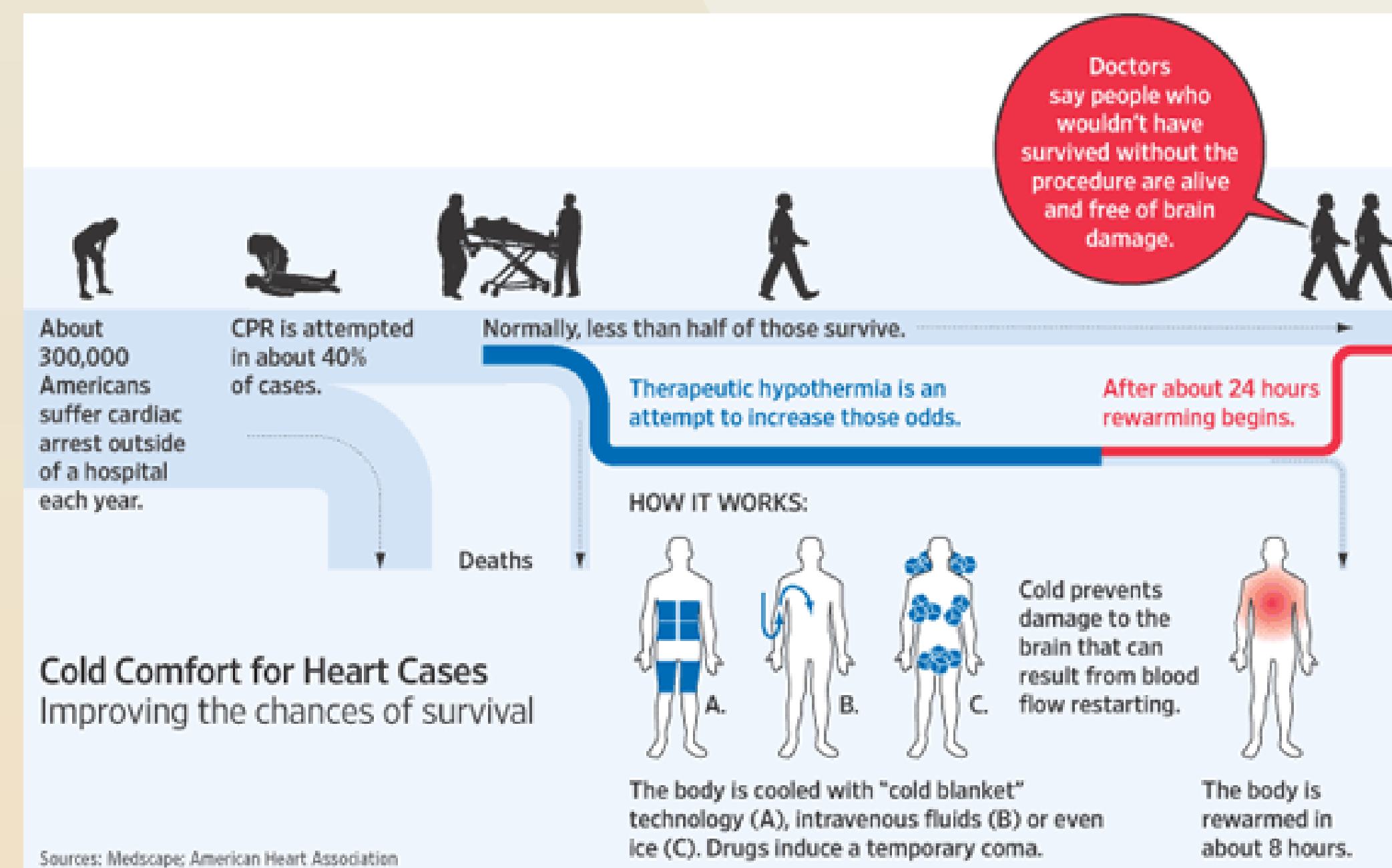


# Improving Neurological Outcomes in Post Cardiac Arrest Adults Using Therapeutic Hypothermia

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## STATEMENT OF THE PROBLEM

As the leading cause of death, cardiac arrest remains one of the most unexpected, dramatic, & life-threatening events in medicine. In 2014, about 356,500 people experienced out-of-hospital cardiac arrest in the United States (American Heart Association, 2015). Cardiac arrest leads to loss of circulation, causing anoxia and therefore brain cell necrosis, leading to the most common cause of death after a cardiac arrest. Several studies have shown that mild hypothermia markedly mitigates brain damage after cardiac arrest. Implementation of the therapeutic hypothermia (TH) protocol must be initiated within 6 hours of cardiac arrest. Optimal neurological outcome varies case by case basis, taking into account multiple factors.

