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Cardiac Arrest: CPR and Beyond

Cardiac arrest management used to be CPR and a trip to the morgue. Now, it is maximizing compression and hypothermia and they are surviving, do you know why? You are listening to ReachMD, the Channel for Medical Professionals. Welcome to the Clinicians 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 are discussing cardiac arrest management and survival.

**DR. JOHNSON:**

Welcome Dr. Abella.

**DR. ABELLA:**

Thank you.

**DR. JOHNSON:**

Now, tell us a little bit about yourself. Not everybody has a primary specialty of cardiac arrest. How did you get into this.

**DR. ABELLA:**

It is a funny thing being a cardiac arrest physician. You write that exactly on a regular clinic.

**DR. JOHNSON:**

I hope not.

**DR. ABELLA:**

All right. So, it resuscitation science is really considered more of a research field than a specialty I guess. My clinical specialty is certainly emergency medicine although I also boarded in internal medicine. I became interested in cardiac arrest as an entity really

when I was a resident in internal medicine. Many of your listeners out there remember the days when they were a resident and remember responding to code blues there at the hospital many times and they probably remember just how chaotic it was, and they probably remember just how many people did not recover from cardiac arrest that was certainly my experience and a troubled man made me think we can do better and it made me wonder what doing better would entail and so through finding out more and through finding people who were studying these topics I got involved in research and that is how it all began.

**DR. JOHNSON:**

Now tell us about being a Penn, Penn has been hot for cerebral perfusion research for years and resuscitation medicine. What are some of the things that you have been working on at PENN?

**DR. ABELLA:**

Well it is an exiting place to be and I will tell you we have a group here called the Center for Resuscitation Science of which I am the clinical research director and it is really a unique entity. We have a large research enterprise in the world of resuscitation, and we have recognized that cardiac arrest requires multiple areas of expertise, so we have nurses, physicians, we have PhD scientists, we have engineers all working together, and it is really quite an exciting thing. We probably have about 30 or 40 people part of our center and so we are doing research in a number of areas. One of our areas that we are very involved in is therapeutic hypothermia as a treatment for post-arrest victims, what this means is when someone suffers a cardiac arrest the notion is that you can cool them down to about 90 degrees Fahrenheit or about 32 degrees Celsius for 24 hours and greatly reduce brain injury and improve survival that is only one area. The other area we study how people deliver CPR. In new ways to teach CPR, new ways to look at CPR, because we truly believe that CPR is one of the corner stones to survival from cardiac arrest and there has certainly been a number of studies showing that the provision of CPR can double or triple survival from what is otherwise a highly mortal condition.

**DR. JOHNSON:**

Now going back to the ACLs care even has it chain of survival change, is it still accessed CPR defibrillate and care.

**DR. ABELLA:**

The general \_\_\_\_\_0139 of care for cardiac risk victims has remained the same namely prompt recognition of a cardiac arrest. The delivery of CPR and defibrillator therapy if a defibrillator is available and then ACLs care and this is certainly a \_\_\_\_\_ by the American Heart Association through the chain of survival concept and so that has not changed. What has changed however is we are beginning to make real progress with getting therapy to the victim and I mean the provision of automatic external defibrillators or AEDs, which everybody now sees in malls and airports and gyms. They are becoming more like fire extinguishers namely they are everywhere, you do not need them very often, but when you need them you can use them. In addition, organizations are beginning to make inroads towards boarder CPR education and then therapeutic hypothermia is really making a big impact in many cities that have hospitals that offer it. So, we are beginning for the first time since the development of CPR and defibrillation about 50 years ago. For the first time, we are really beginning to see an up tech and survival.

**DR. JOHNSON:**

Now, most of our listeners as physicians have heard it is compression, compression, compression in the field what about the other factors of compression. What about the depth of compression, does that impact survival?

**DR. ABELLA:**

Well in fact chest compressions are a complicated thing. It sounds simple, push on the chest, but there are a number of parameters. One is the compression rate and that is certainly important. Current teaching is that 100 compressions per minute should be delivered, but depth is also important and we generally believe pushing hard is the key thing. The American Heart Association teaches 1.5 to 2 inches of depth as a guideline, but with our changing population and increasing levels of obesity I am not sure 2 inches is necessarily the right answer. I think the right answer is pushing as hard one can on the chest at a 100 beats per minute. But there are other factors as well for example leaning on the chest. We find a lot of health care providers lean on the chest inadvertently between compression. It is important to release pressure completely between compressions and a number of studies including our research have shown this to be important for blood flow. So, actually CPR is a little bit more complicated than it seems, but here is the most important thing for listeners to realize some CPR and suboptimal CPR is better than no CPR, so by no means should people feel like while this is hard to do, I am not going to do it.

