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Cardiac Arrest: Management and Survival

### CARDIAC ARREST: MANAGEMENT AND SURVIVAL

There were over 400,000 cardiac arrests per year and in some cities 10% to 20% are surviving to hospital discharge. What does this survival teach us?

You are listening to ReachMD, The Channel for Medical Professionals. Welcome to the Clinician's Roundtable. I am Dr. Shira Johnson, your host, and with me today is Dr. Benjamin Abella from the University of Pennsylvania. Dr. Abella is a Clinical Research Director at The Center for Resuscitation Science in the Department of Emergency Medicine at the University of Pennsylvania. His area of research and teaching is cardiac arrest and at the University of Pennsylvania, he is at the forefront of his field. Today, we discussing cardiac arrest – CPR and beyond.

**DR. SHIRA JOHNSON:**

Welcome, Dr. Abella.

**DR. BENJAMIN ABELLA:**

Great to be here, thank you.

**DR. SHIRA JOHNSON:**

So first of all, tell us a little about your background, how did you get involve in this really very existing area of medicine?

**DR. BENJAMIN ABELLA:**

Well, it's a good question actually. Most people who enter the field of resuscitation science do so randomly because it's not a real clinical specialty. What happened in my case, I was an internal medicine resident, and as a resident you see a lot cardiac arrest, you see in the hospital and you often serve as a code team leader. After seeing a number of these events in the hospital go badly or have poor outcomes, it really got me thinking we could do better and asking questions as to why more people weren't surviving cardiac arrest and

so it was literally by just seeing a number of these events in the hospital that it peaked my curiosity and my academic interest.

**DR. SHIRA JOHNSON:**

So now from your vantage point, what can you say about the epidemiology of cardiac arrest in the United States per year, both in hospital and out of hospital?

**DR. BENJAMIN ABELLA:**

I think that cardiac arrest is a generally under-appreciated problem. What people may not realize is that cardiac arrest is one of the leading causes of death in the United States. It is estimated that around 300,000 to 400,000 Americans die each year of sudden cardiac arrest and that is defined as the sudden and abrupt stoppage of the heart, so certainly in a philosophical sense all people die of cardiac arrest because all of our hearts eventually stop, but what we are really taking about here is a unique disease process whereby someone is healthy, walking around and his heart suddenly stops and they collapse to the ground requiring the delivery of CPR and other emergency care, and if this population as exemplified by the unfortunate death of Tim Russert this last year who died of sudden cardiac arrest, most people are aware of his passing; it's patients like that we're talking about. The leading cause of death and survival is remarkably poor. Depending on which city you look at, it is often 5%, 10%, sometimes as low as 2 or 3% in some cities, so most people do not survive a cardiac arrest event.

**DR. SHIRA JOHNSON:**

Now what's different, what numbers you have on in-hospital and out of hospital in terms of survival. In the past, out-of-hospital cardiac arrest, more typically un-witnessed, there was no immediate bystander response and results were dismal. They came to the ER just to get pronounced.

**DR. BENJAMIN ABELLA:**

That's right, and in fact, survival is very different if you have an arrest in the hospital versus out of the hospital. Most hospitals post statistics that show a survival rate of anywhere from 15 to 25 to 30% survival, and I think in part that's because of the rapid recognition and rapid response. In the out-of-hospital setting, if someone does not receive bystander CPR by lay public or a physician or nurse rather, healthcare professionals happen by the scene, if they do not receive bystander CPR, the chance of survival drops by 10 to 15% for every minute that they are in cardiac arrest and so you could imagine if it takes 10 minutes or so for paramedics to arrive, survival is very, very low.

**DR. SHIRA JOHNSON:**

What about looking at survival say 1 year post discharge as that give you a different set of figures.

**DR. BENJAMIN ABELLA:**

Well, it turn out, this s a very interesting thing. A number of studies have looked at this and found that patients who leave the hospital after surviving a cardiac arrest event, if they are reasonably functional, meaning walking, talking, interactive, their survival rate is no

different than age or general comorbidity matched other populations. What I mean to say is that people after surviving a cardiac arrest are just like everybody else with may be high blood pressure or coronary disease at their age. They are not in any special categories and actually their survival can be quite good. So there are a number of people who survive cardiac arrest and live for years and years, and in fact there is a recently newly formed organization called the Sudden Cardiac Arrest Association which is a survivor's group. This survivor's group has hundred of survivors of cardiac arrest who meet on an annual basis and do advocacy and education work. This group would have been unthinkable a decade ago, but by virtue of improvements in the field, deployment of automatic external defibrillators, we are getting more and more survivors.

