

Targeted Temperature Management Q & A Podcast

- Liz Olsen: [00:04](#) The use of therapeutic hypothermia is a centuries old technique. In modern times now referred to as targeted temperature management. The practice is a class one guideline, according to the American Heart Association. Despite the evidentiary support, many hospitals still lack the protocols to include this therapy in their post-cardiac arrest care protocols.
- I'm Liz Olson with the American Heart Association, and today we're here to answer your cooling questions on targeted temperature management. We'll be talking with two physician experts from Get with the Guidelines Resuscitation AHA's premier quality improvement resource for in-hospital resuscitation.
- On our recent webinar, Fundamentals of Targeted Temperature Management, we took your questions and today we'd like to revisit some of the most frequently asked questions on targeted temperature management. I want to welcome my guests for today, Dr. Tia Raymond and Dr. Steve Bradley. Dr. Raymond, would you tell us a little bit about yourself?
- Dr. Tia Raymond: [00:57](#) Sure. So I'm a pediatric cardiac intensive care physician. I work at Medical City Children's Hospital in Dallas, Texas. I primarily take care of infants, and children, and young adults who have cardiac issues, mostly post-surgical. My research interests for about the last 15 years has been on resuscitation and specifically, pediatric in-hospital cardiac arrest.
- Liz Olsen: [01:23](#) That's fantastic. Dr. Bradley, tell us a little bit about yourself.
- Dr. Steve Bradley: [01:26](#) Thanks, Liz. I'm Steve Bradley. I'm a general noninvasive cardiologist in Minneapolis at the Minneapolis Heart Institute, part of a line of health. I'm trained as a health services and outcomes researcher, and have spent a good portion of my energy on identifying ways that we can improve the quality and outcomes of care for our patients, and part of that has spread into work around resuscitation and participation to go with the guidelines resuscitation. I now co lead the Healthcare Delivery Innovation Center for MHI Minneapolis Heart Institute [inaudible 00:01:55].
- Liz Olsen: [01:56](#) Great. Thank you. Well, it's wonderful to have you both here with me today. Let's start with the basics, what is targeted temperature management and what's its purpose?
- Dr. Tia Raymond: [02:05](#) So I'll start, Liz. This is Tia. Targeted temperature management refers to the control of the temperature, the core temperature of

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patients who have achieved return of spontaneous circulation after either an out-of-hospital cardiac arrest or an in-hospital cardiac arrest. So lots of literature has been published about post-cardiac arrest syndrome, which includes post-cardiac arrest brain injury specifically, and so targeted temperature management and the use of hypothermia, as well as avoidance of fever more specifically, has been shown in both pediatric and adult literature to result in improvements in neurologic function. So that is the goal not only to have ROSC, but to have neurologically intact survival after either an in or out-of-hospital cardiac arrest.

Dr. Steve Bradley:

[02:59](#)

I'll just piggyback on that to say it's the neurologic outcomes that are amongst the most significant after a cardiac arrest. A big intent of therapeutic hypothermia targeted temperature management is to improve neurologic outcomes and thereby, improve overall outcomes for patients who suffer cardiac arrest. One of the things to keep in mind, Liz you mentioned therapeutic hypothermia, and we've used the term targeted temperature management, is to recognize that that term came about as a result of a study that compared to specific temperature goals that didn't specifically find outcome differences, whether or not patients were driven to a temperature of 33 degrees Celsius or 36 degrees Celsius after a cardiac arrest. But both of those temperatures required active management, they required the concepts of therapeutic hypothermia. So there's, I think, a misperception that it's all about fever avoidance, but in fact, the benefit of the therapy is to drive down temperature to those targeted levels to improve neurologic outcomes to improve outcomes after cardiac arrest.

Liz Olsen:

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One of the most frequently asked questions we've gotten is how to know when we should start targeted temperature management and how do we know when it's worked? When do we rewarm?

