



## Controversy

## Awareness during resuscitation: Where is the data?

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For the last several centuries, efforts at improving outcomes from sudden cardiac death have been challenging [1,2]. Improvements in early defibrillation and cardiopulmonary resuscitation (CPR) techniques have made reanimation from cardiac arrest no longer a rarity. Indeed, over the past 3 decades there has significant emphasis on good quality CPR, either manually or utilizing chest compression systems in order to improve return of spontaneous circulation (ROSC) [3]. In addition to obtaining ROSC, the goal of such techniques has been to improve cerebral blood flow, therefore, the term cardio-cerebral resuscitation (CCR) is now commonly used when referring to modern resuscitation techniques. However, a clinical concern that has been reported about CCR over the last decade, is a series of patients that have reported having awareness during such high-quality techniques [4,5]. This CPR-induced consciousness (CPRIC), is extremely important for emergency practitioners, as a variety of ethical concerns and issues may arise.

In this issue of *The American Journal of Emergency Medicine*, Pourmand and associates elegantly approach this subject by reviewing and analyzing existing studies that have documented CPRIC [6]. A comprehensive review of the literature yielded 123 patients that had CPRIC. What is more important about this paper, is the fact that 40% of the cohort patients had recall of the events that occurred during CPR. In their detailed analysis of existing data, the authors' main conclusion is the need to continue active pathways of research to better understand CPRIC.

The descriptions of awareness during cardiac arrest or resuscitation maneuvers (also called near-death experience or NDE) have been reported for several centuries. Pierre-Jean du Monchaux, in 1740, reported a febrile patient who was about to die that had significant awareness followed by “*he saw an extremely bright light and thought he was in heaven*” [7]. In a comprehensive collection of 150 cases, Moody described NDE in some patients undergoing CPR in 1975 [8]. More recently, Parnia and associates, reported the results of the AWARE (AWAREness during REsuscitation) trial, a four-year, multicenter, observational study of critically ill patients that undergone CPR and survived a cardiac arrest and had NDEs [9]. This study revealed that 2% of interviewed survivors, reported *full awareness* of the events, according to the Greyson's NDE scale.

A major concern for emergency practitioners of CPRIC, is the specific recall of resuscitative events that may include discussions among medical professionals [10]. Ethically, this is a very challenging area, as many clinicians may make inappropriate comments as it pertains to the specific prognosis of the patient (i.e., this patient will die for sure), or the phenotypic characteristics during resuscitation. The long-term effects of this recall are not fully understood.

Presently, there are several studies trying to ascertain how important CPRIC in clinical practice, as well as the effect of this recall on medical professionals providing resuscitation. For example, a Danish protocol is actively collecting data in an attempt to understand cardiac arrest team members perspectives on ethical issues related to awareness during resuscitation efforts [11]. Also, the AWARE II trial, a two year, multi-center observational study that plans to enroll between 900 and 1500 patients, aims to understand the relationship between the quality of brain resuscitation and consciousness, neurological, functional and cognitive outcomes following cardiac arrest [12]. In the AWARE II trial, when an in-hospital cardiac arrest occurs, it elicits a resuscitative effort, then a research team proceeds to the bedside and monitors a variety of neurological parameters. In addition, a computerized tablet placed facing opposite to the patient (bird's eye view), will display a variety of symbols that may be recalled. This is done as many patients have described the sensation of “floating” over the resuscitative efforts. If that was a legitimate event, then recall of the tablet-displayed images would occur.

Over the last few millennia, extensive religious and scientific discussions have tried to ascertain the origin of these NDE. For now, we don't know the specific reason for these phenomena. It is possible that good

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quality CPR may play a role in CPRIC. Moreover, with the advent of newer techniques, including resuscitative endovascular balloon occlusion of the aorta (REBOA) and extracorporeal life support (ECLS), it is possible that we will see more reported cases of CPRIC.

Regardless, the fact is that several patients will recall resuscitative events and very specific details regarding comments made at the time. This is extremely important during resuscitation events and needs to be further studied. Specifically, a series of questions arise: How will the rescuer identify those at risk for the development of CPRIC? Will an amnestic agent need to be administered immediately after ROSC to avoid CPRIC? Clinicians are reminded to be aware of the potential cognizance of these patients during resuscitation and the need for clinical discretion.

### Support

None.

### Conflict of interest statement

The author has no conflict of interest to disclose.

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