**DR. SHIRA JOHNSON:**

What are some of the reasons why we are seeing improved survival, say in the field?

**DR. BENJAMIN ABELLA:**

It's a very exciting time for resuscitation science. There have been a number of important improvements in our treatment of these patients just over the past few years. One of those is the widespread deployment and adoption of automatic external defibrillators or AEDs and I believe that every primary care doctor's office, every healthcare facility, and probably most high-traffic public spaces like airports, malls, and gyms should have AEDs in them. We really should think of them like fire extinguishers. You rarely need them, but we you need them, they are important and they have been now well proven to save lives and save lives in settings where perhaps no healthcare professionals are immediately available. So that's one thing. AEDs are becoming much more widespread. I think another important improvement is actually something we do after initially getting someone's pulse back and that is this notion of therapeutic hypothermia after cardiac arrest and this has received some attention in the media. For example, there was a football player recently in the Buffalo Bills who received therapeutic hypothermia. Now, he didn't have a cardiac arrest, he had a spinal cord injury, but nonetheless, entered the public sphere. The notion is that someone gets their pulse back, if you cool them down, whole body cooling to about 32 degrees Celsius not Fahrenheit, so that's about 90 something degrees Fahrenheit for 24 hours, their brain has a much better chance of recovery as does their overall survival.

**DR. SHIRA JOHNSON:**

I want to get back to the hypothermia as well, but getting back to your first remark about the AEDs that we see everywhere, are people using them? I mean they are everywhere and if you are a health professional, you would grab them, do you have any experience or any anecdotes about people that actually saw them, picked them up and use them because that's my fear as people will be, if they are not trained on them, they might be more reluctant?

**DR. BENJAMIN ABELLA:**

It's a very important question to ask whether people would actually use an AEDs or do CPR for that matter when called upon. We do not have unfortunately good data on responder willingness to use this equipment. When you do survey studies, most people say they would be willing to use it. Of course, in a moment of crisis it's a very different matter altogether. We do know that there are a number people in almost every city in America that have been saved by AEDs, we don't have a great sense of willingness to use, although I would say this; if an AED is placed in a fairly public place where there is a lot of potential responders, almost certainly it will get used because usually there is always a few people in the crowd who are either paramedics, nurses, and a doctor or two at the airport, for example, who will step forward and use it. Whether or not say a building of lawyers without a nurse or doctor present, would jump and use it, I don't know, one would hope they would.

**DR. SHIRA JOHNSON:**

They would call for a contract first.

**DR. BENJAMIN ABELLA:**

Yes, yes, there may be some disclosures involved, but in all seriousness, the other question is the use of CPR and actually that one is even more challenging. Using an AED doesn't involve that much direct patient contact, but ask someone to perform mouth-to-mouth on a stranger, and that's altogether a different question. Now there is an important thing I should tell listeners about that has come about just in the last few years the notion that we may not need mouth-to-mouth resuscitation, that pushing on the chest may be sufficient. This is very exciting new development in bystander CPR. There is an increasing body of research showing that survival with just chest compressions alone on average is about the same as when you do mouth-to-mouth. Now, organizations such as the American Heart Association still teach the full complement of CPR which is cycles for 30 compressions and two mouth-to-mouth breath repeated until help arrived. However, those organizations like the American Heart Association are now suggesting that at least for the lay public or those who are not comfortable doing mouth-to-mouth, chest compression only CPR is a completely viable alternative saving lives and I am actually fairly enthusiastic about this because I know just how much people don't want to do mouth-to-mouth, so if we can get more people CPR by telling them, look just push on the chest, we might save a lot more lives.

**DR. SHIRA JOHNSON:**

If you've just joined us, you are listening to the Clinician's Roundtable from ReachMD, The Channel for Medical Professionals, and I am Dr. Shira Johnson. I am speaking with Dr. Benjamin Abella and we are discussing cardiac arrest, immediate management and beyond.

