

## Targeted Temperature Management (TTM)

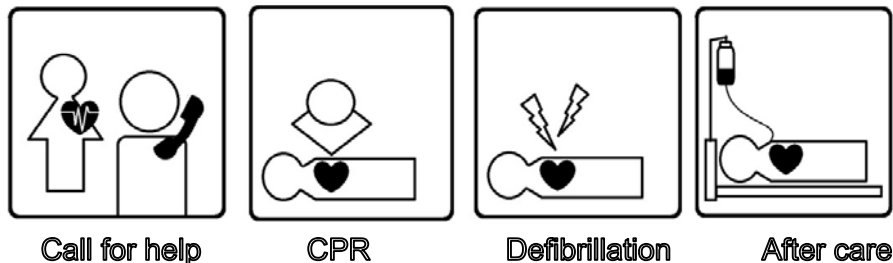


Figure 1. A patient undergoing TTM with an external cooling device

### What is TTM?

**TTM** is an active treatment that tries to achieve and maintain a specific body temperature in a person for a specific duration of time in order to lessen the injury to the brain after cardiac arrest.

### Figure 2. Chain of events during Cardiac arrest



Cardiac arrest means that the heart stops pumping out blood normally. Without heartbeat, blood does not flow around the body and oxygen does not reach the brain and other organs.

If eventually the pulse returns after CPR but the patient does not wake up fully, it means that the brain may have been injured during the period of cessation of blood flow (ischemic injury). TTM can be started to reduce the metabolic rate of the brain, and it has been found to reduce the damage when blood flow resumes through the brain after cardiac arrest. We call this additional damage “reperfusion injury”.

However, not all cardiac arrest patients will benefit from this treatment, especially those who have coma due to some other causes like severe infection, heart failure,

etc. Patients who require prolonged CPR may not benefit from TTM because these patients often will be in very poor condition and may even die.

### ***How is it done?***

We usually lower the body temperature by a combination of methods, for example, ice packs, cooling mattress, cooling blanket, external cooling device (Figure 1). We can also insert a catheter into the blood vessel to infuse ice-cold saline into the vein. The body temperature is kept at 32-36°C (cooling period) for at least 24 hours upon decision of ICU doctor. After 24 hours cooling period, patients are slowly rewarmed to reach targeted temperature at 36-37°C and their body temperature will be kept normal until 72 hours post cardiac arrest.

### ***Why is there a need to do it?***

TTM can reduce brain injury, improve survival and neurological outcome in post-cardiopulmonary resuscitation patients. Certainly, cardiac arrest is an extremely grave condition. Even though TTM is achieved, many patients after cardiac arrest may not survive and may have significant impairment in functions. The final outcome depends on the severity and duration of cessation of blood flow when the brain receives no oxygen supply.

### ***Risk and complications***

TTM may lead to fluid and electrolyte imbalances, arrhythmias, insulin resistance, shivering, coagulation problems, pancreatitis, infection, skin breakdown and other adverse effects.

### ***Possibility that the procedure cannot be carried out***

Sometimes targeted body temperature may not be reached or maintained using the above methods. For examples, shivering occurs and may be counterproductive to induce cooling. The fact is that not every cardiac arrest patient is suitable for TTM, e.g. traumatic cardiac arrest and active bleeding. The doctor will assess and decide to use TTM for the suitable patient.

### ***Other treatment options***

If the patient chooses not to perform this procedure, it may affect the overall condition. The change of the condition is affected by a variety of clinical factors, including the individual patient's physical condition before the onset of illness, the type of disease, the response to treatment and the progress, etc. Your doctor will explain other suitable options to you.



Coordinating Committee in Intensive Care  
Effective date: 1 March 2020  
Version3.0

Targeted Temperature Management (目標體溫治療)  
Document no.: PILIC0250E version3.0  
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### ***Disclaimer***

The information provided in this booklet is for general reference only. The risks and complications listed above are not exhaustive. Please consult your attending doctor for details.