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Therapeutic Hypothermia Following Cardiac Arrest

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Incidence
According to the Sudden Cardiac Arrest Foundation (2014), each year, 424,000 people in the United States experience EMS-assessed out-of-hospital cardiac arrest (OHCA) and only 10% of those survive to hospital discharge. The risk of death from cardiac arrest is 0.06% per person per year. This is roughly equivalent to the number of American males that will die of prostate cancer in any given year (Reiberger, 2005). A study by the European Heart Network showed that, in the post-2000 period, the number of OHCA victims increased steadily across Europe (European Heart Network, 2010). Hypothermia is a common form of accidental hypothermia due to cardiac arrest or other causes. With this in mind, it is critical to continue to improve the treatment of post-cardiac arrest patients. Hypothermia is used in an effort to preserve injured neurons and for cardioprotection (Malhotra et al., 2013). In 1937, Dr. Fay cooled a patient to 32˚C for 4 hours to arrest fibrillation of heart. This observation was the first example of hypothermia being used as a treatment and started the debate on the use of hypothermia in the treatment of cardiac arrest patients (Reiberger, 2005). In 2000, at the University of Washington, the first large scale clinical trial using hypothermia after cardiac arrest was performed in 424 patients (Donnino, 2010). In this study, 10% of patients who received hypothermia survived an out-of-hospital cardiac arrest (OHCA) to hospital discharge as compared to 4% of patients who received standard care. Additional clinical trials were performed by the European Society for Intensive Care Medicine (2010) and The Cardiac Arrest Network (2012) that showed that hypothermia significantly improved survival rates (7% vs. 3%).

Pathophysiology
Therapeutic hypothermia (TH) is the only intervention shown to improve neurological outcomes following cardiac arrest (Lundby, de Marez, & Hirsch, 2013). As described by Lundby, de Marez, and Hirsch (2013), hypothermia is subdivided into four stages: (1) mild hypothermia (32–34 °C); (2) moderate hypothermia (30–32 °C); (3) deep hypothermia (28–30 °C); and (4) profound hypothermia (less than 20˚C) both defined by cardiac dysrhythmias, shallow breathing and a progressive decline in consciousness (Donnino, 2010).

Eligibility Criteria
Table 2 describes the eligibility criteria for therapeutic hypothermia described by Malhotra et al. (2013).

Table 2 Functional cell changes in hypoxic-ischemic injury

Table 3 Initial eligibility criteria for therapeutic hypothermia

Table 4 Reversal of excitotoxic injury

Table 5 PECAN (Prehospital Early Cooling After Neurotrauma) study

Table 6 Criteria for ongoing monitoring

Table 7 Invasive monitoring

Table 8 Complications

Table 9 Table 4 briefly lists the possible adverse effects of therapeutic hypothermia described by Malhotra et al. (2013).

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Importance of Nursing

Nursing Implications

Conclusion
Now that nursing and multidisciplinary goal-directed post-cardiac arrest care includes hypothermia and has led to improved outcomes and a decrease in mortality and morbidity (Williams, Cakir, & Doronino, 2013). The timing of the onset of cardiac arrest, start of CPR, ROSC, hospital arrival, initiation of TH, reaching target temperature and being weaned are all important factors in determining the post-arrest outcome (Shinada et al., 2013). European research regarding the use of therapeutic hypothermia has been incorporated over a period of 4 years, half of 986 TH-treated OHCA patients observed and surveyed more than 95% with good neurological outcomes at long-term follow-up. Therapeutic hypothermia has shown to improve recovery results that can greatly impact the outcome of such a devastating pathophysiological injury.

References