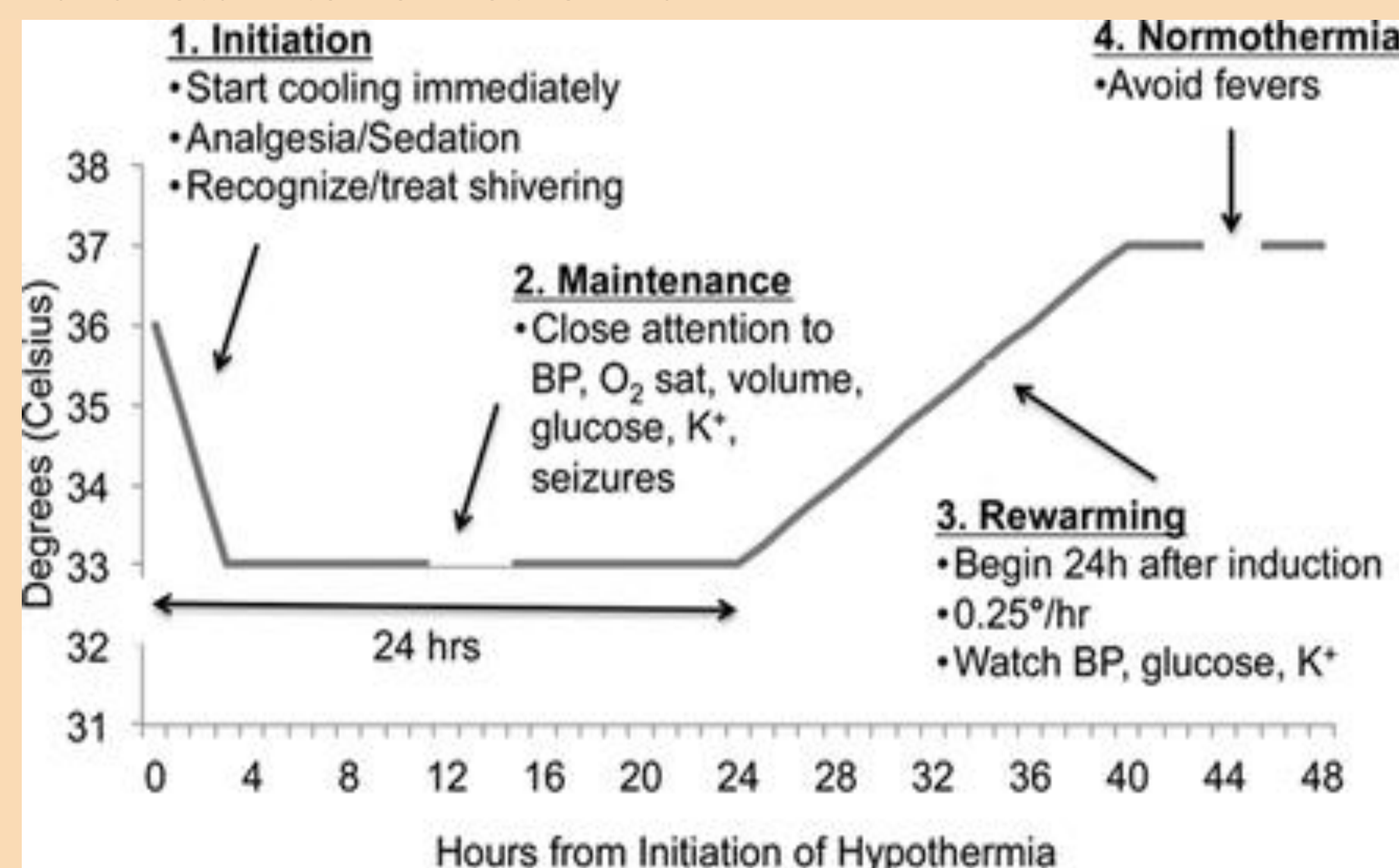


## HYPOTHERMIA PROTOCOL

American Heart Association (AHA) for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care (2010) guideline recommends:

Comatose adult patients with ROSC after out-of-hospital VF cardiac arrest should be cooled to 32°C–34°C (89.6°F–93.2°F) for 12 to 24 h. Induced hypothermia also may be considered for comatose adult patients with ROSC after in-hospital cardiac arrest of any initial rhythm or after out-of-hospital cardiac arrest with an initial rhythm of pulseless electric activity or asystole (Peberdy et al., 2010).

