**Expert Panel Discussion**

**Targeted Temperature Management in Nursing Care**

***Moderator:*** Thomas Keeble, MD1,2

***Participants:*** Michelle Gossip, RN3, Makayla Cordoza, MSN, RN, CCRN-K4, Michelle Deckard, DNS5, Noel Watson, RN1,2

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*During 2018 Therapeutic Hypothermia and Temperature Management Meeting in Miami, informative lectures were presented in targeted temperature management in nursing.*

*Dr. Thomas Keeble from Essex Cardiothoracic Centre, United Kingdom moderated this interesting discussion.*

*Dr. Michelle Gossip, ARCTIC Program Coordinator, Virginia Commonwealth University, Richmond spoke on various support programs for cardiac arrest survivors and families. Interesting topics included the various support phases that family and friend / care-givers could provide, patterns of neurological recovery as well as factors related to successful post-discharge outcomes.*

*Makayla Cordoza focused upon evidence base recommendations for management of TTMs side effects as well as therapeutic targets. Side effects including electrolyte and acid base imbalance as well as shivering were emphasized in this interesting lecture.*

*Dr. Michelle Deckard from Indiana University Health, Methodist Hospital, lectured on the importance and timely question of does target temperature matter? In this presentation recent data from the Nielsen 33-36oC study was summarized with comparisons to previous hypothermia trials for cardiac arrest patients. Together the series of presentations provided a rich background for a very informative question and answer sessions during the meeting.*

**Dr. Thomas Keeble:** I have invited Noel Watson up to the panel, he is our lead nurse in the Essex Cardiothoracic Center for our hypothermia trials. Michelle, I really liked your comment about time to temperature. I think if we are to prove the benefits of hypothermia - timing is the key. Your patient “time to temperature” is impressive, could you let us know how you achieved these times because we need to learn from best practice.

**Dr. Michelle Deckard:** One, we never allow shiver. We paralyze immediately and give an initial 1500ml of chilled saline over 30 minutes. At that time, if their temperature is above 33.5C, we give another 500ml and do that up to 3 more times up to a total of 3L. We paralyze initially and then every hour until we get to target temperature. I am a huge proponent of no variation in temperature and from the get go I have said if we are going to do hypothermia, we must not allow shiver. So, we paralyze immediately and are very aggressive with our chilled saline.

**Dr. Thomas Keeble:** For me, that is the difference. Many centers after the Kim *et al.* paper went away from being really aggressive with ice cold saline but it is clear from you that you are not doing that.

**Dr. Michelle Deckard:** I will say that we did do some pre-cool in the ambulance in the Indianapolis area but from an in-patient perspective, I have a harder time getting these patients to temperature when this was done because the EMS were not paralyzing patients. From my outside hospitals that came into our hospital, if they are not paralyzing then the patient starts to shiver and it is harder for us again to get them to target because the patient has already started to shiver. As I talked with the other outside facilities, I have managed to get them a little more comfortable with the need to paralyze if you are going to do hypothermia and you need to send us these patients quickly.

***Question:* *Are you having any pulmonary oedema complications with your cold saline regimen? and also, do you have any data regarding precision of control with regards to outcome?***

**Dr. Michelle Deckard:** Yes and no. As far as the chilled saline, do we occasionally have pulmonary edema? Yes. My intensivist says I would rather oxygenate through pulmonary edema because I have a ventilator than risk the brain cells. If they come in with fulminant pulmonary edema, we are not going to give them those large volumes of chilled saline. If they have a known low EF, we actually give that initial bolus over 60 minutes to pull back on those we know have LV dysfunction. If we are unable to give chilled saline, we also use ice and not just axially or the groin area. I tell my staff, I want them covered because I want them cooled quickly. As far as control, I do not have the actual data. We use the water temperature as our signal of impending shiver versus micro-shiver. My staff will intervene at micro-shiver. I tell them do not wait for overt physical shiver. So, my temperature fluctuation is minimal.

