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The Importance of Resuscitation



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An Interview with Dr. Jerry Nolan

Dr. Jerry Nolan was co-editor of the European Resuscitation Council Guidelines for Resuscitation 2010. He is Consultant in Anaesthesia and Intensive Care Medicine at the Royal United Hospital, Bath in the UK. In addition he serves as Vice Chairman of the European Resuscitation Council, a Member of the Executive Committee of the Resuscitation Council (UK), Chairman of the Steering Group of the National Cardiac Arrest Audit, Council Member of the Royal College of Anaesthetists and Editor-in-Chief of the journal Resuscitation.

The updated European Resuscitation Council CPR Guidelines for Resuscitation are due in 2015. What is the latest evidence showing, and are you expecting major changes?

The evidence review process, which is quite lengthy, has only just started and there's been no discussion on the outcomes of those reviews, so it's premature to try and judge what changes might be expected. What I would say is that one area where there have been a lot of new studies is in the area of prognostication in cardiac arrest survivors. There will be some changes especially of interest to intensive care doctors and nurses in the area of prognostication for comatose survivors of cardiac arrest, in other words trying to predict those patients who are going to have a poor outcome whatever we do, and those who will potentially have a good outcome.

Is it possible to provide guidance on how long to perform resuscitation for?

This has been the subject of at least one major study (Goldenberger et al. 2012). I think the most important message is that every decision needs to be made on a case-by-case basis. There is no specific cutoff time that we could apply to every patient in every case. We do know from the work published from the American Heart Association's, Get With the Guidelines® Resuscitation registry, which is a very large database of in-hospital resuscitation in the United States, that of those patients who achieve return of spontaneous circulation, 90% of them will have achieved this by 30 minutes. Once you get to 30 minutes the chances of survival are getting slimmer and slimmer, and only 10% more survivors will come from beyond that time. Clearly some do, and I think the most important message is that if clinicians still think there is a reversible problem, a cause of cardiac arrest they can do something about, there may well be an indication for continuing resuscitation for a lot longer. The whole process, particularly of in-hospital resuscitation, is becoming more complicated, because in many parts of the world now there is the ability to use extracorporeal cardiopulmonary resuscitation (E-CPR), where these patients are put on to bypass, which can prolong CPR for many hours whilst trying to address the underlying problem, which may be, for example, an occluded coronary artery.

Will the updated Guidelines address the issue of obesity and resuscitation?

Obviously obesity is an increasing problem across the world. There are issues around obese patients in being able to deliver effective chest compressions and, although modern defibrillators compensate for increased chest impedance, in patients with very high BMI defibrillation may be a problem. At the moment we do not have good evidence to change the way we deliver CPR in these patients.

Of particular interest to the intensive care team community is that one specific study looking at patients with poor outcomes versus body mass index (BMI), who were admitted to intensive care after cardiac arrest, surprisingly shows that those patients with higher BMI actually do better (Jain et al. 2010). I suspect that it is the low BMI patients that do particularly badly; I suspect that amongst these are patients who have lost weight or have underlying co-morbidities that probably explain why the outcome is worse. It has been shown in other areas of critical care medicine that patients with higher BMI do better, it's not just after cardiac arrest.

Do you think we have the answers yet on therapeutic hypothermia in cardiac arrest?

The short answer is clearly no. The recently published Targeted Temperature Management trial (Nielsen et al. 2013) has caused some confusion among clinicians. In that study patients were randomised to a target temperature of either 33 or 36°C, and there was no difference in their

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neurological outcome. I think it has left people unsure which target temperature they should be using. Some clinicians feel strongly we should shift to 36°C, others that we should stay with 33°C. I think the message that must come across from that study, and I think all experts would agree, is that we should still continue to use some form of temperature control to prevent hyperthermia in these patients. I still think we have unanswered questions about the optimal temperature and the optimum duration of temperature control. Even if we are going to use targeted temperature control at 36°C, we still don't know the best method to achieve this.

What do you think are the biggest challenges in resuscitation currently?

I would say prognostication in post cardiac arrest patients, because I think we now recognise that we have been testing these patients far too early. Clinical examination, imaging and/or electrophysiological testing is used in an attempt to determine those who have no realistic possibility of a good outcome and therefore to enable us to withdraw active treatment. It now transpires that we have probably been too premature in those investigations and withdrawal decisions, and as time has gone on we are beginning to understand that we really need to give these patients time before we can have tests that are reliable enough to enable us to make these very difficult decisions. Patients are staying longer and longer on intensive care units as we give them time to show signs of recovery.

In hospital the biggest challenge we face today is trying to select which patients are going to benefit from our resuscitation efforts and in which patients we should not attempt cardiopulmonary resuscitation. That is a very difficult area, not least because of the ethical and potential medicolegal issues involved. But it's really important that we try to reserve these therapies for patients who have a realistic chance of returning to a good quality of life.

There has been quite a lot of progress in the technology behind defibrillators. I think we are very close to having defibrillators widely available that are capable of eliminating the chest compression artefact, so that these defibrillators will be able to analyse cardiac rhythms without interrupting chest compressions. Currently, you can't touch the patient while the defibrillator is analysing the cardiac rhythm, but we are now getting to the stage where we have the technology to filter out compression artefact. These devices are capable of reading the underlying rhythm during CPR which means that there will be virtually no pause between compressions and delivering shocks.

Looking at the Chain of Survival, where does most work remain to be done? Can more be done to teach CPR, for example?