Dr. Tia Raymond:

[04:11](#)

So there's three phases of targeted temperature management, so the first is the induction phase, the second is maintenance of the temperature, and then the third phase is rewarming. So one of the key things to initiate targeted temperature management in these patients who have achieved ROSC is to start it within the first six to eight hours after achieving ROSC. If you wait much longer, then you've probably lost the benefits of targeted temperature management. After the first eight hours, the maintenance phase is continued for approximately 24 to 72 hours, depending upon how long you're going to cool the patient or to keep the patient normal thermic. And then following that is the rewarming period, which usually can take about 24 hours because the thought is that you want to raise the temperature back up to normal, very slowly.

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- Dr. Steve Bradley: [05:12](#) One of the things that Tia and I were commenting about earlier is we care for different populations and so there may be nuances between pediatrics and adults that we don't even think about just because we don't necessarily have overlap in our populations. I'll say that the concepts for adults are largely similar. The first is that the patient population are those that have suffered cardiac arrest and are in persistent coma, so not intentionally responsive. Our best evidence is that that's most effective for patients who have suffered out-of-hospital cardiac arrest with a shockable rhythm, but current guidelines recommend use of therapeutic hypothermia or targeted temperature management in anybody who's suffered cardiac arrest, regardless of whether or not it's out-of-hospital, in-hospital, and regardless of whether or not it's a shockable or non shockable rhythm, if they have persistent coma.
- The other part is to recommend that in that population, that you initiate targeted temperature management as soon as possible with one caveat. So there have been studies looking at initiation of targeted temperature management through the use of bolus cold IV infusion, saline fusions in patients prehospital that did not improve outcomes and concern for harm. So it's not recommended to use bolus IV infusions prior to hospital arrival. Whether or not there are benefits to other approaches to cooling prior to hospital arrival is still in debate under study, but essentially initiating targeted temperature management as soon as possible. And the other concept of duration and rewarming as outlined by Dr. Raymond.
- Liz Olsen: [06:49](#) You mentioned some of the considerations when administering TTM, are there any specific exclusions to implementing TTM that we would need to be aware of?
- Dr. Tia Raymond: [07:00](#) Yeah, so there actually are a couple of instances where it's contraindicated. So one would be uncontrolled bleeding, recent surgery. Steve had mentioned that the patient needs to become comatose, so if the patient following ROSC is awake and is actually able to follow verbal commands, then that would be a relative contraindication. Issues with arrhythmias and QTC prolongation also should be thought about and discussed if the patient is in a septic shock, and then finally, the thing that I had said earlier is the time to initiating targeted temperature management. So if the event happened more than six to eight hours, then it's probably too late.
- Liz Olsen: [07:47](#) For pediatrics, in this case, are there any pediatric specific... You mentioned verbal commands for a small child who may not have the physical skill, are there any specific pediatric considerations?

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- Dr. Tia Raymond: [07:59](#) Yeah. So I mean, you can't follow verbal commands if you're an infant, but certainly they can follow other commands. So if you tell, lift your finger, squeeze my finger, push your foot against my hand, that's another ability to follow commands for an infant.
- Liz Olsen: [08:19](#) In that same train of thought, thinking about specific patient populations, special considerations for more vulnerable populations before we initiate TTM?
- Dr. Steve Bradley: [08:30](#) I'll piggyback on what Dr. Raymond said to say that the absolute contraindications as were outlined, important to think about other ways that targeted temperature management can lead to challenges and management. One is that it does have an impact on the effectiveness of leukocytes, so there's an increased risk of infection. The studies that have been conducted in targeted temperature management and have not seen that those infection rates are dramatic or tied to increased risk of mortality, but something to be aware of. That's the reason for that contraindication in patients with an ongoing infection or a systemic shock from their infection. The others are glycemic issues, so particularly patients with diabetes who have insulin resistance. Hypothermia can contribute to insulin resistance and thus, raise blood sugar levels. So awareness and monitoring of glycemic control. And then finally with rewarming in particular, there can be changes in electrolyte balance, and so close monitoring for electrolyte imbalances, and particularly amongst patients who have renal dysfunction as these imbalances can become more severe.
- Liz Olsen: [09:39](#) For patients who have gone through targeted temperature management, how do you measure patient outcomes?
- Dr. Tia Raymond: [09:47](#) So obviously the outcome variables that we follow following cardiac arrest include ROSC, so return of spontaneous circulation, there are also patients who will be resuscitated to ECMO, and so ECPR or ROC with ECMO is another outcome variable, 24 hours survival is an outcome variable that we follow and then survival to hospital discharge. However, the most important variable, which Dr. Bradley has already commented on, is actually the survival to hospital discharge with intact or favorable neurologic outcome that is unchanged from admission. And generally speaking, there are various number of neurologic and outcome tests that can be done. I know the Get With The Guidelines Registry uses pediatric cerebral performance category scores and adult cerebral performance category scores that are scored from one to usually four, five, and then six would be death. So neurologically intact survival to hospital discharge is the most important variable following cardiac arrest.

