

<p><b>Stage I: Begin Cooling</b></p>	<p><b>Hx of present illness:</b> 45 y/o male patient who had been complaining of severe sharp chest pain with radiation to the left arm. Three minutes prior to EMS arrival, pt collapsed and bystander compression only CPR was initiated. Upon EMS arrival, ACLS guidelines were initiated for VF; pt was given 2 mg of epinephrine, intubated, defibrillated 2 times and ROSC was achieved. Down time was 14 minutes. Pt was given 2 liters of cooled NS in the field. In the ER pt received right radial a. Line &gt; Right IJ TLC &gt; placed on the Vent AC 16 / TV 600 / FIO2 100% / PEEP +5 &gt; sedated with fentanyl 100meq bolus &amp; gtt started at 50meq/hr / Versed bolus 2mg given and Versed gtt 0.5mg/hr started.</p>															
<p><b>Vital Signs &amp; Comments</b></p> <p><b>BP:</b> 108/50 MAP 73 and dropping  <b>HR:</b> 66 and dropping  <b>RR:</b> 16/3  <b>SaO2:</b> 98  <b>Temp:</b> 36.4°C  <b>Lungs:</b> Clear  <b>Heart:</b> S3  <b>Rhythm:</b> SR with PAC's  <b>CVP:</b> 7  <b>Urine output:</b> 150ml/hour  <b>BIS</b> = 75  <b>ETCO2</b> = 39  <b>Weight</b> = 70kg</p>	<p><b>Participants Should</b></p> <ol style="list-style-type: none"> <li>1. Read and follow orders lines are placed</li> <li>2. Apply Arctic Sun Device™ and Pads and activate automatic mode on the cooling unit and set target temp at 33 degrees</li> <li>3. Recognizes BIS is &gt; 60 so the students titrate up the Versed and Fentanyl</li> <li>4. Applies counter re-warming blankets to hands and feet</li> <li>5. Recognizes need for additional fluid &gt; reviews orders &gt; based on CVP &amp; Lactic acid &gt; bolus of cooled NS is started.</li> <li>6. Recognizes MG is low and calls for replacement.</li> </ol>	<p><b>Debriefing Questions &amp; Answers</b></p> <ol style="list-style-type: none"> <li>1. Name 3 cardiac dysrhythmias that may happen to Jack Frost?             <ol style="list-style-type: none"> <li>a. VF</li> <li>b. Bradycardia</li> <li>c. PEA</li> </ol> </li> <li>2. Define mild, moderate, and severe hypothermia?             <ol style="list-style-type: none"> <li>a. Mild &gt; 34°C</li> <li>b. Moderate 30°C to 34 °C</li> <li>c. Severe &lt; 30°C</li> </ol> </li> <li>3. At what temperature would you expect the pt to shiver?             <ol style="list-style-type: none"> <li>a. The clinical hallmark of mild hypothermia is the onset of shivering which occurs with temperature of &lt; 35°C (American Heart Association 2008)</li> </ol> </li> </ol>														
<p><b>Recommended Doctor's Orders:</b></p>		<p><b>Diagnostic Results:</b></p>														
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<p><b>Stage II: Cooling</b></p>	<p><b>In Stage II:</b> The Arctic Sun Device™ is already applied Temperature is falling in “simulation time” BP, MAP and HR are dropping. Extremities are turning blue. Once Stage II starts pt will become blue over 1 min, HR/BP falls and Temp falls. Pt shivers once temperature reaches 35.8°C.</p>													
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<p><b>Following are at conclusion of Stage II</b></p> <p><b>BP:</b> 80/60 MAP 66  <b>HR:</b> 52  <b>RR:</b> 16/ 2  <b>SaO2:</b> 98  <b>Temp:</b> start 35.8 &gt; 33.7°C  <b>Lungs:</b> Clear  <b>Heart:</b> S3  <b>Rhythm:</b> SB 1<sup>st</sup> degree AVB with PAC's  <b>CVP:</b> 8  <b>BIS =</b> 52  <b>ETCO2 =</b> 38  <b>Weight =</b> 70kg</p>	<ol style="list-style-type: none"> <li>As BP drops participants give the NS as ordered.