***Question: Do you know if there is any difference in keeping that kind of precision and not?***

**Dr. Michelle Deckard:** I would like to tell you that but I just don’t have the man power to look at that data.

**Ms. Makayla Cordoza:** What is your cut-off for determining micro-shivering in the water temperature?

**Dr. Michelle Deckard:** My definition of micro-shiver is your trend arrows are going up and your water temperature is dropping so we usually start look at it at about a 5*oC* drop at 33 *oC* . But usually at 33 *oC* if they start shivering or even the micro-shivering, their temperature drops pretty dramatically and fast so all my staff does is they look at the water temperature and see a difference in either one, they treat it. Now, at 36 *oC* , using the trend monitor, there is more of a nuance because your temperatures are not as significant and sometimes that trend monitor doesn’t even start to go up when you know I look at them I know that they are heading that way so we have got to the point when we are at 36 *oC* , my staff if their water temp gets below 28 *oC* , they start thinking about intervening.

***Question: Congratulations, very nice data. Large data set. Fantastic quality work at your institution. I was also impressed by the target to cooling from ROSC of 250 minutes. What is the temperature at admission after out of hospital cardiac arrest?***

**Dr. Michelle Deckard:** It is 35/35.5 *oC* . We have looked at that as well.

***Question: That makes sense and is similar to our data.***

**Dr. Thomas Keeble:** Can you explain how your in-hospital cardiac arrest patients that were shockable had half the survival rate compared to your out of hospital cardiac arrest? That seems unusual to me.

**Dr. Michelle Deckard:** It does. Part of it I think is the co-morbidities that are seen within the in-hospital cardiac arrests. Those patients that are bad enough to suffer cardiac arrest in the hospital, there are other things going on.

***Question: I was wondering about the need for a statistician in analyzing your data. How could we help you?***

**Dr. Michelle Deckard:** Unfortunately we do not have access to a statistician. My colleague who has been working on the dataset has been trying to get someone to do it for over 2 months. I would love some help.

***Question: We should definitely get that data analyzed.***

**Dr. Thomas Keeble:** Who prescribes the temperature? Is it clinician or a department policy?

**Ms. Makayla Cordoza:** At Legacy in Portland, the physician decides but we have created a protocol because physician A chooses one temperature and physician B chooses another. There was a lot of confusion. Theoretically, we all agree to one temperature but in clinical practice we can get variation.

**Dr. Michele Deckard:** I am the same with mine. After we looked at our data in 2014, we agreed to stay at 33*oC* , but in 2015, I actually wrote a new protocol for 36*oC* because shiver management is different at 36*oC* .

**Dr. Thomas Keeble:** We have gone to a sticker in the notes. 33*oC* or 36*oC* . However, if you don’t know what you are chasing, it is a challenge.

***Question: For Makayla, your energy expenditure data looked like calorimetry. Did that come off of the ventilator?***

**Ms. Makayla Cordoza:**  No, I used a standalone calorimetry breath by breath so I stayed at the bedside for 28 hours monitoring the patient. There was a lot of coffee! I would have loved to have an inline to the ventilator.

**Dr. Thomas Keeble:** I think if there ever was a convincing slide demonstrating the need to take shivering really seriously – you showed it. You beautifully demonstrated the physiological stress that shiver invokes in humans. I was also interested in the data where your temperature was outside of the range you were aiming for, how can we improve that? Is it just a shiver issue? Could you explore a bit more this micro-shiver? I used to look on the ECG monitor but tell me how you do it.

**Ms. Makayla Cordoza:** I study the association between water temperature and patient temperature and relationship to shivering.

**Ms. Michelle Gossip:** I was going to ask that same question. How did you differentiate between shivers and seizures in this population?

**Ms. Makayla Cordoza:** That is a good question. I definitely looked at seizing, not in the energy expenditure patients, but it certainly effects their temperature. Most of the time, patients had EEG monitoring during their TTM period enabling prompt seizure identification and treatment.

**Dr. Thomas Keeble:** My experience is that once your patients shivers temperature management can be challenging. You are chasing your tail, which temperature you are going to dial in, which drugs you are going to give now. You had an 80% shivering rate at some point, is there scope from industry to try and have a better way of finding shivering before it happens? Maybe we could look at the muscle, there is some fine twitching so may be really early before you have shivering.

