Time to intra-arrest hypothermia and its association with neurologic outcome

1. SUMMARY PRINCESS
2. TIME ASSOCIATION
3. POOLED ANALYSIS

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DISCLOSURES:
Laerdal Foundation
Swedish Heart and Lung Foundation
BrainCool AB – provided cooling devices without cost
princess

OUT-OF-HOSPITAL CARDIAC ARRESTS

- Intra-arrest cooling
  - Cooling at ICU
- Standard care
  - Cooling at ICU

 CPC 1-2 at 90 days

CPC 1
GOOD CEREBRAL PERFORMANCE

CPC 2
MODERATE CEREBRAL DISABILITY

CPC 3
SEVERE CEREBRAL DISABILITY

CPC 4
COMA OR VEGETATIVE STATE

CPC 5
BRAIN DEATH
Cooling method

TRANSNASAL EVAPORATIVE COOLING

- Primarily brain cooling
- Easy to use, early initiation
- Non-invasive
- Continuous cooling
- No volume load
677 patients

343 intervention versus 334 Controls

Inclusion criteria
- Bystander witnessed OHCA
- Age ≥18 years

Predefined subgroup: Ventricular fibrillation

Exclusion criteria
- Age ≥80 years
- Obvious non-cardiac cause
- ROSC prior to randomization
- EMS time > 15 minutes

677 patients
343 intervention versus 334 Controls
PRIMAR Y OUTCOME

Ventricular fibrillation

% cpc 1-2 at 90 days

INTERVENTION

34.8%

p=0.11

CONTR OL

25.9%

p=0.25
Complete recovery

cpc 1 at 90 days

Ventricular fibrillation

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>32.6%</td>
<td>20%</td>
</tr>
<tr>
<td>P-value</td>
<td>P=0.02</td>
<td>P=0.09</td>
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</tbody>
</table>

14.8% vs 10.5%
TIME ASSOCIATION

- EMS INITIATED CPR: 9 MINUTES
- AIRWAY ESTABLISHED: 14 MINUTES
- TIME TO RANDOMIZATION: 17 MINUTES
- COOLING STARTED: 19 MINUTES
TIME TO randomization

cpc 1-2 at 90 days

- 0-9 min: 44% (44%)
- 10-19 min: 32% (19%)
- 20-29 min: 19% (9%)
- >30 min: 12% (7%)
TIME TO randomization

Ventricular fibrillation

cpc 1-2 at 90 days

0-9 min: 75%
10-19 min: 53%
20-29 min: 43%
>30 min: 18%
Propensity Score matching

Age, Gender, Rhythm, Randomization time, Bystander cpr, Study site

343 patients were randomized

- Intervention (Intra-arrest cooling)
  - 179 were excluded (Cooling ≥20 min or no cooling)

- 164 Cooling <20 min
  - 14 were excluded (No matching)

677 patients were randomized

334 Control (Cooling at hospital)

300 patients were matched

150 were included in the analysis

150 were included in the analysis
## Study population

After propensity score matching

<table>
<thead>
<tr>
<th>Intra-arrest cooling</th>
<th>variables</th>
<th>control</th>
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</thead>
<tbody>
<tr>
<td>64 years</td>
<td>AGE</td>
<td>66 years</td>
</tr>
<tr>
<td>24%</td>
<td>Sex, woman</td>
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<tr>
<td>38%</td>
<td>Rhythm, VF</td>
<td>38%</td>
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<tr>
<td>59%</td>
<td>Bystander Cpr</td>
<td>57%</td>
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<tr>
<td>13 min</td>
<td>Randomization</td>
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TIME TO cooling <20 min

cpc 1-2 at 90 days

<table>
<thead>
<tr>
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<th>Intervention</th>
<th>Control</th>
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<tbody>
<tr>
<td>%</td>
<td>23.3%</td>
<td>16%</td>
</tr>
<tr>
<td>p</td>
<td>0.07</td>
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TIME TO cooling <20 min

Ventricular fibrillation

cpc 1-2 at 90 days

- **INTERVENTION**: 50.9%
- **CONTROL**: 29.8%

p=0.03
Kaplan Meier curve

Survival with cpc 1-2 at 90 days

Shockable Rhythms

\[ p = 0.027 \]
Kaplan Meier curve

Survival with cpc 1-2 at 90 days

p = 0.83

NON-SHOCKABLE RHYTHMS

<table>
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<tr>
<th>Control</th>
<th>264</th>
<th>13</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>249</td>
<td>11</td>
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In summary

**INTRA-ARREST COOLING <20MIN compared to HOSPITAL COOLING**

- A significant difference in CPC1-2 in patients with ventricular fibrillation.
- Time matters – the earlier, the better
- Rhythm matter – Shockable rhythms compared to non-shockable rhythms
- Pooled analysis (PRINCE and PRINCESS) strengthens the results from the PRINCESS trial
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