Therapeutic Hypothermia and Post Cardiac Arrest Survival: Best Practice in a Community Hospital

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**Introduction**

*Survival rates prior to the era of therapeutic hypothermia ranged from 9% to 11% for all-cause cardiac arrest and 19% to 21% for primary ventricular fibrillation. In 2002 two landmark studies showed 6-month survival rates ranging from 49% to 59% and good neurologic outcome following initiation of mild therapeutic hypothermia for out of hospital ventricular fibrillation cardiac arrest.*

*More recent publications have confirmed the original randomized controlled trials by showing that therapeutic hypothermia improved survival and neurologic outcome. The Cochrane Collaboration update showed a 30-40% survival rate. Since the last 2011 update, survival rates for patients with out of hospital cardiac arrest still range from 2% to 35%.*

*This project demonstrates the impact on survival of patients treated at Littleton Adventist Hospital (LAH) with therapeutic hypothermia since implementation.*

*In May 2008, LAH physicians, nurses, pharmacists, and leaders from ICU, ED, and Cath Lab initiated a standardized post cardiac arrest management protocol.*

*The first patient was successfully resuscitated and survived in May 2008.*

**The Therapeutic Hypothermia Project**

*LAH Therapeutic Hypothermia (TH) Project:*

- Developed and approved an evidence-based order set
- Gained leadership support for purchase of two Arctic Sun hypothermia machines
- Educated, coached, and mentored nursing staff
- Communicated the plan with the entire LAH team
- The Centura-wide HACA (Hypothermia after Cardiac Arrest) Project:
  - LAH initiative was incorporated into Centura-wide multidisciplinary team led by leaders from LAH and Penrose-St. Francis Hospital (PSF) to standardize evidence-based care of post cardiac arrest patients.
  - Centura HACA Hypothermia Cardiac Arrest orders were piloted at LAH and PSF Hospitals in 2011 – became standard of care for all Centura facilities.

**Abstract**

Hypoxic brain injury post cardiac arrest historically has been a major determinant of survival after cardiac arrest. Implementing mild hypothermia in the immediate post cardiac arrest period has been shown to positively impact neurologic recovery. There is evidence that between 20% and 50% of patients who survive out-of-hospital cardiac arrest who remain unresponsive on return of spontaneous circulation may have good neurologic outcome when treated with therapeutic hypothermia (TH). The purpose of this project is to demonstrate the seven-year impact on survival and neurologic outcome of patients treated with early TH after cardiac arrest in one community hospital.

**Results**

- **Fig. 1:** LAH 50% cumulative survival for all cause cardiac arrest 7 year period (S08 to 4/15)
- **Fig. 2:** LAH 81% survival in primary VF/VT fibrillation and benchmarks in literature
- **Fig. 3:** LAH 50% good neuro outcome (CPC1 scores) and benchmarks in literature
- **Fig. 4:** CPC = Cerebral Performance Categories Scale, measure of neuro outcome

**Discussion and Conclusions**

- Littleton collected survival data on all patients treated with a standardized therapeutic hypothermia protocol for a seven-year period (S08 to 4/15).
- 50% (61/122) survival rate for all-cause cardiac arrest (Fig.1).
- 81% (42/52) survival rate for primary ventricular tachycardia/fibrillation (Fig. 2).
- Littleton collected neurologic outcome data at time of discharge on patients surviving primary ventricular tachycardia/fibrillation post therapeutic hypothermia.
- 50% (26/52) of patients surviving primary ventricular tachycardia/fibrillation post therapeutic hypothermia had CPC 1 scores at time of discharge (Fig. 3).
- LAH survival and neurologic outcomes are shown with benchmarks in the literature.
- A limitation of this study was inability to collect better follow-up data on neurologic outcomes post discharge using a standardized neurologic function scale such as the CPC Scale (Cerebral Performance Categories Scale – see Fig. 4).
- Implementing therapeutic hypothermia after cardiac arrest in the early post arrest period has been an important and successful strategy for improving patient survival and neurologic outcome at Littleton Adventist Hospital.

**Literature**


Hsu, P. et al. (2016). Brain death. In Insel, A., et al. (Eds), Principles of Critical Care. 5th edn. (LOE1)


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