**Ms. Makayla Cordoza:**  I did a preliminary look to see if perhaps water temperature is an early indicator so if someone wants to fund some research, I just need more detailed data to look at that because I was looking at chart data. Someone else mentioned that documentation of temperature is pretty poor but perhaps you could use the temperature device to look at as an early indication of shivering. For example, when heat generation changes X% in relation to patient body temperature could there be some sort of alert. I think the temperature regulatory systems create huge variations in temperatures to control body temperature in a small range so part of the physics of the device is that it does change temperature pretty variably but it could not always be related to shivering but maybe other things like heat generation related to seizure activity, awakening. I think we have to be careful in associating all temperature changes in water temperature to shivering.

**Dr. Thomas Keeble:** When you uncover these patients to look at the femoral vein site, you can induce shivering by uncovering them and I think that is an issue, is that something you see also?

**Ms. Makayla Cordoza:** Yes.

**Dr. Thomas Keeble:** Michelle,I resonated with everything that you said. My challenge to everyone in this room is if you or your institution does not sequentially offer cardiac arrest patients a dedicated follow-up, please go home and implement this. It can be anyone who is interested within your instituation - a rehabilitation nurse, an ICU nurse, a cardiologist, but you need to interest them more as currently these patients go home and they feel abandoned. That is the word they use to me. I think you documented that story very well. Who currently pays for your service?

**Ms. Michelle Gossip:** So, I am the nursing program coordinator for our targeted temperature management at my hospital. In the early settings, having been an ICU nurse, my focus was acute care management. It did not take long to recognize that while we had good acute care management, our follow up and psychological support was less advanced. Our process is when patients are declared in neurologic recovery, go to our progressive care area, they receive their management of care, with a dedicated cardiologist who follows up on these patients, they also receive post-discharge neurological exams. I do the neurological exam prior to discharge and they will see a neuro-psychologist post-discharge.

**Dr. Thomas Keeble:** In this room, who has a dedicated cardiac arrest follow up service that would address some of the psychological issues for these patients? A handful of you. That tells us all what we need to do to move forward. Tell us about your social media campaigns because again if we don’t have enough time, not enough money maybe utilizing some of the online options that you have used may be useful. In Essex we have made a bespoke video for survivors and families of cardiac arrest (www.lifeaftercardiacarrest.com) to allow them to better understand the problems and the journey they may face. You can imagine that even a leaflet could be given to those patients with details for counseling after a cardiac arrest.

**Ms. Michelle Gossip:** Early on I developed a brochure that we used internally on topics that patients and families would be exposed to but obviously noting that really the declaration of neurologic recovery is the component that changes the trajectory of recovery and discussions. So, some of that information was not appropriate for all patients as soon as they come to the hospital but was more appropriate at the declaration of neurologic recovery. My observation of social media is nothing more than anecdotal observation. We do not have a social media site for our patients. I would say partnering with a clinical expert, we have definitely had some thoughts about a partnership because when I read some of the items on social media it is clearly not clinically focused. There is a lot of mis-information, there is a lot of non-healthcare providers providing healthcare information and I fear that this is a vulnerable population looking for answers potentially in the wrong place.

**Dr. Thomas Keeble:** Who in the audience has some sort of CPR support to the person who has done CPR to an individual in the field? I think that is something that you described.

**Ms. Michelle Gossip:** Yes, we have that.

**Dr. Thomas Keeble:** Does anyone else have that? I think this is really important to give feedback to these individuals who have done something really extraordinary.

**Ms. Michelle Gossip:** We provide 100% feedback to those individuals. At the hospital level, part of my role is to give feedback to our pre-hospital providers to improve the partnership we have with our pre-hospital providers. We are in an area that has three large hospital organizations probably 13 hospitals within a 12 mile radius, you don’t have to come to my hospital but it is difficult to navigate my organization for numerous reasons, but I can definitely see a partnership with our EMS providers as they receive feedback from us. I can certainly see a change in referrals.