Getting back to your other point, I know a lot of researches done at Penn, have you guys looked into this hypothermia, was that part of your work at Penn?

**DR. BENJAMIN ABELLA:**

Yes, we have a number of active programs involving therapeutic hypothermia here at Penn. We study at both in the laboratory setting. We are developing new technologies to cool faster and better, but we also have an active clinical program. For example, I can tell you that just 2 days ago we had someone flown in from an outside hospital, a 22-year-old who suffered a cardiac arrest at home, we still aren't too sure why by the way, and we cooled him, and he has actually made a remarkable recovery and has been extubated, now moved to the floor. We were just talking to his family today. He is doing quite well and so it's an exciting thing that we can offer patients, this therapy. However, it should be known that the majority of hospitals in the United States still do not offer hypothermia as a therapy for arrest victims even though the data are quite strong supporting them and I think this is because it's a bit complicated. Actually, it's harder to perform than you might think. It involves a protocol, it involves getting physicians from different departments to work together and so many hospitals don't offer. So I would want the listening public to know that they should ask people at their hospital do you offer hypothermia after cardiac arrest, and if not, why not. I think this can become increasingly important over the next few years.

**DR. SHIRA JOHNSON:**

This patient that you mentioned, was he cooled right away before he was flown in?

**DR. BENJAMIN ABELLA:**

Well that's an interesting question whether he was cooled right away, he actually was not cooled initially and there up a bit of a delay in transferring and getting him over here, but the good news is it seems that as long as cooling has started within 4, 5, 6 hours in that timeframe, the benefits are profound. If cooling is delayed more than say 12 hours, probably there is not much benefit to be accrued. We believe the sooner you start cooling the better and so certainly if you start cooling within an hour or two, you have the most chance of salvaging the brain. On the other hand, 3, 4, 5 hours all of it is within the data that we know from clinic studies that hypothermia can improve both survival and neurologic outcomes.

**DR. SHIRA JOHNSON:**

Is cooling difficult to carry out, you mentioned a protocol and I too would be concerned that smaller and medium sized hospitals may not be jumping to do this right away, teaching hospitals certainly, but?

**DR. BENJAMIN ABELLA:**

Well, that's right, and in fact there are some proposals being discussed at the American Heart Association and other organizations about whether or not we should be even having a standard that all hospitals should do this, may be smaller hospitals should be referring these patients and flying them in, sort of along the lines of a level 1 trauma center model. Because you are right, it is complicated to do, sounds simple, cooling somebody down, but there are a lot of issues. (1) As you cool people down, they shiver and shivering can lead to a number of problems including just ineffectual cooling and so you need to know how to handle that and usually these patients require paralysis, so people have to be comfortable with intubation and paralysis and so forth. There is a risk of seizures in a post-arrest state and if you paralyze someone you may miss this, so most places that cool recommend a neuro intensivist and/or continuous EEG monitoring. Not all places do that, but it certainly is a good idea if possible, and as you correctly pointed out, this often requires a tertiary care center to do so. In addition, cooling requires special equipment that usually has to be purchased. You have to have a temperature management feedback system because you will need to maintain them at 32 degrees for 24 hours. If you cool them just with ice or saline, you may over or under cool them and this can lead to problems, and by the way, I should probably state at this point for full disclosure I have done some consulting for cooling companies, so I want people to understand my comments in light of that. I do believe that devices are important in the cooling process, but it should be said that there are a number places that cool just with low tech methods such as ice and cold saline, but it just does require very careful attention to temperature management.

**DR. SHIRA JOHNSON:**

We want to thank you for being our guest today.

**DR. BENJAMIN ABELLA:**

Well, thank you very much.

**DR. SHIRA JOHNSON:**

We want to thank to Dr. Benjamin Abella who has been our guest today. We have been discussing cardiac arrest, immediate management and beyond.

I am Dr. Shira Johnson. You have been listening to the Clinician's Roundtable from ReachMD, The Channel for Medical Professionals. Please visit our website at [www.reach.com](http://www.reach.com) which features our entire library through on-demand pod casts or call us toll free with your comments and suggestions at 888-639-6157. Thank you for listening.

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