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EUROPEAN RESUSCITATION COUNCIL

Letter to the Editor

# The three dimension model of the out-of-hospital cardiac arrest

**Keywords:** Out-of-hospital cardiac arrest, System, Survival

*Sir,*

Increasing positive outcomes for those patients who suffer an out-of-hospital cardiac arrest (OHCA) is one of the main goals of resuscitation science, as well as that of those people involved in the resuscitation movement.

If we think about OHCA, we can easily identify three dimensions: the patient, the event and the system.

Firstly, regarding the patient, there are different variables that are intertwined, these include, but are not limited to, age, sex, cardiovascular risk factors, comorbidities and medical therapy.

Secondly, with regards to OHCA event, there are a number of factors which may influence patient outcome. OHCA can either be witnessed or not, it can happen during the day or during the night, in public or in a private house and of course the underlying rhythm is fundamental to the likely outcome.

Thirdly, if we think about the whole system, we have a variety of resources which may be involved in managing an OHCA patient. These may include responders such as bystanders, emergency medical services, the hospitals, the wider health services and resuscitation network (professionals, first responders, laypeople, community). How we engage with them and enable them to perform together in case of an OHCA may have an impact of survival.

All these three dimensions are important and all the variables of which they are composed of influence the outcome of the OHCA victim. It is widely known that the outcome will be better if the patient is younger, without comorbidities and medical therapy, as well as the OHCA occurs in a public place and it is witnessed by other persons; in addition the chance of survival are greater if the witness recognizes immediately the cardiac arrest, starts high-quality bystander CPR, uses an AED, EMS response is timely with onward transport to definitive care, such as cardiac arrest centres.

Where these three dimensions intersect each other, the chance of survival is the best (Fig. 1 - left). Viewed in this way, these three dimensions seems to be similar one to each other, but there is a fundamental difference that differentiates one from the others: we cannot change the patient, we cannot change the event, but we can change the system. The system is the only dimension on which we can influence directly by improving every part of it step-by-step to increase the chance of survival of an OHCA patient. The way to act is schematically shown very clearly in the Utstein formula of survival.[1] The more we implement it, the more the ring of the system dimension will be superimposed to the other two dimensions, and, so, greater will be the area of intersection between the three dimensions and the survival of the patient (Fig. 1 - right). This has been demonstrated in various regions globally, where an improvement of the system had led to an increase of the survival.[2–5] We believe that the three dimensions model of the OHCA can be a simple, but efficient way to represent the OHCA challenge. It can help all the people involved in the resuscitation network to better comprehend the importance of the system and stimulate them to improve their local system to improve OHCA survival.

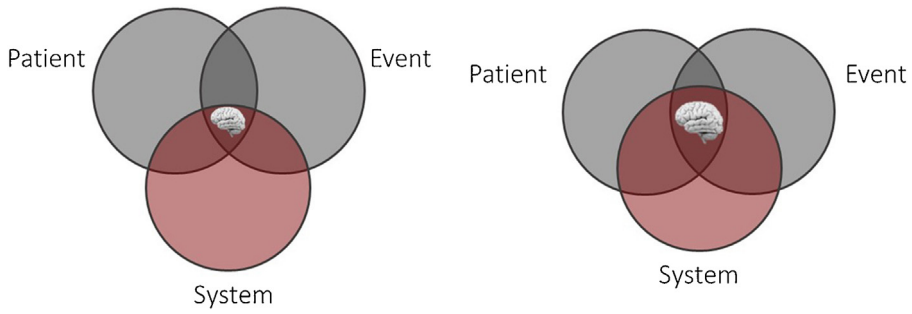


**Fig. 1 – The three dimensions of out-of-hospital cardiac arrest: in the centre the best chance of survival is represented by the intersection of the three dimension and by the little brain. It may increase if the system ring is more superimposed to the other two dimensions.**

## Conflict of interest

None declared.

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