***Question: Since we have an international crowd, I am curious that I have noted in the last 30 years of practice that continued fragmentation of care by the primary care providers are no longer invited into the hospital to make rounds on their patients but yet patients leave the hospital and the primary care providers have very little information of what actually transpired at the hospital, is that unfortunately percolating out to the international practice or just uniquely only in the US?***

**Dr. Thomas Keeble:** No it is absolutely true within the UK too. Our general practice colleagues really are incredibly un-interested in cardiac arrest medicine in general. The trouble is they are very busy and they have to know when to refer in a whole variety of medical specialities; we just look after our expert area. What I propose is that every general practice in the UK would have one GP that would have an interest in cardiac arrest patients and would attend our course so that when someone in their local population is recovering from OHCA, the patient would go see that GP because he / she understands the difficulties the patient is experiencing and can access the specialist support services. It is about “getting it”. We find that you need to understand the problems and many of my colleagues don’t understand the problems and until we follow these patients sequentially, it is only then that we can help. We need to educate the public more and the practitioners because you are right it is important to be supportive and we need more help from the GPs.

**Ms. Michelle Gossip:** I can also comment. We are doing a lot of referrals for psychiatric or psychological counseling and repetitively our post-arrest patients come back with the psychological counseling they have received, they don’t feel understood. They don’t feel that their innate issues are understood. That has been a repetitive problem.

**Mr. Noel Watson:** Just to echo what Tom was saying, we have a similar set-up in the UK and just touching on what you have just said about what the patients are saying about their counseling, I just wonder if there is an opportunity to have them involved in your team?

**Ms. Michelle Gossip:** We have run into some barriers into having a psychologist involved. In some respects, it is a payment issue, but I am going to get around that. We have a navigator program for heart failure patients and a lot of our patients do experience heart failure post-arrest. So, I am going to try and work with our heart failure physician psychologist team member to take on some of the responsibilities of these patients.

***Question: I must say I really enjoyed this session because I don’t recall a meeting where we would discuss this important topic. I can see an unmet need at every step in our system and you see yourself stopping when the patient is going CPC 1 and bye bye and it is after this that the whole story starts. My question which fits to this topic, you admit a comatose survivor cardiac arrest at day 1 and the relatives come very shocked and then you have to explain to them this vegetative state. The heart is working, the lungs are ventilated, the renal function is ok but they want to know why the patient doesn’t wake up. Then you realize that somethings that are very logical to you is not to the family. We have repeatedly identified this problem, and it has gone to the stage that basically we drafted a one page pamphlet in lay terms to explain what happened to their relative and why he doesn’t wake up and what is the prognosis. We start this from Day 1 because like you know, 30-40% will not wake up so we had to prepare the family. Our experience has been it is very important to start at day 1. Physicians who talk to relatives always say the same thing, they give optimistic information from one physician and the next guy comes and later on it is not so optimistic. What do you think about that?***

**Ms. Michelle Gossip:** Thank you for your comment. We have definitely had barriers to having conversations like you describe. One thing I did with my ICU team that cares for these patients from a nursing standpoint is drafted some questions that they may receive from family members and how would you answer these questions. We drafted answers to those questions so nurses were not caught off guard by that question but instead we all spoke the same language and we have also implemented a huddle prior to having any type of aggressive conversation. The huddle includes the person who will have that conversation with the family and the nurse caring for the patient so that way we are all on the same page with the information that we take in and communicate that in the same way. We have seen an improvement with that but those conversations are always difficult.

**Comment:** I want to congratulate Michelle on her talk because I think she elegantly showed the challenges that we have had with the external validity of the Nielsen data into populations that we often see in the US. I suspect if you had done that a few years ago you would have saved a lot of the bloodshed between the two camps of 33*oC* vs 36*oC*.

**Dr. Thomas Keeble:** Please let me summarise this terrific session.

I thought the first talk really showed how we need to collect our data well. If we don’t change our practice and monitor what our data is doing in respect to changing our practice then we don’t know if what we are doing is good, bad or indifferent. I thought the second talk, the elegance of shivering and the control of shivering that we really need to stop shivering before it happens. Your graph of the calories and the temperature was superb. Finally, we must take care of these patients once we have spent loads of time and money and energy and we really need to rehabilitate their lives back to some sort of normality and if we don’t choose to look at them or understand or explain some of the things with simple pieces of education then we really are failing our patient.

On that note, let’s go out there and do better things for our patients.

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