An Evaluation of Post-Cardiac Arrest Outcomes among Patients Eligible for Targeted Temperature Management (TTM) at a Community Hospital

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Introduction

- 500,000 patients suffer from cardiac arrest per year in the United States.
- Modern resuscitation measures ensure patients survive the initial event, but prolonged hypoxia and reperfusion cause post-cardiac arrest syndrome in many patients.
- Post-cardiac arrest syndrome can include central neurological injury, myocardial dysfunction, and system-wide ischemic responses.
- Central neurological injury has been deemed the primary cause of death in two-thirds of post-arrest patients.
- Targeted temperature management (TTM) is a therapy endorsed by national and international organizations, indicated for post-cardiac arrest neurological injury.
- Eligibility for TTM includes a full code status, Glasgow Coma scale of less than 8, and absence of conditions such as hemorrhage, sepsis and shock.

Background

- TTM has been shown in randomized control trials to prevent permanent neurological dysfunction by as much as 50%.
- 13% of hospitals have a TTM protocol in place.
- Overall, up to 2% of all cardiac arrest patients receive the therapy in previous utilization studies.
- Community hospital settings are less likely to provide the treatment.
- Supportive therapies used during TTM, such as vasopressors and neuromuscular blockade (NMB) may effect the outcomes of TTM (evidence is inconclusive).
- Prolonged and abbreviated time ranges from return of spontaneous circulation (ROSC) to goal temperature have been shown to impact survival rates and neurological function.

Methods

- A list of records with the following ICD codes of 427.5, 847 or 446 between January 2015 through December 2016 was provided by the project site’s quality department.
- A total of 424 records contained a code for cardiac arrest.
- Cardiac arrest records were screened for TTM eligibility criteria.

Results

- All records deemed eligible (n=61) were reviewed for TTM utilization and survival (primary outcomes of interest).
- Records with a recorded time of death were considered expired. Records without a recorded time of death were considered to have survived.
- Records that did not have a signed TTM order set were categorized as not receiving the therapy.
- Records containing a signed TTM order set were considered to have received the therapy.

Discussion

- Considerable variability exists within the literature regarding TTM utilization within the post-cardiac arrest population.
- Previous literature estimates utilization of TTM at 0.35-2% of all adult cardiac arrest patients.
- This project found a 6% utilization rate amongst all records screened for eligibility.
- Further screening for TTM eligibility was also performed and 43% in the eligible sample received TTM.
- Survival rates are lower than previous sentinel mortality figures regardless of receiving TTM or not.
- Many factors, including NMB usage (92% in TTM group) and time to goal temperature, may have contributed to survival.
- Significant differences in gender and survival were seen, favoring males, among all TTM eligible records.
- No difference in survival was observed based upon gender in TTM vs non-TTM groups.

Recommendations

- Revise TTM protocol to remove possible contributors to inefficacy, such as unnecessary neuromuscular blockade use, vasopressor use, over-sedation, and consideration of time to goal temperature.
- Conduct further research regarding ROSC time to goal temperature, survival, and possible confounding factors for further policy development and practice modification.
- Introduction of objective shivering assessment tool in order to optimize NMB use.

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