There are 4 stages of TH: initiation, maintenance, rewarming, and return to normothermia



## REVIEW OF LITERATURE

### Impact of Presenting Rhythm on Short and Long Term Neurologic Outcome in Comatose Survivors of Cardiac Arrest Treated with Therapeutic Hypothermia, 2014

A retrospective cohort study to compare short and long term neurologic outcomes in comatose survivors of out-of-hospital cardiac arrest treated with mild therapeutic hypothermia presenting with non-shockable vs. shockable initial rhythms. Data was collected from electronic health records of the emergency department and ICU of the University of Michigan Emergency Department. 57 non-shockable rhythms and 66 shockable rhythms treated with therapeutic hypothermia between 2006 and 2012 were reported. Analysis of data concluded that neurologic status tended to improve between hospital discharge and long term follow up (Terman et al., 2014).

### Therapeutic Hypothermia After Resuscitation from a Non-Shockable Rhythm Improves Outcomes in a Regionalized System of Cardiac Arrest Care, 2015

A retrospective cohort study to evaluate TH effects on neurologic outcome in patients resuscitated from a non-shockable out-of-hospital cardiac arrest rhythm. Data was maintained by the Los Angeles County EMS. Of the 1713 patients presenting with an initial non-shockable rhythm, TH was induced in 596 (42%) patients. The primary outcome of the study was survival to hospital discharge with good neurological outcome, as defined by a cerebral performance category (CPC) score at hospital discharge of 1 or 2. After analysis of the data, the researchers reported survival with good neurologic outcome occurred in 14% in the group receiving TH, compared with 5% in the group not treated with TH ( Sung et al., 2015).

### Functional Outcome, Cognition, and Quality of Life After Out-of-Hospital Cardiac Arrest and Therapeutic Hypothermia: Data from a Randomized Controlled Trial, 2015

A randomized control trial to evaluate functional neurologic and cognitive outcome and health related quality of life, 6 months after out-of-hospital cardiac arrest from ventricular fibrillation (OHCA-VF) treated with TH. After analysis, the researchers concluded that out of the 57 patients, 91% of OHCA-VF patient surviving 6 months after CA and TH were functionally independent and 95% of survivors had been able to return to their home. Intact cognitive performance (CPC 1) was observed in 49%, mild to moderate deficits (CPC 2) in 34% and severe cognitive deficits (CPC 3) in 17% of 41 patients assessed by neuropsychologist. Furthermore, the health-related quality of life of CA survivors did not differ from that of age and gender matched normal population. In conclusion, this study supports TH in cardiac arrest patients for shockable rhythms as their data provides evidence that it decreases the risk of neurologic and cognitive impairments (Tiainen et al., 2015)

