Effect Of Early Sustained Prophylactic Hypothermia On Neurologic Outcomes Among Patients With Severe Traumatic Brain Injury: The POLAR Randomized Clinical Trial
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SUMMARY

- Most hospitals have therapeutic hypothermia protocols in place for patients that get ROSC without return of neurologic function even though the two biggest and best studies on this topic showed no benefit over maintenance of a normal temperature.
- What about in patients with acute traumatic brain injury?
- The theory behind this is cold can attenuate cerebral inflammatory and biochemical cascades that are activated after an initial injury and are responsible for secondary brain injury. However, the cold could impact coagulopathy, bleeding and infection rates.
- A 2007 meta-analysis suggested that prophylactic hypothermia might decrease mortality and improve long term neurologic outcomes, but the only RCT included was negative.
- The POLAR RCT is a multicenter, multinational trial of patients with traumatic brain injury between 18 and 60 years old, GCS <9 who were intubated. They excluded patients with massive ongoing bleeding and who had a GCS of 3 or blown pupils.
- Patients were randomly assigned to hypothermia (33-35 degrees C) for at least 72 hours vs. normothermia.
- The primary outcomes was neurologic function based on the Glasgow Outcome Scale Extended (1 is dead, 7-8 is good recovery).
- 511 patients were enrolled with 266 to the hypothermia group and 245 to the normothermia group. Groups were similar at baseline (mid 30s, GCS 6).
- Interestingly, about 1/3 of patients in the hypothermia group had less than 48 hours of cooling and 1/3 never got to target temperature due to complications and physician decision.
- The primary outcome, patients having a favorable outcomes, was the same: 48.8% vs. 49.1%
- In terms of secondary outcomes, mortality was a little worse in the hypothermia group (21.2% vs. 18.4%) but most others were the same (ventilator days, ICU days, total LOS, 6 month mortality).
- Adverse events were fewer in the normothermia group (new or increased ICH and PNA) by only a few % points.
- When they ran the per protocol numbers, there was essentially no change in outcomes. However adverse events were substantially more (23% absolute difference) in those were were cooled.

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EDITOR’S COMMENTARY: This study found that for patients with severe traumatic brain injury, early prophylactic hypothermia compared with normothermia did not improve neurologic outcomes at 6 months. Even in a big multinational trial like this, there were some limitations that temper the conclusions in both directions - Many patients were enrolled in the pre-hospital setting before an actual head injury could be confirmed, many never got to or stayed at target cold temp and it was a convenience sample so many eligible patients were not enrolled because of physician decision. Given that this study along with prior RCT data on therapeutic hypothermia in TBI patients was fairly negative, I think this is basically it for the concept of cooling in brain injury. I would aim for normothermia (avoiding fever) in TBI patients.