</li> <li>At 35.8°C Pt starts to shiver and participants should give Demerol 12.5mg IVP</li> <li>Pt continues shiver Demerol 12.5mg IVP given</li> <li>Pt continues shiver Nimbex times 2 is given</li> <li>Recognizes BIS is <math>\geq 60</math> so the students titrate up the Versed and Fentanyl</li> </ol>	<ol style="list-style-type: none"> <li>If Jack Frost was to arrest while his core temp is between 30°C to 34 °C what changes in the ACLS algorithm would need to be considered ?             <ol style="list-style-type: none"> <li>If the core temperature is &gt; 30°C , IV medications may be administered BUT at increased intervals between doses. There are no recommendations as to what intervals should be. (American Heart Association 2008)</li> </ol> </li> <li>What are your fluid resustatsion goals for Jack Frost?             <ol style="list-style-type: none"> <li>Lactic acid &lt; 4</li> <li>CVP &gt; 12</li> <li>MAP &gt;70</li> <li>SAP &gt; 90</li> </ol> </li> <li>What electrolyte should be maintained on the high end of normal to help prevent shivering?             <ol style="list-style-type: none"> <li>Magnesium</li> </ol> </li> </ol>												
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<p><b>Stage III: Cooled</b></p>	<p><b>In Stage III:</b> Begins with the patient improving and stabilizing as all the gtt's are titrated up and fluids are given. Temperature drops to 33.2°C. VS stabilize and scenario concludes with immediate debriefing.</p>															
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<p><b>Following are at conclusion of Stage III</b></p> <p><b>BP:</b> 110/70 MAP 83  <b>HR:</b> 58  <b>RR:</b> 16/ 0  <b>SaO2:</b> 98  <b>Temp:</b> 33.2°C  <b>Lungs:</b> clear  <b>Heart:</b> S3  <b>Rhythm:</b> SB 1<sup>st</sup> degree AVB with PAC's  <b>CVP:</b> 14  <b>BIS =</b> 51  <b>ETCO2 =</b> 37  <b>Weight =</b> 70kg</p>	<ol style="list-style-type: none"> <li>As pt condition improves participants should continue to monitor the pt.</li> <li>Continue to titrate gtt to achieve clinical end points</li> </ol>	<ol style="list-style-type: none"> <li>What is your target temperature range Jack Frost?                     <ol style="list-style-type: none"> <li>32 – 34 °C with 33°C</li> </ol> </li> <li>What laboratory value should be monitored and how often?                     <ol style="list-style-type: none"> <li>Potassium and Magnesium every 4 hours.</li> </ol> </li> <li>How long should the treatment be maintained and when does the “clock” start?                     <ol style="list-style-type: none"> <li>24 hours</li> <li>Once the pt is at goal temperature</li> </ol> </li> </ol>														
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<p><b>Stage IV: Re-warming Begins</b></p>	<p><b>In Stage IV:</b> Begins with Jack as stable temperature 33 °C. He is only on Versed at 5mg/hr and Fentanyl at 150meq/hr. Arctic Sun Device™ is set to re-warm at a rate of 0.5 °C per hour</p>															
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<p><b>BP:</b> 110/70 MAP 83  <b>HR:</b> 58  <b>RR:</b> 16/0  <b>SaO2:</b> 98  <b>Temp:</b> 33.1°C and rising  <b>Lungs:</b> clear  <b>Heart:</b> S3  <b>Rhythm:</b> SB 1<sup>st</sup> degree AVB with PVC's  <b>CVP:</b> 14  <b>BIS =</b> 51  <b>ETCO2 =</b> 37  <b>Weight =</b> 70kg</p>	<ol style="list-style-type: none"> <li>Participants Set target temperature to 36.5 °C and re-warm at a rate of 0.5 °C per hour with the Arctic Sun in automatic mode</li> <li>Continue to maintain sedative and analgesic drips until patient's temperature is 36.5 °C.</li> </ol>	<ol style="list-style-type: none"> <li>What is the maximum re-warming rate and what is the goal temperature?                     <ol style="list-style-type: none"> <li>0.5 °C per hour with 36°C as the goal</li> </ol> </li> <li>What laboratory value should be monitored and how often?                     <ol style="list-style-type: none"> <li>Potassium and Magnesium every 4 hours.</li> </ol> </li> </ol>														