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- Dr. Steve Bradley: [10:58](#) I would agree with all of that and say that one of the best ways to do that as a system is to participate in the Get With The Guidelines Resuscitation Program, whereby data on patients who are cared for in your hospital as a result of in-hospital cardiac arrest, that data is then contributed to a quality improvement program that allows insights on who are the patient populations that you're serving, who have suffered in-hospital cardiac arrest, what are their treatment and what are their subsequent outcomes as it relates to survival and their neurologic outcomes. An excellent opportunity to tie together your understanding of processes of care and the impact on the patient outcomes for whom you're caring.
- Liz Olsen: [11:37](#) For a hospital that doesn't currently have TTM protocols, what would your recommendations be for integrating this into their post-cardiac arrest care processes?
- Dr. Steve Bradley: [11:48](#) Well, I'm going to jump in on this one because I've known Dr. Raymond for a number of years as a result of us working together on the Get With The Guidelines Program and Resuscitation, and I've learned that she is a tremendous champion, a tremendous clinical champion and quality improvement champion. You need that type of champion in your institution and system to identify that this is something that we are going to take on wholeheartedly and develop programmatic approaches to achieve the processes that we want and the subsequent patient outcomes that we want. So with that champion, I really think that you can lead the organization forward. And then you need members within the healthcare system that touch on the patients, so that's going to include for out-of-hospital cardiac arrest care, involvement of your prehospital providers, EMS services, it's going to involve your emergency room, it's going to involve nurses and in-the-emergency-room providers in ICU, as well as nurses and pharmacy, all to be involved in what are the processes necessary to achieve this change in care delivery, achieve it at the highest quality possible and thereby impact our outcomes. Dr. Raymond is an example of the type of person who's led that type of change for her organization.
- Dr. Tia Raymond: [13:05](#) So just to follow up on what Dr. Bradley just said, it's very important that the clinical champion just cannot be a physician champion. It has to be a multidisciplinary team approach, so there has to be nursing buy-in, physician buy-in, respiratory therapy, pharmacy, administration, various departments within the hospital, intensive care, cardiology, emergency room. So you don't need a champion in each of those areas, but obviously each of the multi-disciplinary parts that a hospital has to take care of these complex patients has to be involved.

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The other thing that I would say is reaching out to other centers, even centers that might be in your city. I know we have a post-cardiac arrest care clinical pathway that we use in our hospital, and I'm sure there are other hospitals who have the same thing, and there's no point in reinventing the wheel. So I think reaching out to other facilities within your area, we can give our own information if needed as well, and start by developing a pathway, putting it at the bedside and bringing it out so that everybody knows what they need to do in this situation.

And practice it. It can be part of a simulation training as well, post-cardiac arrest care.

Liz Olsen:

[14:28](#)

Well, I want to thank you, Dr. Raymond and Dr. Bradley for talking with me today about targeted temperature management.

Thank you for joining us. Remember, share this show with someone who needs it. To view our previous webinar on targeted temperature management and learn more about the American Heart Association and its quality improvement efforts, visit us at heart.org/resuscitation. Today's webinar's made possible through the support of Becton, Dickinson and company.