAISING

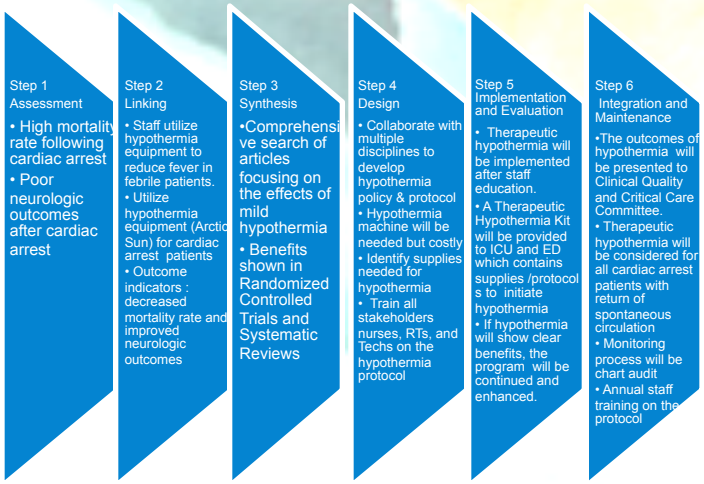
Synopsis of Evidence

- Patients in the hypothermia group were more likely to reach a best cerebral performance category score and were more likely to survive to hospital discharge compared to standard post-resuscitation care (Cochrane Collaboration).
- The American Heart Association (2010) recommends initiation of therapeutic hypothermia to patients who remain comatose after resuscitation from sudden witnessed out-of-hospital cardiac arrest.
- Therapeutic hypothermia has been shown to improve neurologic outcomes and improve mortality following cardiac arrest (Bernard et al., 2002; HACA, 2002).

APPLYING

Description of Project

- A therapeutic hypothermia protocol was developed in collaboration with nursing, medicine, respiratory therapy, physical therapy, pharmacy, and clinical informatics.
- Staff in the ED, ICU, and Cath Lab were educated on the concepts of therapeutic hypothermia and the protocol.



Rosswurm and Larrabee (1999) Model of Evidence-Based Practice

Outcomes Measured

- Mortality Rate
- Neurologic Outcomes
  - Modified Rankin Scale (MRS) and Cerebral Performance Category (CPC) Scale

ANALYZING

Results

- A total of 60 patients came to the hospital after cardiac arrest with Return of Spontaneous Circulation (ROSC) and met criteria for hypothermia. All 60 patients received therapeutic hypothermia. Twenty-five patients (42%) died but 35 (58%) were discharged alive. Out of the 35 patients who were discharged alive, 29 (83%) had an MRS score of 1- 2 (good neurologic outcome) and 6 (17%) survived with poor MRS score of 3-5 (poor neurologic function) after induced hypothermia.

	N	Survival and Mortality Rate following Hypothermia (2010-2014)	
		Survival	Deaths
Hypothermia Patients	60	35 (58%) Survived	25 (42%) Died

	N	Neurologic Outcome following Hypothermia (2010-2014) Survived at time of Discharge	
		Good Neuro Outcome	Poor Neuro Outcome
Discharged Alive Hypothermia Patients	35	29 MRS Score 1-2 (83 %)	6 MRS Score3-5 (17%)

LESSONS LEARNED

- Results suggest therapeutic hypothermia may decrease mortality rate and improve neurologic outcomes.
- Adherence to a standard hypothermia protocol and careful selection of patients are necessary to achieve optimal outcomes in a therapeutic hypothermia program.
- Continuing need exists for staff to be educated on the process of induced hypothermia to maintain competency.