**DR. JOHNSON:**

I cannot do it, it has changed. I have not read the book.

**DR. ABELLA:**

Well that is right. The most important thing is to have no fear, get the hands on the chest, and start beating on it. Because that is the only way to keep people alive until help can arrive.

**DR. JOHNSON:**

How do you think things have changed to as you go through the sequence? What is the role of administering shock?

**DR. ABELLA:**

Well, the role of defibrillation delivering shocks to patients in ventricular fibrillation is changing. It turns out a number of studies have shown that doing CPR before defibrillation may actually be important in some cases. Now, I will try to make this clear. The American Heart Association and other organizations still certainly teach that immediate defibrillation of VF or ventricular fibrillation rhythm is the right thing to do. That being said, if someone has had an unwitnessed arrest or someone has been down for several minutes with no CPR being delivered. It seems that delivering CPR for a few minutes before attempting to defibrillate may greatly increase the chance with successful defibrillation. So, I think practically what this means is if we can get to somebody right away, see the collapse, get those pads on and you shock him right away that is ideal. If you run into a room, you have no idea how long they have been down or if no one is giving CPR it is probably a good idea they start get CPR started for several minutes until you can get the defibrillator hooked up and then try to shock someone.

If you have just joined us you are listening to the clinicians round table from ReachMD, the Channel for Medical Professionals. I am Dr. Shira Johnson and I am speaking with Dr. Benjamin Abella. We are discussing cardiac arrest, survival, and treatment post arrest.

**DR. JOHNSON:**

I have read some of your material before and you mentioned the importance of a deep breathing after an arrest. Why is it often missing in hospital settings.

**DR. ABELLA:**

Well cardiac arrest is a funny thing for practitioners. It interrupts the normal workflow. You are often doing other things and suddenly summoned to go to a cardiac arrest and this is the same also by the way for paramedic. What happens is after an arrest event usually the team disperses and I think a real opportunity for quality assurance and for learning is lost in this. What we have been doing at our hospital and other hospitals that we work with is encouraging deep breathing. Where if the team after an arrest event whether the patient lives or dies huddles up and discusses what they did right or wrong it can be a remarkable opportunity both for closure, but more importantly for improvement of care for the next time around and this model is certainly understood by those who are in the reserves, who do military training or military exercises. When a military team goes through a stressful combat mission they will debrief and they will discuss what happened because at that time everything is vivid in everybody's head and you can really learn how to improve care.

**DR. JOHNSON:**

Mechanical CPR devices, are they effective?

**DR. ABELLA:**

So, there are several mechanical CPR devices that are currently available on the market for example and I should give full disclosure. I have received some consulting fees of a small amount from one of these companies ZOLL. ZOLL Corporation makes the AutoPulse, which is a mechanical CPR device. Also, a Medtronic is licensed a device that is currently also available called LUCAS. Both of these devices can be strapped to a patient and can mechanically deliver CPR meaning you do not have to push on the chest. You just hit the arm button and it will compress the patient for you as you are. The devices are complicated. There are data supporting them certainly, but there it has to be published any large clinical trials convincingly shown that they work on all cases. I personally believe these devices are promising and have a lot of potential and may be the way of the future. I just do not think we are quite there yet. I think some settings however might greatly benefit from them. For example rural EMS setting or paramedics who have a long delivery time to the hospital. It is just not physically feasible to give manual CPR for 15 or 20 minutes in the back of an ambulance. So, in those settings, I think already these devices may be very helpful. Possibly also in emergency department, it is not entirely clear however the role of these devices in the hospital setting. They are subjective intense of a research and I do suspect to an idea that here to stay.

**DR. JOHNSON:**

Could you touch on for a moment the ethics of resuscitation. Are people surviving because of the advances in science who perhaps should not have or did you survive the arrest, but they may not make it out of the hospital.