The whole concept of the Chain of Survival is important. It's no good just trying to make one link very strong and then forgetting the others. Intensivists will tend to focus on post-resuscitation care but what happens in the first key moments after cardiac arrest is critically important. For out of hospital cardiac arrest, work has to be done at the beginning of the chain, particularly in getting the public trained and prepared to do bystander CPR. It may enable many more people to be prepared to give it a go. We know that if bystander CPR is provided the survival rate is increased by two or three times (Wissenberg et al. 2013). The study from Copenhagen is a really important study (Wissenberg et al. 2013), because it shows that if you can improve many rings of the Chain of Survival you can make an enormous difference; the improvement in their outcomes over the last 10 years is impressive. To some extent this has been shown in other communities as well. What they have done in Denmark most impressively is the increase in bystander CPR rates. They achieved that with a combination of things: for example, they have been very aggressive with their programme for teaching CPR in schools, and I think many European countries are pushing forward with that.

We've had disappointment with this in the UK, where despite a robust campaign, led by the British Heart Foundation and Resuscitation Council UK, including some support from politicians and inclusion in a debate in Parliament, we have failed to get this to be a mandatory part of the school curriculum. It's something we will keep working on.

Another thing I would single out from the Copenhagen study, which all European countries should consider, is that they mandate resuscitation training to enable you to have a driver's licence. That's a clever way of implementing bystander CPR and they are to be congratulated. The other initiative from a European perspective is the European Resuscitation Council's Restart a Heart Day (<http://www.restartaheart.eu>), which is the 16th October each year. The idea is to try and educate and focus people's minds on the importance of CPR, particularly engaging members of the European Parliament, for example, by lobbying for training on CPR in schools.

This interview will appear in an issue on Organisation and Design of the ICU. Could you briefly explain the reasons for and benefits of rapid response teams and cardiac arrest centres?

The rapid response team comes back to prevention of cardiac arrest. The principle of rapid response teams is to have systems in place to identify a patient who is at risk of cardiac arrest and of deteriorating, and having in place a system, which can alert the appropriate people, who then can come along and treat them effectively and stop them from having a cardiac arrest in the first place. It may be that that is the time a 'do not attempt cardiopulmonary resuscitation' decision is made with the patient and their family. The idea is to dramatically reduce the incidence of unexpected cardiac arrests in hospital. There is some evidence that that has already happened. That's how we will start to see much higher survival rates, simply by targeting those that will benefit most and preventing others from having an arrest in the first place.

Cardiac arrest centres are really developing by default, because we are now recognising that many of these out of hospital cardiac arrest patients benefit from early cardiac catheterisation and percutaneous coronary intervention. These patients need to be taken to a centre that has a 24/7 cardiac catheter lab that can provide the best treatment. Of course not all hospitals have that facility, so we're already beginning to see, certainly in the UK and I'm sure in many European countries as well, a situation where the cardiac arrest patient is taken to a hospital with a 24/7 cardiac cath lab and not necessarily the nearest hospital. Intensive care clinicians and neurologists join with the cardiologists in treating these patients. As more and more of these patients are bypassing local hospitals, we effectively build up a cardiac arrest centre network. It is clearly happening, it is just a question of how fast it is implemented internationally.

What should be the priorities for further research into resuscitation?

Prognostication is really important. There is a lot going on there, but I think there's a lot more to be done. I think we need to be getting research to provide evidence for clinical guidelines that can help clinicians and families make very difficult decisions. It is important for patients and for healthcare systems; we should not invest a lot of resources in patients who, sadly, have no chance of quality survival.

Other areas of research that I think should be priorities include pre-hospital airway management in cardiac arrest. That's a whole area that's never been properly studied, so we don't know, even now, whether tracheal intubation or some form of supraglottic airway is the best way to initially manage the airway during cardiac arrest.

The third area, which I hope will be the subject of research, is to determine once and for all whether adrenaline benefits patients in cardiac arrest. I hope we will be doing a very large placebo-controlled trial of adrenaline vs. Placebo for out-of-hospital cardiac arrest in the UK fairly soon. It has been the standard drug for resuscitation for decades, and this is largely on the basis of animal data with virtually no high quality human clinical data.

Some observational studies have suggested that adrenaline given during cardiac arrest actually makes long-term neurological outcomes worse. There have been recent observational studies. It is important to go back to the drawing board and have a very large placebo-controlled trial. I hope that that such a study will get underway soon.

There are many ethical and medicolegal issues around discussing resuscitation with families. Could you comment on these?

I think this is an extremely challenging area, possibly one of the most difficult that I face in my clinical work as an intensive care consultant today. I think that we should be clear about the objectives. Firstly, we should not be offering treatment to patients that will not work, so if we have patients who are sadly coming to the end of their lives, trying to resuscitate them with what is really quite aggressive treatment potentially needing to be followed up with long term intensive care afterwards, should be done only when the patients have a chance of surviving with good quality of life. However, deciding when that time has come is very difficult, and deciding when patients have very little or no chance of survival is not necessarily that easy. So if there is a situation where it is a question of the likely quality of life after a resuscitation attempt, we should discuss what treatment is appropriate, either with the patient if they are well enough, or with the family to try and determine what the patient's views would be. These are the principles in theory. How this is applied in practice in increasingly busy hospitals, with clinicians that are under enormous pressures, is very difficult. I don't think there will ever be easy answers. Of course there are different cultural aspects as well, and inevitably it will be different in every country across the world.

What are your views on family presence during CPR?

The results of the randomised controlled study of family presence during prehospital resuscitation of adults were very interesting (Jabre et al. 2013) and align with the experience we have of parental presence during the resuscitation of children. If relatives were very keen to be present during the resuscitation of an adult, I would be comfortable with that, not least because I'm already used to this when resuscitating children. So far, in my experience, it is uncommon for adult relatives to request to be present during resuscitation.

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