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<p><b>Stage V: Re-warming</b></p>	<p><b>In Stage V:</b> Begins with Jack turning unstable as his temperature rises. His rhythm change to SR with PVC's with runs of VT. MAP and BP drops requiring more fluids and start of dobutrex. Once temperature rises to 35.1°C patient starts to shiver.</p>													
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<p><b>BP:</b> 80/40 MAP 65  <b>HR:</b> 58 and climbing  <b>RR:</b> 16  <b>SaO2:</b> 98  <b>Temp:</b> 33.2°C and climbing (shivers at 35.1°C)  <b>Lungs:</b> clear  <b>Heart:</b> S3  <b>Rhythm:</b> SB &gt; SR 1<sup>st</sup> degree AVB with PVC's and 10second runs of VT  <b>CVP:</b> 10  <b>BIS =</b> 65  <b>ETCO2 =</b> 38  <b>Weight =</b> 70kg</p>	<ol style="list-style-type: none"> <li>Participants recognize that Jack is not stable temperature is rising, BP is dropping and he is having runs of VT.</li> <li>BIS is now 65 Continue to titrate sedative and analgesic drips for BIS &lt; 60.</li> <li>Give albumin 5%/250ml as ordered</li> <li>Starts Dobutrex gtt and titrates for MAP &gt; 70</li> <li>Sends for STAT potassium and magnesium level (K is 5.8 &amp; magnesium is 2.0) orders received.</li> <li>For the shivering participants give demerol x2 and Nimbex X 1 (shivering stops)</li> </ol>	<ol style="list-style-type: none"> <li>Why was Jack unstable during the re-warming?             <ol style="list-style-type: none"> <li>As he re-warms he will vaso-dilate</li> <li>Potassium will shift out of the cells and can cause temporary arrhythmias.</li> </ol> </li> <li>Why did we treat the hypotension with only 250 ml of albumin before we went to dobutrex?             <ol style="list-style-type: none"> <li>He was already volume resituated CVP is borderline.</li> <li>He has a weak heart due to the MI and he is no longer going to have cold diuresis. So now needs inotropic support. Could have chosen levophed as well.</li> </ol> </li> </ol>												
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<p><b>Stage VI: Re-warmed</b></p>	<p><b>In Stage VI:</b> Begins with Jack turning around and stabilizes as his temperature rises to 36 °C. His rhythm changes back to SR. MAP and BP improves with dobutrex and there is no more shivering. He is stable and ready to be weaned from the sedatives and ventilator.</p>													
<p><b>Vital Signs &amp; Comments</b></p>	<p><b>Participants Should</b></p>	<p><b>Debriefing Questions &amp; Answers</b></p>												
<p><b>BP:</b> 120/80 MAP 80  <b>HR:</b> 80  <b>RR:</b> 16  <b>SaO2:</b> 98  <b>Temp:</b> 36.2°C  <b>Lungs:</b> clear  <b>Heart:</b> S3  <b>Rhythm:</b> SR  <b>CVP:</b> 13  <b>BIS =</b> 45  <b>ETCO2 =</b> 37  <b>Weight =</b> 70kg</p>	<ol style="list-style-type: none"> <li>1. Recognize that the patient has stabilized.</li> <li>2. Obtain orders for weaning sedatives and ventilator.</li> </ol>	<ol style="list-style-type: none"> <li>1. What have you learned from this simulation?             <ol style="list-style-type: none"> <li>a. Let participants answer</li> </ol> </li> <li>2. What are some key take home points?             <ol style="list-style-type: none"> <li>a. Hypothermia can improve neurologic outcomes for survivors of cardiac arrest.</li> <li>b. Is not that complicated but there needs to be due caution.</li> <li>c. Major side effects is arrhythmias and electrolyte shifts.</li> <li>d. TH is a team effort from EMS - ER -Cath Lab- ICU</li> <li>e. Must maintain fluid volume</li> <li>f. Must maintain 33 °C for 24 hours</li> </ol> </li> </ol>												
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## References

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