## FACTORS EFFECTING NEUROLOGICAL OUTCOME

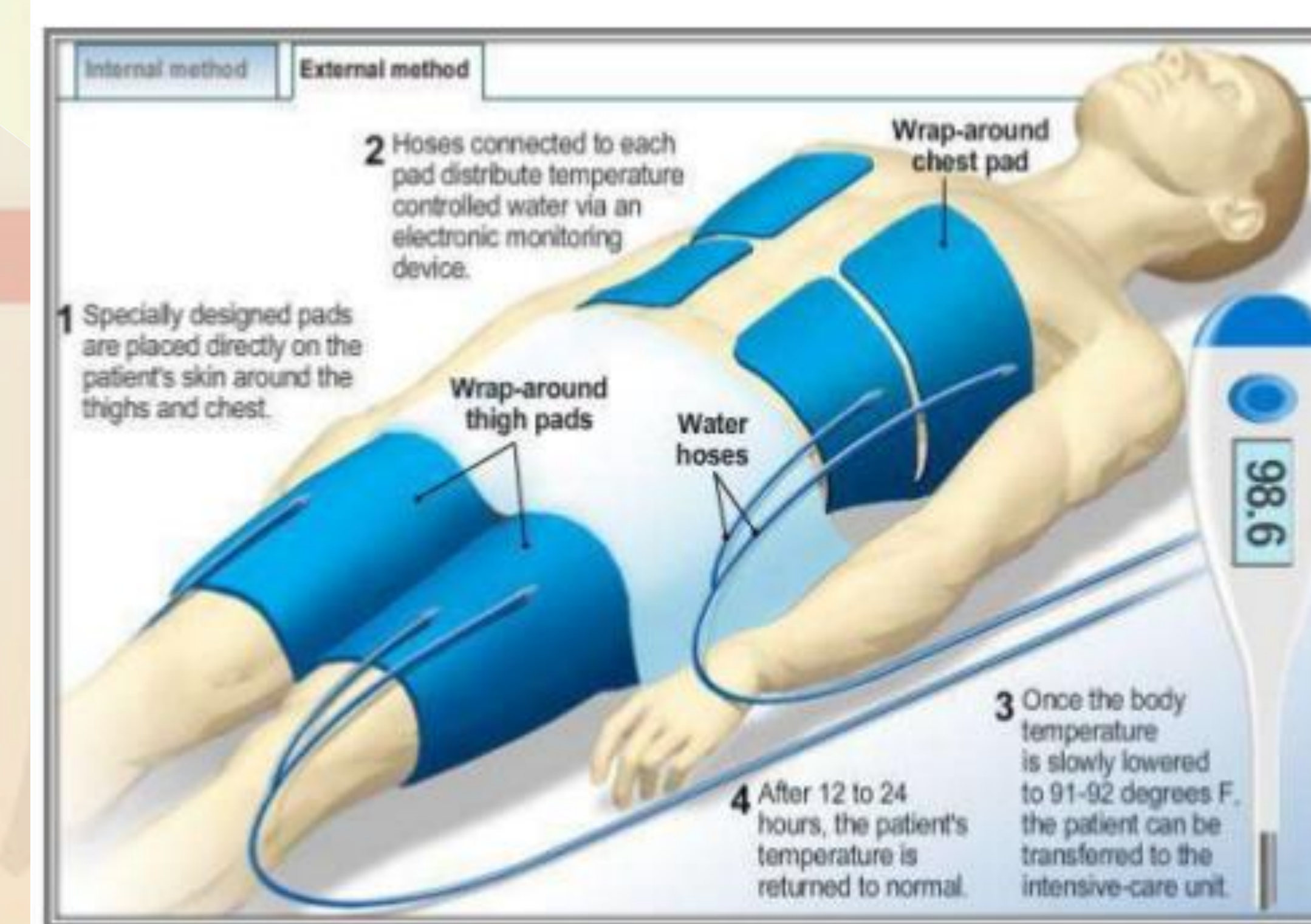
- Initial cardiac rhythm – shockable vs. non-shockable
- Cause of cardiac arrest
- Time until CPR and ROSC
- Underlying comorbidities
- Time of initiation of TH
- Cooling method
- Time of neurologic observation

(Scirica, 2013)

## BARRIERS TO TIMELY IMPLEMENTATION

- A delayed decision to implement therapeutic hypothermia
- Lack of protocols to guide implementation
- The volume of cardiac arrest patients treated
- Training and experience of staff
- Not achieving target temperature in fewer than 6 hours after the initiation

(Ryan Avery, O'Brien, Daddio Pierce, & Gazarian, 2015)



## FUTURE RESEARCH

- What's the best cooling method?
- What's the optimal cooling temperature?
- How long optimal temperature should be maintained?
- How soon should patients be brought to target temperature after achieving ROSC?
- Can TH help other patients, such as those who've had in-hospital arrests and those who are conscious but not at their baseline neurologic status after ROSC?
- Have all subpopulations of patients surviving cardiac arrest that benefit from therapeutic hypothermia been identified?

(Waters, 2014)

## IMPACT ON NURSING PRACTICE

- Nurses play a vital role in preventing, detecting, and treating adverse effects and complications of therapeutic hypothermia
- Care for patients receiving therapeutic hypothermia is highly complex and require intensive nursing monitoring
- Family support and education

(Deckard & Ebright, 2011)



## DISSEMINATION OF INFORMATION

- The American Heart Association
- The International Liaison Committee of Resuscitation
- American Board of Cardiovascular Medicine
- Preventive Cardiovascular Nurses Association
- The European Resuscitation Council