**DR. ABELLA:**

That is a very legitimate concern. Certainly, we all worry that we might resuscitate someone who goes on to be neurologically

devastated. Certainly, there have been famous cases of this in our recent American history that I have received \_\_\_\_\_ variety and we certainly want to avoid that associate that not what the family would have wanted. The good news is that with therapeutic hypothermia for example we tend to have a bimodal distribution of survivors. People tend to either die or live with a reasonably recovered brain. What hypothermia seems to do is reduce the number of folks who survive, but have neurologic devastation and that is exactly what we would want. Now, the other aspect of this question, should we even attempt resuscitation on every one and I think the answer to that should be no. What I mean to say is I think there is certainly some people for whom resuscitation is not going to work and this is certainly not something that we should be deciding unilaterally, but I think all of us as physicians needs to more aware of the need for living well for advanced directive discussions with families, for families to understand what resuscitation really means and for families to understand that still the chance of resuscitation in most cases is low. I think the public is greatly influenced by television and in TV everybody survives a cardiac arrest events just swelling exciting music and so patients think that everybody comes back when it is actually not the case and so I think careful frank discussions with families, I suspect it is the way to go with this and there are probably many patients for whom resuscitation really is futile. I think this is also important so that we can focus our energies on those patients who are savable and they have a good recovery. For example, most people are aware of the untimely death of Tim Russert a television correspondent last year. He died of sudden cardiac arrest and he was a very functional, active participant in society as he had survived with good brain recovery. I think we can all agree that that would have been a wonderful thing for him and his family. It is people like him that we really want to focus our energies on folks who are active and reasonably healthy they may have underlying hypertension or diabetes. What I think we do not want to focus our energies on is folks who are clearly terminal in the last weeks or months of their life who are fragile with medical problems that can go on for pages and pages. These patients entrust whether they want to go through resuscitation and it would have really help them and that is where I think our discussion should reside.

**DR. JOHNSON:**

Are there conditions when you would not induce hypothermia?

**DR. ABELLA:**

So, hypothermia is a therapy that has been studied in the setting of out of hospital, ventricular fibrillation arrest. So, most people who suffer a cardiac arrest have tachyarrhythmia, a ventricular fibrillation or VS. The research studies have shown conclusively that cooling that subset of patients have a great benefit. It remains less clear whether one should cool patients who have survived say a pulseless electrical activity or PEA arrest or an asystolic arrest, a flat line arrest. Also, it is not entirely clear the role of this therapy for patients who suffer in hospital cardiac arrest as opposed to out of hospital cardiac arrest. So, there is a lot of work left to be done. It is generally believed that cooling is beneficial for most arrest patients, but certainly there are some patients for whom we would not recommend cooling therapy. So, for example, it is generally understood that cooling raises the risk of bleeding. It can induce a coagulopathy and so we generally will not cool patients who are immediately postoperative and this is not uncommon. Someone can be a day or two out from a bypass surgery, cardiac bypass, or a large vascular surgical procedure and have an arrest event. We would not generally cool those patients because of concerns for bleeding and so forth often the therapy for them is to go back to the operating room because usually it is a bleeding problem or cardiac tamponade or other similar problem. So it is not certainly a therapy for all patients. In addition, if a patient has had a very long down time and discussion was held with the family that they would not want to continue aggressive care, we often will not cool at that point as well. So there are certainly reasons not to cool. However, I think it is fair to say that in general we do not use cooling aggressively enough and there are probably a whole host of arrest victims who could benefit from it. Now, I should also point out for the purpose of full disclosure, I have received consulting moneys in small amount from hypothermia company, so people should be aware of that, but it is generally believed by the entire field that we do not cool enough patients after resuscitation and in indeed people are looking at the use of hypothermia and other ischemic disease processes as well such as stroke or myocardial infarction, heart attack, and so there is a lot we have yet to learn about the use of hypothermia.

**DR. JOHNSON:**

Thank you Dr. Abella for being our guest today.

DR. ABELLA:

Thank you very much.

Our thank goes to Dr. Benjamin Abella who has been our guest. We have been discussing cardiac arrest and survival and post-arrest management. I am Dr. Shira Johnson, you have been listening to the Clinicians Roundtable from ReachMD, the Channel for Medical Professionals. Please visit our web site at [reachmd.com](https://reachmd.com), which features our entire library through on demand pod cast or call us toll free with your comments and suggestions at 888-639-6157 and thank you for listening.