Underutilization of Therapeutic Hypothermia After Sudden Cardiac Arrest in United States: A 10 Year Perspective

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Background
- In 2002, International Liaison Committee on Resuscitation recommended that unconscious adults patients with spontaneous circulation after an out of hospital ventricular fibrillation (VF) arrest receive cooling to 32-34°C for 12-24 hours.
- Therapeutic hypothermia (TH) improves neurologic outcomes in resuscitated cardiac arrest (CA) patients.
- Institution of therapeutic hypothermia is a Class I indication after a VT/VF cardiac arrest and a Class IIb indication after a non-VT/VF arrest.
- Our aim was to examine trends and predictors of therapeutic hypothermia utilization after cardiac arrest using a large national database.

Methods
- NIS is nation’s largest all payer database, approximating a 20% stratified national sample.
- We searched NIS from 2002 to 2011 for all patients >18 years age with cardiac arrest (CA) using ICD-9 codes 427.5 & V12.53 in any diagnoses fields.
- Therapeutic hypothermia was identified using ICD-9 procedure code 99.81.
- Chi-square test for trend was used to identify trends in TH utilization over the years.
- Logistic regression models were created to identify the predictors of TH utilization.

Results
- 2,300 out of 297,522 (0.77%) patients underwent TH.
- Mean age of patients with TH was 60.9 ± 16.0 years.
- Mean age of patients without TH was 67.1 ± 16.2 years.
- 38.7% females in TH group compared to 45.6% females in no TH group.
- 74.4% Caucasians & 12.3% African Americans in TH group compared to 69.2% Caucasians & 16.1% African Americans in no TH group.

Table 1. Predictors of Utilization of Therapeutic Hypothermia in Patients Presenting With Cardiac Arrest

<table>
<thead>
<tr>
<th>Predictor</th>
<th>OR</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;65 years</td>
<td>0.59</td>
<td>0.53-0.65</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female gender</td>
<td>0.85</td>
<td>0.78-0.93</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>1.69</td>
<td>1.54-1.85</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Deyo-Charlson Score*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.90</td>
<td>0.81-1.01</td>
<td>0.07</td>
</tr>
<tr>
<td>3 or more</td>
<td>0.87</td>
<td>0.79-0.96</td>
<td>0.006</td>
</tr>
<tr>
<td>Primary Payer*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private insurance</td>
<td>1.24</td>
<td>1.11-1.37</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Self-pay/Other</td>
<td>1.33</td>
<td>1.15-1.53</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Teaching hospital</td>
<td>1.19</td>
<td>1.10-1.30</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Large hospital bed size</td>
<td>1.34</td>
<td>1.22-1.47</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hospital RegionE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwest</td>
<td>0.86</td>
<td>0.76-0.98</td>
<td>0.021</td>
</tr>
<tr>
<td>South</td>
<td>0.55</td>
<td>0.49-0.62</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>West</td>
<td>1.25</td>
<td>1.10-1.41</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* (Deyo Charlson Score 0-1 considered as referent, Medicare/Medicaid considered as referent, E Northeast Hospital Region considered as referent)

Conclusions
- Inability to determine shockable rhythm or eligibility of therapeutic hypothermia at presentation is a major limitation of the database. This may result in underestimation of utilization rates.
- Hypothermia is less likely to be utilized in women, older patients & in those with multiple comorbidities.
- Need to explore reasons for gender differences.

REFERENCES: